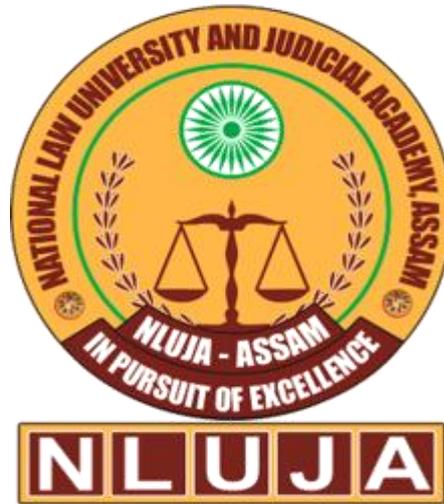


ARTIFICIAL INTELLIGENCE AND INTELLECTUAL PROPERTY RIGHTS:
A FUTURISTIC STUDY



Dissertation submitted to National Law University and Judicial Academy, Assam
in partial fulfilment for award of the degree of
MASTER OF LAWS

Supervised by
Dr. Topi Basar
Associate Professor of Law
National Law University and Judicial Academy, Assam

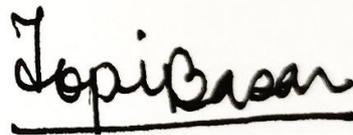
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August, 2020

SUPERVISOR CERTIFICATE

This is to certify that Ms. ANYA BEHERA is pursuing Master of Laws (LL.M) from National Law University and Judicial Academy, Assam has completed her dissertation titled “ARTIFICIAL INTELLIGENCE AND INTELLECTUAL PROPERTY RIGHTS: A FUTURISTIC STUDY” under my supervision. The research work is found to be original and suitable for submission.

A handwritten signature in black ink on a light yellow background. The signature reads "Topi Basar" in a cursive style, with a horizontal line underneath the name.

Dr. Topi Basar

ASSOCIATE PROFESSOR OF LAW

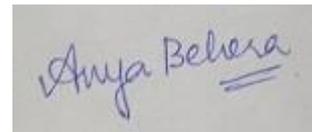
Date: 25.8.2020

National Law University and Judicial Academy, Assam

DECLARATION

I, ANYA BEHERA, pursuing Master of Laws (LL.M) from National Law University and Judicial Academy, Assam, do hereby declare that the present dissertation titled “ARTIFICIAL INTELLIGENCE AND INTELLECTUAL PROPERTY RIGHTS: A FUTURISTIC STUDY” is an original research work and has not been submitted, either in part or full anywhere else for any purpose, academic or otherwise, to the best of my knowledge.

Date: 24.8.2020

A rectangular box containing a handwritten signature in blue ink that reads "Anya Behera".

ANYA BEHERA

SF0219003

ACKNOWLEDGEMENT

I acknowledge with pleasure my Alma mater, National Law University and judicial Academy, Assam for its unparalleled infrastructural support and its rich academic resources.

I am highly elated to work on the topic of “ARTIFICIAL INTELLIGENCE AND INTELLECTUAL PROPERTY RIGHTS: A FUTURISTIC STUDY” under the able guidance of my supervisor, Dr Topi Basar, Associate professor of law, National Law University and judicial Academy, Assam.

First of all I would like to express the deepest gratitude towards Dr Topi Basar, Associate professor of law who has the attitude and substance of brilliance; incessantly and cogently conveyed a spirit of adventure in regard to the dissertation. Throughout the writing of this dissertation I have received a great deal of support and assistance. Without the guidance and persistent help this dissertation would not have been possible. You provided me with the tools that I needed to choose the right direction and successfully complete my dissertation.

Second of all I would like to thank Dr. J. S. Patil, the Honorable Vice Chancellor of National Law University and judicial Academy, Assam for providing me an opportunity to embark on this dissertation and also for sharing his vast knowledge.

Third I would like to express my gratitude to the officials and staff members of National Law University and Judicial Academy, Assam who rendered their help during the period of my dissertation. I want to thank you for your excellent cooperation and for all of the opportunities I was given to conduct my research.

This research work bears testimony to the active encouragement and help of friends, family members and well-wishers.

I am greatly indebted to the various writers, jurists and all other authors from whose writings and literary works I have taken help to complete this dissertation.

PREFACE

With unexpected and unprecedented growth in the field of Artificial Intelligence, I thought of this subject to study the relational development of Artificial Intelligence and IP laws. The basis for this research originally stemmed after getting to know the huge development which is taking part in the Artificial Intelligence sector and the change which is taking place in other sector due to the development in the Artificial Intelligence. In this dissertation named Artificial Intelligence and Intellectual Property Rights: A Futuristic Study, we will see that with the development in Artificial Intelligence has it invaded to Intellectual property rights. Will Artificial Intelligence would really get any protection under the IP regime. As Artificial Intelligence is a huge sector in itself we will focus on the legal provisions provided to them under the IP regimes. There is a need to discuss the future of Intellectual Property Rights along with Artificial Intelligence in the upcoming years.

In truth, I could not have achieved my current level of success without a strong support group. First of all, my parents, who supported me with their love and I was also benefited from debating on this issue with them which helped me throughout my dissertation. Secondly, my guide has supported me throughout the dissertation process. Thank you all for your unwavering support.

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1852- British Patent law
1856 -Patent Act of India
1889- Indian Merchandise Act
1914- Indian copyright act.
1938- UK Trademark act
1940- Trademark Act
1957- Indian copyright act
1970-Indian Patent Act
1977- Patents Act of UK
1988- Copyright, Design and Patents Act
1999- Trademark Act
2000- Semiconductor Integrated Circuits Layout Design Act
2000- The Design Act

TABLE OF ABBREVIATION

| | | |
|-----|--------------|--------------------------------------------------------------------------|
| 1. | ABC | Atanasoff-Berry Computer |
| 2. | AI | Artificial Intelligence |
| 3. | AGI | Artificial General Intelligence |
| 4. | AIR | All India Report |
| 5. | ANN | Artificial Neural Network |
| 6. | Art. | Article |
| 7. | ASI | Artificial Super Intelligence |
| 8. | AWS | Amazon Web Services |
| 9. | BC | Before Christ |
| 10. | BIRPI | United International Bureaux for the Protection of Intellectual Property |
| 11. | CT | Computed tomography |
| 12. | CPU | central processing unit |
| 13. | DAG | Direct Acyclic Graph |
| 14. | DRL | Deep Reinforcement Learning |
| 15. | DNA | Deoxyribonucleic acid |
| 16. | EPO | European Union Office |
| 17. | ETAs | Estimated times of arrival |
| 18. | EU | European Union |
| 19. | GANs | Generative Adversarial Networks |
| 20. | GDPR | General Data Protection Regulation |
| 21. | GP | Genetic programming |
| 22. | GPS | Global Positioning System |
| 23. | IBGC | Institute for Business in the Global Context |
| 24. | IBM | International Business Machine |

| | | |
|------------|----------------|------------------------------------------------------|
| 25. | ICSE DB | International Child Sexual Abuse Data Base |
| 26. | ILSVRC | Image Net Large Scale Visual Recognition Challenge |
| 27. | IOT | Internet of Things |
| 28. | IP | Intellectual Property |
| 29. | LIT | Language Interpretability Tool |
| 30. | ML | Machine Learning |
| 31. | NLP | Natural language processing |
| 32. | Ors | Others |
| 33. | PC | personal computer |
| 34. | PETA | People for the Ethical Treatment of Animals |
| 35. | PETs | Privacy-Enhancing Technologies |
| 36. | R&D | Research and Development |
| 37. | SBI | State Bank Of India |
| 38. | Sec | Section |
| 39. | SOTA | State of Art |
| 40. | SSG | Sir Sayajiro Gaekwad |
| 41. | TM | Trademark |
| 42. | TRIPs | Trade Related Aspects of Intellectual Property Right |
| 43. | UK | United Kingdom |
| 44. | URL | Uniform Resource Locator |
| 45. | USA | United States of America |
| 46. | WTO | World Trade Organisation |
| 47. | WIPO | World Intellectual Property Organisation |

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CHAPTER 1

1.1 INTRODUCTION:

“Artificial Intelligence is a fundamental risk to the existence of Human Civilisation. Artificial Intelligence is a technique of getting machines to work and behave like Humans.”¹

“Artificial intelligence” in general defined as “an expression commonly used to designate those kinds of computer systems that display certain capabilities associated with human intelligence, such as perception, understanding, learning, reasoning and problem solving.”²

“Artificial Intelligence is the development of Computer System that are capable of performing task that normally require human intelligence such as decision making, object detection and so on. Artificial Intelligence covers domain name such as Machine learning , Deep learning ,Neural network, Natural language processing, Object detection, Knowledge based expert system ,Solving complex problems, Increased accuracy and Perform High level computation.

Artificial Intelligence has been able to accomplish this by creating machines and robots which have been used in wide range of field including health care, robotics, marketing, business Analytics and many more. However, many Artificial Intelligence applications are not perceived as Artificial Intelligence because we often tend to think of Artificial Intelligence has Robots doing are daily course. But the truth is Artificial Intelligence has found its way into our daily lives. It has become so general that we don't realise the wondered that at we use this all the time. For, instance have you ever wondered that Google is able to give you such accurate search Result. Face book feed gives you content based on your interest and to these entire question is Artificial Intelligence.”³

It was a much awaited desire of human to replicate his behaviour through a machine were machine can behave like a human there comes the branch of study Artificial intelligence. Different ancillary subjects like Machine learning , deep learning, data mining have came up to support AI. Other computer based development networking; artistic approach to replicate human behaviour is also part of AI intelligence. The input data required to program the computer were gathered from ML and kept in database warehouse. These data are classified, analysed, and then used through neural networks to solve desired problems.

Artificial intelligence is engineering, science and artistic. Human curiosity to make a perfect machine which can think and act like human in parallel to human or better than him. The engineering part of the AI is the machine and the hardware, the science is the behaviour and to provide sufficient intelligence through programs to behave like human and the artistic part is pertaining to look, expression, emotion and visible behaviour of

¹ Artificial Intelligence and Intellectual Property| WIPO Magazine, [https://www.wipo.int/wipo_magazine/en,\(5/4/2020\)](https://www.wipo.int/wipo_magazine/en,(5/4/2020)).

²“WIPO conversation on Intellectual Property and Artificial Intelligence,” https://www.wipo.int/edocs/mdocs/mdocs/en/wipo_ip_ai_ge_19/wipo_ip_ai_ge_19_inf_4.pdf (Last accessed on April 5, 2020).

³Swapnil Tripathi and Chandni Ghatak , “Artificial Intelligence and Intellectual Property Law,” <http://journals.christuniversity.in/index.php/culj/article/view/1873> (Last accessed on April 5, 2020).

the AI system. In 1943 Walter Pitts and Warren McCulloch's work in AI field was recognised as the first work in the field of AI. In the other hand John von Neumann was known as the founder of AI. The nuclear bomb project was one of the major works of John von Neumann with assisted AI. Later in 1960 the term AI intelligence was coined and used in general. John Mc Carthy wrote a paper "Programs with Common Sense" which discussed to find out a solution for general problems through AI. Next two decades the development of AI was not much due to computer companies and programmers were busy in developing computational capacity of systems and AI was not given much importance. During 1974 a system named MYCIN was developed to diagnose bacterial infection. The treatment suggested by the system was better than medical practitioners. AI has deep rooted into different fields which includes Robotics, Speech processing, Evolutionary computation, Neural network, Natural language processing, Data mining, Machine Learning, Ontology, Genetics programming and Nanotechnology.

With growing technology, faster computational capacity of computer and launching of new language and software made a easier path for AI to achieve a sustainable growth. From specific small works like playing games, helping in business out sourcing, choosing the best lot, ecommerce to larger area like medical diagnosis, Deep sea exploration, space research and complex creative works are now produced by AI systems. With this the legal status of authorship, creativity responsibility needs to be fixed by intellectual property laws. With exceptional growth in AI the protection under the legislation of IP Laws is the need of the day.

1.2 STATEMENT OF PROBLEM: The problem for this Dissertation is related to the concept of Artificial Intelligence and its relation with Intellectual Property Laws .To also find out whether the creator and inventor of AI will come under the ambit of IPR and we will also see that in future can Artificial Intelligence supersede Human Intellect. The problem is also in relation to the proper legal framework of Artificial Intelligence and its relations with Copyright and Patent. The authorship, creativity credits are still controversial under Indian Judicial legislation. The non human original creator or the assistance towards the work has not been recognised as a legal person in present Copyright Act, 1957.The paper will deal with the controversy between the creator and the machine that who would actually get protection. With technological development AI is going to play a major role in generation of work. The process to recognise the authorship of AI auto generated or partly assisted work needs to be considered as part of creative process. The paper will also deal with the liabilities faced due to infringement and will AI be responsible for the infringement. With that we will also see will AI receive any incentive for his work.

1.3 AIM(S): The aim of this Dissertation is to show the advancement of Artificial Intelligence and also Artificial Intelligence in relation to Intellectual property Rights. The Effect of Artificial Intelligence's in the Intellectual Property Right regime. The aim is to look into the development of Artificial Intelligence in IPR with respect to the present scenario and also to study the current and evolved situation of the Copyright and Patent with respect to Artificial Intelligence. New technologies, creative work, invention in the field of AI are

encouraged for sustainable economy. The IP system should take care of this. This also shall focus on patents and its relevance to Artificial Intelligence.

With rapid technological development in AI it has been recognized and accepted by society so fast that our legal system has not yet coped up with that number of questions are yet to be answered "Who is the author of a painting made by machine using Artificial Intelligence?" As AI system involves high end computation use of data mining it requires a huge investment therefore it is the demand of return on huge investment to protect the AI system through proper IP Laws or legislation to protect future development of AI. In case of infringement the innovator/creator should be compensated through proper copyright or patent grant. There is a vital need to look into the emerging field of law in connection with the machines. The whole Intellectual property laws need to evolve and cope up with the emerging world.

1.4 OBJECTIVE(S):

This Dissertation sets to achieve following objectives:

1. The target is to search that will AI be recognized as natural person.
2. To study AI and its impact on the IPR regime.
3. To analyze the protection given to AI created works under Copyright Law.
4. To analyze the protection given to AI invented works under Patent Law.
5. To show the liability and responsibilities faced by the Artificial Machine when there is any infringement.
6. To analyze the impact of AI enabled technologies on innovation and creativity.
7. To bring out the much needed and relevant legal provisions in this regard.
8. To study the importance of AI in the 21st Century Era.

1.5 SCOPE AND LIMITATION:

The scope of this Dissertation is limited to the following subject-matter:

- a) Understanding the history and development of Artificial Intelligence and its role, advantages and disadvantages.
- b) Understanding the key challenges faced by Artificial Intelligence when they want protection under Intellectual Property Right regime which includes Copyright and Patent.
- c) Analyzing the provisions and legal frameworks relating to Artificial Intelligence and AI in relation to Intellectual Property Right.
- d) Understanding the various regulations followed in international and national set ups.

1.6 LITERATURE REVIEW

This Dissertation will review the following literatures for understanding the topic under study:

- “Copyright and Artificial Intelligence” by Ishan Sambar in this article the author has discussed about the crucial features in Artificial Intelligence with that the author has also given a detailed study of ownership given to AI works under copyright. This has been explained broadly in chapter 5 of Artificial Intelligence and Intellectual Property Rights: A Futuristic Study.
- “Theory of Corporate Personality” by Naveen Singh Thakur and Divya Singh in this article author has tried to explain about Corporate personality , whether corporate is a legal entity or not. The author has given detailed study of Characteristics of Corporate personality and also about all the different kind of theories of corporate personality. This concept has been well explained in Chapter 7 of Artificial Intelligence and Intellectual Property Rights: A Futuristic Study.
- The article by Sunil Kumar “Advantages and Disadvantages of Artificial Intelligence” in this article the author has discussed about the Risk and benefits involved in Artificial Intelligence. This has been adopted in Chapter 2 of Artificial Intelligence and Intellectual Property Rights: A Futuristic Study.
- “Copyright protection for computer software an Indian perspective” by Sugandha Nayak in this article the author has focused on the protection given to software in India under copyright. Will computer program per se can be copyrightable or originality is important all are present in this paper. This has been adopted in Chapter 5 on Artificial Intelligence and Intellectual Property Rights: A Futuristic Study.
- “Artificial Intelligence and The Copyright Dilemma” by Kalin Hristov in this article the author has focused on the recent boom in the Artificial Intelligence. The author has emphasised on non-human authors in all the creative works recently made. The computer programmes, algorithm, learning from machines and data mining are the new source of creativity. In this the author has tried to reinterpret the concept of employee’s and employer’s relationship rather than redefining “authorships”. The reinterpretation of this concept would give a better view in understanding authorship. This has been adopted in Chapter 5 on Artificial Intelligence and Intellectual Property Rights: A Futuristic Study.

- The author A Karthiyani in her “Artificial Intelligence and Intellectual Property in India: Is it Time for Renaissance?” in this article the author has discussed about the definition and concept of Artificial Intelligence, relation between copyright and patent with respect to Artificial Intelligence, all the legislations related to IPR which has implications to AI works in India. And there is a high recommendation in amending the present laws and making new laws which would help AI system to function properly. This has been adopted in Chapter 5 as well as in Chapter 6 of Artificial Intelligence and Intellectual Property Rights: A Futuristic Study.
- The author Erica Fraser’s “Computers as Inventors-Legal and Policy implications of Artificial intelligence on Patent” law in this article it gives a detailed description on Patent with respect to Artificial Intelligence. This tells us about Computer assisted and computer- generated patent text, policies involved in it , legal reliability, inventive steps, criteria of patentability and patent subject matters, Artificial Intelligence used as tools in the inventive process, Artificial neural networks, technology involved in it, Autonomous computer- generated invention and so on. In this author has tried to give a detail study of patent in Artificial Intelligence. This has been adopted in Chapter 6 of Artificial Intelligence and Intellectual Property Rights: A Futuristic Study.
- “Artificial intelligence and copyright- The Authorship” by Lucy Rana in this article the author has focused on authorship. Author has discussed about the disputes in case of ownership between the author and the AI in copyright, the matter of liability in case of infringement and has also given a wide view of Indian scenario with respect to Indian legislation. This has been adopted in Chapter 5 on Artificial Intelligence and Intellectual Property Rights: A Futuristic Study.
- “Thinking About Thinking Machines: Implications of Machine inventors for patent law” by Liza Vertinsky & Todd Rice in this article the author has focused on the challenges faced by the patent system due to the establishment of the thinking machines, challenges between inventor and inventions, challenges faced due to sudden and speedy change in technology and also challenges faced during the test of novelty and non-obviousness. The author has also given few recommendations to be done in the legislation regarding the patent system and Artificial Intelligence. This has been adopted in Chapter 6 of Artificial Intelligence and Intellectual Property Rights: A Futuristic Study.
- “Opportunities and challenges for Artificial intelligence” by Shivaram Kalyanakrishna, Rahul Alex Panicker In this article the author discussed about opportunities in development in AI, risk involved in that as well as safeguards and framework. This has been adopted in Chapter 1 and 8 on Artificial Intelligence and Intellectual Property Rights: A Futuristic Study.

- W.A. Copinger, Law of Copyright: With a new introduction by Ronan Deazley, Professor of Law, University of Glasgow. First Edition of “A Standard Book on the Law of Copyright” Reprint of the first edition. “A standard book on the law of copyright was published by W.A. Copinger [1847-1910] in 1870. It deals very fully with the history and the statute law as to literary copyright; as to Crown and university and college copyright; as to musical, dramatic, and artistic copyright, and copyright in designs; as to international copyright and copyright in foreign countries; and as to agreements between authors and publishers. The merits of the book are proved by the fact that it reached a ninth edition in 1958.” -William S. Holdsworth, History of English Law XV 299-300 WALTER ARTHUR COPINGER [1847-1910] was a barrister-atlaw of the Middle Temple. This has been adopted in Chapter 3 of Artificial Intelligence and Intellectual Property Rights: A Futuristic Study.
- “Generating Rembrandt: Artificial Intelligence, copyright and accountability” by Shlomit Yanisky Ravid In this article the author says that “This Article addresses the questions of the copyright ability of artworks generated by AI systems: ownership and accountability. The Article debates who should enjoy the benefits of copyright protection and who should be responsible for the infringement of rights and damages caused by AI systems that independently produce creative works. Subsequently, this Article presents the AI MultiPlayer paradigm, arguing against the imposition of these rights and responsibilities on the AI systems themselves or on the different stakeholders, mainly the programmers who develop such systems”. This has been adopted in Chapter 5 of Artificial Intelligence and Intellectual Property Rights: A Futuristic Study.
- “Intellectual property” by Elizabeth Verkey in this book the author has explained the history of Intellectual property, How India became a part of TRIPS, about the history and current scenario of copyright, patent and trademark. This has been adopted in Chapter 3 of Artificial Intelligence and Intellectual Property Rights: A Futuristic Study.
- “The importance of Robotic technology in engineering industries, medical and radioactive environment” by Dr. Nagarathinam in this paper thoroughly discusses the classification of robots, important parts of the robots and the application of Robotic technology in the present era to reach the phase where the industries will have less human intervention. Also an emphasis is given on understanding the basic design and methodology of the robots. This has been adopted in Chapter 6 of Artificial Intelligence and Intellectual Property Rights: A Futuristic Study.
- “AI created works and copyright” by Takashi B. Yamamoto in this paper the author has discussed about copyright, may and should AI works be protected by copyright and the author also discussed

about copyright and the age of Artificial intelligence. This has been adopted in Chapter 5 of Artificial Intelligence and Intellectual Property Rights: A Futuristic Study.

1.7 RESEARCH QUESTIONS:

This paper will try to find appropriate solutions of the following research questions-

1. Whether Machine and Robots (Artificial intelligence) doing Human function can be treated as natural person?
2. Whether the creations/inventions made by AI would come under the scope of creator/inventors under the Copyright and patent regime?
3. Whether the works made by AI/AI Agent would get any incentives or reward?
4. Whether jurisprudential study of few theories of rights can be applicable to AI?
5. Whether AI be held responsible for any infringement?
6. Whether human will be affected in future due to the increase development in Artificial Intelligence, will it be a threat to Human intellect?

1.8 HYPOTHESIS:

1. The existing IPR regime is well suited to provide adequate legal protection to Artificial Intelligence.
2. There is a need for sui generis law for protection of Artificial intelligence.
3. The developments in AI will have wide ramifications on human intellectual creativity and innovation.

1.9 RESEARCH METHODOLOGY:

The research method that is followed in this seminar paper is Legal Doctrinal method. However, Historical Method is also applied to the extent for studying the historical background of Artificial Intelligence and in order to analyze the efficacy of its implementation. This method is also used to define the relation of Artificial Intelligence and Intellectual property rights. For this paper doctrinal method is been utilized, as the researcher make utilization of different articles, journal, etc. By using different sources and articles the researcher has tried to find out the current scenario of Artificial Intelligence in relation to Intellectual property rights. As mentioned in bibliography. Researcher has utilized essential sources of information collection from primary and secondary sources. Researcher has followed Bluebook 19th version for citation and footnoting all through the researcher paper.

1.10 RESEARCH DESIGN

The research pattern of this seminar paper includes the following structure:

- a) Chapter-1:Introduction
- b) Chapter-2: This Chapter basically introduces to the History of Artificial Intelligence and the basic concepts, role, advantages and disadvantages involved in Artificial Intelligence.
- c) Chapter-3: This Chapter elaborates the Intellectual property regime and a brief description of its relation with Artificial Intelligence and also includes the role of AI in the working sphere of IPR.
- d) Chapter-4: This Chapter explains will ever Machine and Robots doing Human function can be treated as natural person.
- e) Chapter-5: This Chapter tells us about the protections given to a machine with AI under the copyright regime. And the issues rising with respect to AI.
- f) Chapter-6: This Chapter shows the protection given to Artificial Intelligence in relation to Patent regime, development related to it and problems faced by AI under IPR.
- g) Chapter-7: This Chapter includes jurisprudential analysis of Artificial Intelligence in relation to IPR.
- h) Chapter-8: This Chapter would analyze if AI a future replacement to human brain or human.
- i) Chapter-9: This Chapter would provide Conclusion, findings and suggestions.

CHAPTER 2

2.1. HISTORY OF ARTIFICIAL INTELLIGENCE

In between 380 BC and to the late 1600, there were various techniques used for mechanizing human thoughts into a non living human being. This thing was done by various mathematician, philosophers, professors and authors. The various techniques which were used for mechanizing human thoughts where mechanical techniques, calculating machines and numeral systems.

The Era of Greek mythology started around 700BC, In Greek mythology, stories about artificial intelligent creatures takes people back to the event of the Ancient Greeks. Hephaestus was basically the child of Zeus and Hera. He was Vulcan to the Romans. Metal was the essential commodity for the development of his creations. He not only made the primary lady, Pandora but also made exact metals robots. The blacksmith of Olympus was Hephaestus. Hephaestus's also robotized drinks trolley.

In the early 1700, during early times of 1700 there was a wide discussion in the literature and where literature has depicted the Machines of similar character to that of a computer. In year 1726 "Gulliver Travels" was written by Jonathan Swift⁴ in his book they have specified a device which is called "engine". In this era of modern days technologies are used widely, specifically computers which is basically an engine. This device make life easy by improving knowledge and mechanical operation to that extent that it makes a least talented person look skilled. All these were done with help and knowledge of a non -human mind.

Towards the end of 1700, Charles Babbage⁵ was a Victorian academic and inventor and was the first to design computer. Though this computer design was incomplete but in year 1991 a computer was built using his design and it is also said that it could have also worked in that Victorian Era.

Basic mathematical function was carried out by the Babbage difference engine which was designed in 1822 and General purpose Computation was carried out by analytical engine which design was never completed.

Ada lovelace⁶ created few algorithm for analytical engine though this design was not completed. There is still controversies regarding her contribution in the Babbage's work but still it is said that she might not be the first programmer but was definitely be first programmer Debugger.

In the year 1818, the lead actor of Mary Shelley's Frankenstein decided to employ scientific methods and equipments as old as during year 1988. Samuel Butler in his novel "Erewhon" coined the ideas of future machines which would be capable of conscious decision making capability.

2.1.1. THE EVOLUTION THAT TOOK PLACE DURING THE PERIOD OF 1920- 1930

The famous Czech play writer Karel capek ⁷, penned a scientific fictional novel the "Rossum's Universal Robots" during the year 1920-21 where from initial knowledge of robot or machine doing mimic work of human was recognized by the society this imagination further put into different study and research. The basic

⁴ Patricia Bauer, "Gulliver's Travels", <https://www.britannica.com/topic/Gullivers-Travels>.(Last accessed on June 7, 2020).

⁵ http://www.bbc.co.uk/history/historic_figures/babbage_charles.shtml. (Last accessed on June 7, 2020).

⁶ Eugene Eric Kin & Betty Alexander Toole, ADA AND THE FIRST COMPUTER , Vol.280, 1999, pp. 76-81.

⁷Michael E. Moran, "Rossum's Universal Robots: Not the Machines", <https://www.liebertpub.com/doi/abs/10.1089/end.2007.0104>. (Last accessed on June 8, 2020).

concept of display was factory made artificial people called Robots. All the robots made had a human appearance and also had the ability to think. After this lot many stories were written using such concept. And in the year 1921 people took the robot Idea and implemented it into their research, art and discoveries.

In the year 1927 Fritz Lang, directed a science fictional film “Metropolis” which featured a robotic girl and the robotic girl was not easily distinguishable from that of a human beings .This was the first on screen depiction of robot and which also gave inspired others to introduce other non human character in art work such as Star Wars character that is why this film holds a greater significance in the history of Artificial Intelligence.

In the year 1929, Gakutensoku⁸ was created by a Japanese biologist and professor Makota nishimura. This had a feature which included moving of hand, nodding of head, movement of legging, adopting different facial expression . It basically translated “learning from the laws of nature” implying the robot’s artificially intelligent mind which is derived through data mining and collection from different machine point which translated behavior of human and nature as well.

After 10 years in 1939, Atanasoff-Berry Computer was created by John Vincent Atanasoff⁹. ABC at the capacity to solve upto about 29 simultaneous linear equations and weighing huge 700 pounds

2.1.2.THE ERA OF ALAN TURING FROM 1940-1960

After Second World War, the man understood the importance of collaborating the need of organic beings with functioning of machines. This was possible due to technological advancements. A pioneer in cybernetics, Norbert Wiener’s¹⁰ in his research emphasized on combining mathematical flow theory, electronics engineering and system automation as "a whole theory of control and communication, both in animals and machines".

The computer based on biological neuron with Mathematical flow work was developed by Warren McCulloch¹¹ and Walter Pitts¹² in the year in year 1943 they were the brain behind artificial neuron networking model.

⁸ Dr. D. Nagarathinam, “The Importance of Robotic Technology in Engineering Industries, Medical and Radioactive Environment”, <https://www.irjet.net/archives/V7/i1/IRJET-V7I1269.pdf> (Last accessed on June 10,2020).

⁹ Prof. Kiril Boyanov,“John Vincent Atanasoff-The Inventor of the First Electronic Digital Computing”, https://www.researchgate.net/publication/242757126_John_Vincent_Atanasoff_the_inventor_of_the_first_electronic_digital_computing. (Last accessed on June 10, 2020).

¹⁰ N. Katherine Hayles, “Designs on the body: Norbert Wiener, cybernetics, and the play of metaphor”, <https://journals.sagepub.com/doi/abs/10.1177/095269519000300204>. (Last accessed on June 10,2020).

¹¹ Gualtiero Piccinini, “The First Computational Theory of Mind and Brain: A Close Look at Mcculloch and Pitts’s “Logical Calculus of Ideas Immanent in Nervous Activity””, https://www.researchgate.net/publication/263265620_The_First_Computational_Theory_of_Mind_and_Brain_A_Close_Look_at_Mcculloch_and_Pitts's_Logical_Calculus_of_Ideas_Immanent_in_Nervous_Activity. (Last accessed on June 11, 2020).

¹² Ibid.

In year 1949, “Giant Brains: Or Machines That Think” was written by Edmund Berkeley¹³, a Computer scientist, in which he said that with increase in speed and skill the machines are becoming capable of managing huge data’s. He also stated that machine and human brain is very much similar, machine has hardware like chips and IC and the connectivity either by the wire or wireless in place of flesh and nerves of human and is very much capable to think on its own. Thus, a machine, therefore, can think. There was a rule demonstrated by Donald Hebb¹⁴ known as Hebbian learning which mainly focused on updating of rules for modifying the connection of strength between neurons.

2.1.3. DEVELOPMENT IN THE YEAR OF 1950-1960

John Von Neumann ¹⁵ was the founder of this technology. During 19th century all the logic was based on decimal system where the conversion of different data to computer compatible format was difficult. Then came the binary system where all logics were converted into 1 or 0 which was best suited format for computers. After widely use of binary system in computer the advanced architectures were made into contemporary computers and computers were programmed to achieve pre determined results.

English mathematician Alan Turing pioneered Machine learning in the year 1950. He published the famous Turing “Computing Machinery and Intelligence,” which proposed the idea of The “Imitation Game” for the first time. The century old question of thinking capability of machine matching with that of human being was taken by Alan Turing later this was called the The Turing Test where the ability and capability of thinking process of AI system with human being is measured. Later the Turing Test became a major component in accessing the capability , ability , intelligence , consciousness in AI systems.¹⁶

In 1952: A computer scientist, Arthur Samuel, developed a checkers-playing computer program.

In year 1955: "Logic Theorist" was the first artificial intelligence computer program was co-authored by researcher Allen Newell , the economist Herbert Simon, and the programmer, Cliff Shaw.

In year 1956: it was believed that the Computer scientist John McCarthy ¹⁷ from USA was the first to adopt the word "Artificial Intelligence" which Marvin Minsky defines as "the construction of computer programs that engage in tasks that are currently more satisfactorily performed by human beings because they require

¹³Alonzo Church,“Edmund Callis Berkeley. Giant brains. Or machines that think”, <https://www.cambridge.org/core/journals/journal-of-symbolic-logic/article/edmund-callis-berkeley-giant-brains-or-machines-that-think-john-wiley-sons-new-york-chapman-hall-london-1949-xvi-270-pp/77E4C0968AB4DAB87A6AE9BB58ACB4C5>.(Last accessed on June 12, 2020).

¹⁴Richard E. Brown, “The Life and Work of Donald Olding Hebb”, http://www.ant-tnsjournal.com/Mag_Files/15-2/15-2_p127.pdf. (Last accessed on June 12, 2020).

¹⁵ P.R. Halmos , “The Legend Of John Von Neuman”, 80 JSTOR(1973),p. 382

¹⁶ Varol Akman & Patrick Blackburn, “Alan Turing and Artificial intelligence”, 9 JSTOR (2000),p.391.

¹⁷ V Rajaraman, “John McCarthy- Father of Artificial Intelligence”, <https://www.ias.ac.in/article/fulltext/reso/019/03/0198-0207>(Last accessed on June 12, 2020).

high-level mental processes such as: perceptual learning, memory organization and critical reasoning.” John McCarthy and a team of men created a proposal for a workshop on “artificial intelligence.”

It is believed during conference in 1956 the word “Artificial intelligence” was coined even though the summer conference of 1956 was only a workshop attended by six people which was essentially based on formal logic.

In the next decade with the growth of computational power in computers there was a rapid growth in the field of artificial intelligence where the related and ancillary subject of AI like Robotic, Automation, Programming languages were recognised by society at a large. Then with the use of AI with different field the popularity has been established in the society and the importance of AI is recognised.

In the year 1964, a computer scientist named Daniel Bobrow, developed ‘STUDENT’, which was a natural language processing this helped in solving algebra word problems. This AI program is written in LISP.

Joseph Weizenbaum ¹⁸ a professor and computer scientist created ‘ELIZA’ in the year 1965 where the computer can interact in functional English with a person within a limited manner. The professor intends to demonstrate the communication skill and difficulties in between humans and artificial intelligent mind. It was found this conversation is pre decided and superficial.

In the year 1968, Stanley Kubrick directed The sci-fi film *2001: A Space Odyssey*. It basically features a sentient computer named HAL (Heuristically programmed Algorithmic computer). HAL manages the interaction between with the ship’s crew and the spacecraft’s systems. A professor of computer science, Terry Winograd developed natural language computer program named SHRDLU.

2.1.4. IN 1970 THE MAIN FOCUS WAS ON THE FIRST AI WINTER (1974-1980)

WABOT-1¹⁹ is the first intelligent humanoid robot which was built in Japan In year 1972 This had features including moveable hands, legs and head and had ability to image recognition (vision) and ability to interact with human. During 1974-1980 the interest in AI was in decreasing trend due to major research funding were diverted to other field. This lean period of activity is called AI winter duration.

Star Wars directed by George Lucas was released in the year 1977. This film featured a humanoid robot that is designed as a protocol droid that is C-3PO. This is also “fluent in more than seven million forms of communication.” R2-D2 – a small, astromech droid who is incapable of human speech was also featured in this movie. R2-D2 functions include co-piloting star fighters and small repairs. It is the inverse of C-3PO.

James L. Adams, mechanical engineering graduation student in 1961 developed Stanford Cart, a remote controlled, TV-equipped mobile robot. Hans Moravec added the sliding of TV to this created robot in the year

¹⁸ Lawrence Switzky, “ELIZA Effects: Pygmalion and the Early Development of Artificial Intelligence”, 40 JSTOR (2020), pp.50-68.

¹⁹ Dr. D. Nagarathinam, “The Importance of Robotic Technology in Engineering Industries, Medical and Radioactive Environment”, <https://www.irjet.net/archives/V7/i1/IRJET-V7I1269.pdf> (Last accessed on June 12,2020).

1979. Without human interference the Stanford cart crossed a room filled with chairs for a period of 5 hours. This was the early demonstration of driverless autonomous vehicle.²⁰

2.1.5. IN 1980 THE MAIN FOCUS WAS ON THE SECOND AI WINTER (1987-1993)

In this period funding was stopped for AI as it was very cost effective as well as the results was not up to the mark. In the year 1988 “Probabilistic Reasoning in Intelligent Systems” was published by Judea Pearl a famous Computer scientist and philosopher. Bayesian networks, a “probabilistic graphical model” was developed by him this basically represents sets of variables and their dependencies via directed acyclic graph (DAG). In the year 1990 programmer and inventor of two chatbots, Jabberwacky and Cleverbot, Rollo Carpenter developed Jabberwacky to "simulate natural human chat in an interesting, entertaining and humorous manner." This is an example of AI via a chatbot communicating with people.²¹

2.1.6. AI's GROWTH FROM 2000-2010

During year 2000 one robot on partial theory of mind AI was developed by Professor Cynthia Breazil of Massachusetts institution of Technology, USA. Kismet the robot was capable of delivering facial emotion in response to recognition of human facial signal. The facial structure of kismet was similar to human like eyes, lips, ears, nose, eyebrow, eyelid, cheek movements Cynthia has discussed about these robots in her book “Designing social Robot”.

Hanason robotic Ltd created human like robot called Sophia which is a rare combination of engineering, science, artistry. Sophia is capable of image recognition. It gives human expressions in response to human interaction. These robots are partial achievement in theory of mind AI which needs further research and ultra fast computing system and may be better bioengineering.

Watson super computer of IBM which is using expert system approach in combination with machine learning and natural language processing also comes under Narrow AI or Weak AI.

The Deep blue super computer programmed to play chess was developed by IBM is a reactive machine. Deep Blue plays chess against human champions. The super computer was programmed with an ability to identify the chess board, the rule, the movement detail of the each of the member on the board moreover to predict move against the move of the opponent and predict a best move possible as a reaction to the move of a human opponent. Deep blue super computer played matches with grandmaster Garry kasparov. In a series of matches played in the year 1996-1997 between Garry kasparov and the super computer, the computer defeated the grand master and established the superiority of AI.

²⁰ Shaan Ray, “History of AI” , <https://towardsdatascience.com/history-of-ai-484a86fc16ef>.(Last accessed on June 13, 2020).

²¹Gary Yang, “The History Of Artificial Intelligence” , <https://courses.cs.washington.edu/courses/csep590/06au/projects/history-ai.pdf>. (Last accessed on June 13, 2020).

Major breakthrough in year 2006 with the help of AI system the autonomous understanding of text was developed by group of computer scientist head by Oren Etzioni. From there the term machine reading came into the world of AI. The companies in social media like Face book and Twitter started using machine reading in their business. In the mean time in 2009 Google has developed a driverless car. Then came Smartphone with voice assistance, image recognition, finger print recognition etc has made AI the part of life.

During 2010-2011 annual AI object recognition competition the Image Net launched (ILSVRC)²² ImageNet Large Scale Visual Recognition Challenge with the help of AI system. During this annual object recognition competition the ILSVRC was made available publically for open competition where there aim was to map all the object in the world which can be latter recognized by computer system.

Google's OKGoogle, Amazon's Alexa , Iphone's Siri has brought AI to individuals home. All these machines are used to make the conversation very natural, appropriate and based suited to the request made by human which is logical and better for the society. All these virtual assistant, personal assistant, home assistant were developed to deliver in narrow AI concept where the AI system is utilized to give the output with the reference to a data base and data mining made from the available known sources. Number of companies engaged in different businesses like transportation, marketing, communication, health care are creating new devices using deep learning, Big-data, machine learning. The future is of super intelligence were AI systems can take concise decision in the future.²³

2.1.7. EXPECTATIONS FROM AI IN 2021 AND THEREAFTER

The growth in the field of Artificial intelligence is unprecedented and unexpected. With the trend the past decades the future swing will be upward and very high. The following subset ares of AI needs to be kept under watch beyond 2021:

- **Chatbots + virtual assistants:** Seamless, predictive, readymade customized reply for customers query by chatbot, voice assistance, visual assistance, robotic automation for higher and pleasing customer experience.
- **Natural language processing (NLP):** The predictive, interactive, communication of machine to man needs to be smoothened by enhancing NLP abilities for AI assisted apps, including (and especially for) chatbots and virtual assistants.
 - **Deep Reinforcement Learning (DRL):** In a research from standard ford university the complexity in modeling human motor control process and predictive human movement to make

²² Olga Russakovsky, "Image Net Large Scale Visual Recognition Challenge", https://www.researchgate.net/publication/265295439_ImageNet_Large_Scale_Visual_Recognition_Challenge. (Last accessed on June 13, 2020).

²³John Soma & Yasmin Shanker, "History of Artificial intelligence", <https://www.law.du.edu/documents/privacy-foundation/history-of-artificial-intelligence.pdf>. (Last accessed on June 14, 2020).

AI assisted system behaving more natural as human being. This is the future model in Nero mechanical simulation in human locomotion control.²⁴ This model in future will make machines to move like human. The team is hoping to make a competition on learn to move which will attract researcher from different filed to improve Human musculoskeletal models. Adopted in SOTA DRL technique. Some of the games like Go and ATARI games have been enhanced to super human performance with the help of DRL.

- **ML algorithm for quantum devices:** A team of researcher from university of oxford deep mind and other university proposed a new machine learning algorithm for quantum devices to improve the performance time which is faster than human. The researcher suggested the algorithm is now in a primary stage which can be put to tune quantum devices with diverse configuration where the quantum devices are automatically tuned up by the AI.²⁵
- **NLP Model:** The input in natural language processing and the output after interpretation has got a wide gap and unexpected result in some case in a recent research by Google the problem is tackled through open source platform called Language Interpretability Tool. This is a tool kit. This is based on user interface has following major functions.²⁶
 - (a) Switching over between different data set and local hypothesis.
 - (b) Visual comparison between two model or two data set.
 - (c) Local explanation is supported with rich visualization and prediction. This allows addition of new data at any time and the effect is visible.
 - (d) The analysis the matrix and flexible slicing is also supported.
- **Safety and privacy for AI inference system :** A new technology on AI inference system called Privacy-Enhancing technologies(PETs) which will harness appropriate security protection for AI model of customer data. Here all the cloud service providers, data base ware houses needs to be provided with such security system to protect the data privacy and the interaction between user institutions and regulation authorities. Here the deployment of trust worthy AI inference will solve the future issues associated with data privacy and IP protection.²⁷

²⁴Fangyu Cai, <https://syncedreview.com/2020/08/21/using-deep-rl-to-model-human-locomotion-control-in-neuromechanical-simulations/> (Last accessed on June 14, 2020).

²⁵ Yuan Yuan, <https://syncedreview.com/2020/08/21/new-ml-algorithm-tunes-quantum-devices-faster-than-human-experts/> (Last accessed on June 14, 2020).

²⁶ Reina Qi Wan, <https://syncedreview.com/2020/08/17/google-introduces-nlp-model-understanding-tool/> (Last accessed on June 14, 2020).

²⁷ Michael Sarazen, <https://syncedreview.com/2020/08/14/advancing-safety-privacy-for-trustworthy-ai-inference-systems/> (Last accessed on June 14, 2020).

- **Machine Learning and Automated Machine Learning:** With enhanced computational capability there will be a shift toward Automated ML algorithms to allow developers and programmers to solve problems without creating specific model or fixed method.
- **Self driven vehicles:** The human less, automated, hands free driving is a dream of every human being. Therefore, self-driving vehicles, is understood to be safe and there will be a stronger push to automate the process of driving the vehicle from the point X to destination point Y to destination Z.
 1. Save on the cost of human labor,
 2. Optimize of process of purchase-shipment-arrival to consumer through auto self-driving vehicles. The involvement of human is reduced for better productivity in lesser time.

2.2. ARTIFICIAL INTELLIGENCE

Computer science had developed with more computational capability and data management. The human intelligence has been simulated within a computer formulating the sequence of task performed by human the activities like planning, learning, problem solving, and decisions making repetitive working were achieved with programmable functions of AI. AI is a predominating branch of computer science. AI takes input from machine learning, Big data management or data mining and High speed computational capability of computer system. Algorithm or set of programmes were developed and fed to the computer and AI systems where the system learns through the machine learning and gathers the required data there by progressively the task is delivered better. The basic difference between software and AI is that AI system has capability to learn and adopt but software has fixed characteristics. AI in campuses wide variety of subject from deep sea navigation to simulation of human landing on Mars. AI has transformed the business capabilities, job automation, accurate prediction in production planning and least path delivery in logistic system.

With different variety of functionality and usability AI can be categorised broadly in two categories. Other related field to AI can be categorised as subset of AI. These areas are natural language processing, big data management, machine learning, robotics etc.

2.3. TYPES OF ARTIFICIAL INTELLIGENCE

Artificial Intelligence type I

On the basis of capability of the system this can be divided in to Narrow AI, General AI and Super AI.

1. Narrow AI or Weak AI

- Narrow AI is engaged in performing specific or dedicated task with intelligence. This type of AI is the most common AI used in smaller machines.

- This AI is not capable of performing beyond the limitation or the field of specialisation. This is programmed/trained for specific task therefore this type is called Narrow AI or Weak AI. This may fail in beyond its working limit.
- It operates in the predefined range. Apple's Siri, Google's OK Google , Amazon's Alexa are some examples of Narrow AI. Siri has got more predefined functions. Watson super computer of IBM which is using expert system approach in combination with machine learning and natural language processing also comes under Narrow AI or Weak AI. In general computer playing chess, self driving cars, speech recognition, finger print or image recognition, purchasing suggestion on e commerce or other site are some of the prominent example of Narrow AI or Weak AI.
- Narrow AI or Weak AI is designed to perform singular or specific task which is goal oriented and presently successfully realised and recognised by society. This may appear to be intelligent doing the complex task of human. AI does not replicated human intelligence rather it stimulates, calculates, and formulates human behaviour based on limited parameters and functions.
- During Last decade with development in enhanced computational capabilities Narrow AI or Weak AI has experienced numerous break through by machine learning and deep learning with big data management and machine learning presently AI systems are used in medical diagnostics of critical diseases where extreme accurate predictions are made. With the development of Natural language processing the speech recognition and text in natural language has been made automated rather free from human interference where AI is programmed to interact with other human in a natural and personalised manner.²⁸

Examples of Narrow AI or Weak AI

- IBM's Watson
- Manufacturing and drone robots
- Self driving cars
- Email spam filters/ social media monitoring tools for dangerous content
- Image/facial recognition software
- Siri by Apple, Alexa by Amazon, Cortana by Microsoft and other virtual assistants
- Disease mapping and prediction tools
- Entertainment or marketing content recommendations based on watch/listen/purchase behaviour
- Rankbrain by Google/ Google Search

²⁸ "Narrow AI", <https://deepai.org/machine-learning-glossary-and-terms/narrow-ai> (Last accessed on June 14, 2020).

2. General AI

- General AI is engaged in performing intellectual/ intelligent task like human.
- Artificial General Intelligence (AGI) normally referred as strong AI or deep AI. This can think understand and act like a human for a given situation which cannot be distinguished. Till date the strong or General AI is under development. Full swing research is underway for developing machines with General AI.
- Here to simulate human understanding, emotions, believe, thought process, reaction to event are the different non achievable areas. The level of intelligence and different quotient like emotional quotient, spatial quotient need to be understood and integrated to machine through programming.
- For mapping human brain major research are still going on to understand and create model of general intelligence matching to human understanding and human ability to gathering knowledge and application of the same in different problems.
- But the days are not far where general AI will be next level possibility. Strong AI was achieved by the fastest super computer named K built by Fujitsu. Fujitsu A64FX Post-K supercomputer is the world's fastest Arm processor.²⁹

3. Super AI

- Super AI is engaged in performing any task better than human where the machine will surpass the human intelligence.
- Super AI is next level of outcome of general AI. The Super AI is still a hypothetical concept but it is expected that Super AI will be capable of thinking, reasoning, solve puzzle, communicate to own self, plan, learn and the most amazing to make judgements.
- The Artificial Super Intelligence (ASI) need not understand human intelligence or behaviour rather machines become self aware, intelligent, capable of thinking and ability to take decision.
- ASI will not simply replicate, duplicate, copy some work of human being rather it will perform better than any human in all works of life or activities of human like learning, hobbies, sports, emotional relationship and medicine. In general understanding ASI should have more memory and much faster ability to process or compute and act. In future when the problem solving capabilities and decision making ability of super intelligent AI will be more superior then human beings there is a unknown and uncertain fear of the ASI's impact on human being. This may lead to a new age of living where the survival of human race is under question.³⁰

²⁹ Rebecca Reynoso, "Artificial Intelligence" , <https://learn.g2.com/hub/artificial-intelligence> (Last accessed on June 14, 2020).

³⁰ Ibid.

Artificial Intelligence type II

On the basis of functionality of the system this can be divided in to four categories:

1. Reactive Machines

- The most basic type of Artificial Intelligence was the machines reacts to some command is a reactive machine.
- In this AI system the event is not recorded or the system doesn't store the data for referring in the future action.
- Search machines are programmed to work on current situation and to react for the best possible reaction.
- All interactive gaming by machines are classified in to reactive machine.
- The Deep blue super computer programmed to play chess was developed by IBM is a reactive machine. Deep Blue plays chess against human champions. The super computer was programmed with an ability to identify the chess board, the rule, the movement detail of the each of the member on the board moreover to predict move against the move of the opponent and predict a best move possible as a reaction to the move of a human opponent. Deep blue super computer played matches with grandmaster Garry kasparov. In a series of matches played in the year 1996-1997 between Garry kasparov and the super computer, the computer defeated the grand master and established the superiority of AI.
- Google's Alpha Go were this system defeated the world champion is basically a reactive machine.
- Reactive machine are programmed to function for here and now and react to predefined task.³¹

2. Limited memory

- With keeping data for the past activities and the present data for a short period of action utilised for simple tasks are called limited memory machine.
- This type of machine is designed to store data from the external factor for a limited time period to fulfil their functions.
- Waymo the self driving car is one of the best examples under limited memory AI system. This car stores data forming a limited memory bank of database to store nearby objects speed distance from other car deviation from referred route speed limit, traffic rule, navigation parameter, moreover switching from human dependency to self drive.

³¹Rebecca Reynoso, "Main Type of Artificial Intelligence" , <https://learn.g2.com/types-of-artificial-intelligence> (Last accessed on June 14, 2020).

- This limited memory AI system accumulates the past observation then learns from it to build an experimental knowledge. These experimental knowledge along with pre-programmed object oriented deliveries the self driving car forms the basic working method for the self driving cars. With the limited memory the system reaction time reduces sharply which made limited memory system more advantageous than reactive machines and acceptable and recognised by society.³²

3. Theory of mind

- It was a wild thinking machine will understand the emotion, belief, fear, respect and behave like human is categorised as AI “Theory of mind”.
- This Theory of mind is still under development. The human emotion, belief, thought processes are under study and formulation which can be a part of this AI.
- The prominent constitute of these AI is decision making ability which will be equal to the decision of human mind considering human emotion and other capabilities In this class of machines are expected to understand human thought and emotions which will replicate the machines thought process human interaction in the society is one of the major challenge to this AI system where the machine need to identify, recognise, understand, analyse, retain, remember and produce a desired output best suitable with all references. This should equal to human like social behaviour.
- The Theory of mind AI based machines need to use information/data derived from people’s behaviour and adapt in to their learning, methods and means of communication and treatment to different situation. This system must be capable of shifting behavioural and emotional pattern as per the situation like human this suggest this machine should be adaptable to ultra fast learning so that desired emotion can be expressed.
- During year 2000 one robot on partial theory of mind AI was developed by Professor Cynthia Breazil of Massachusetts institution of Technology, USA. Kismet the robot was capable of delivering facial emotion in response to recognition of human facial signal. The facial structure of kismet was similar to human like eyes, lips, ears, nose, eyebrow, eyelid, cheek movements Cynthia has discussed about these robots in her book “Designing social Robot”.
- Hanason robotic Ltd created human like robot called Sophia which is a rare combination of engineering, science, artistry. Sophia is capable of image recognition. It gives human expressions in response to human interaction.
- These robots are partial achievement in theory of mind AI which needs further research and ultra fast computing system and may be better bioengineering.³³

³² Ibid.

³³ Felp Roza, “Theory of Mind and Artificial Intelligence”, <https://towardsdatascience.com/theory-of-mind-and-artificial-intelligence-231927fabe01> (Last accessed on June 14, 2020).

4. Self awareness

- This is the future AI system called Self awareness AI
- The major characteristic of this AI will be super intelligent; they have their own sentiment, own consciousness, self awareness and judicious thinking.
- It is expected this system will be smarter and faster than human mind.
- This is still a concept but it is a future where machine can take better decision than human.
- This system will not deliver a matching emotion rather it will understand the feeling and reciprocate the best appropriate emotion as an output from the machine. This is the future of AI.³⁴

2.4. ADVANTAGES OF ARTIFICIAL INTELLIGENCE

- **Reduction of human errors**

Humans have a tendency to do mistakes and cannot be hundred percent true and correct. But in that case computers if programmed properly will not make any mistakes. Inaccuracy and inefficiency of humans mainly tends to human errors and human doing any sort of errors is naturally inevitable. Human errors can also lead to loss of life and property but in case of AI they basically reduce error as they are based on information's previously gathered and by applying certain set of algorithms error can be removed. Fortunately, artificial intelligence helps in reducing human errors and the reaching accuracy is easier and not impossible. The most important purpose of A.I. is to reduce human casualties in Wars, Dangerous Workspaces, Car Accidents, Natural Disasters.

Example: Artificial intelligence doing weather forecasting has reduced human errors and has reached accuracy and it is easier for AI to do this.³⁵

- **Available 24 into 7**

Human being and Human brains are built in such a way that it requires refreshment and break. Scientific research also says that human mind can concentrate for 45 minutes and then again it requires break of at least 10 minutes to rejuvenate itself. Human requires weekly break as they have to balance between both personal and work life and average human can do work for 4 to 6 hours but in that place AI can work for day and night for months and even without taking rest and do not require any break as humans does.

³⁴ "How to Build a self conscious machine", <https://www.wired.com/story/how-to-build-a-self-conscious-ai-machine/> (Last accessed on June 14, 2020).

³⁵ Tyron Stading, "The role of Artificial Intelligence and IPR", <https://www.ipwatchdog.com/2017/07/27/role-artificial-intelligence-intellectual-property/id=86085>. (Last accessed on June 15, 2020).

Example: Education institutes and helpline centers are getting many queries and issues which can be handled effectively using AI.

- **Daily application**

Now a days for searching any location, for taking a selfie or making a phone call or replying to a mail and many more we normally use our voice to communicate with few applications such as in case of Apple it is “Siri” in case of Windows it is “Cortona” and in case of Google it is “Ok Google”. These applications have made life easier and have become a part of daily life. For instance if we have to check today's weather so we can ask Google directly to check the weather by saying OK Google what is the weather so Google would say what is the weather , what is the exact temperature , is its sunny or rainy and the weeks weather report is also provided.

And then if you take an example of any place if we say directly OK Google where is Kolkata so Kolkata location will be shown it will be visible in Google Map, what is the distance between your place and Kolkata this will also be visible, what is the weather conditions and what is the best route to be taken everything will be provided. But 20 years ago this was not the way Google used to work. Artificial intelligence has made this easier and convenient and less time consuming for a person.³⁶

- **Faster decision**

When any human makes any decision they analyze before making any decisions they think emotionally as well as practically but in case of AI they think faster, the analyze faster as per the programming they have been set up in and they deliver faster result than that of human and I will always provide you a faster decisions than that by a human.

Example: If we see any kind of chess games in computer it is nearly impossible to beat CPU in hard mode because of AI behind that game because it took the best possible step in very short time according to the algorithm used behind it.

- **Takes risk instead of humans**

Human efficiency is affected due to the emotions that human beings have but in case of a machine which lacks emotion and it only runs on logic so it can take more risk than that of a human .let it be going to Mars or defuse a bomb,explore the deepest part of ocean ,mining of coal and oil it can be used effectively in any kind of natural or manmade disasters. In lots many cases robots can be used in case

³⁶Sunil Kumar, “Advantages and Disadvantages Of Artificial Intelligence” ,<https://towardsdatascience.com/advantages-and-disadvantages-of-artificial-intelligence-182a5ef6588c>. (Last accessed on June 15, 2020).

of humans to avoid any kind of risk. In case a robot has been programmed in such a way that it can defuse a bomb, this would in return get into higher risk and save thousands of life and with less error and maximum accuracy.³⁷

- **Medical Application**

To improve the efficiency of statements and to avoid cause by minimizing the risk of false diagnosis. There is a need of increasing the integration of tools in everyday medical applications. AI has begun transforming in the field of surgical Robotics wherein it has enabled the evidence of robots that perform semi automatic surgical task with increasing efficiency. AI is not going to replace doctors it will rather help them by providing the relevant data need to take care of patients. Such as history of high blood pressure, history of smoking, prior pulmonary embolism, cancer or any kind of coronary blockages as this information would take long time to collect.

- **New inventions**

Human by using AI can solve measures Complex problems would provide extra help to the humans and not replace human rather it provides help to human. Example: Recently, doctor can predict breast cancer in women at early stage using advanced based Technology.

- **Potential Impacts on Society**

AI has spread over almost all gadgets used by human in the society all the gadgets are interlinked. The acceptance is increasing day by day. It is expected AI will rule in all sphere of life from human birth, education, sports, literature performing art, medical diagnosis and to the coffin.³⁸

2.5. DISADVANTAGE OF ARTIFICIAL INTELLIGENCE

- **Unemployment**

AI as a machine can work for more hours in comparison to a human. AI machine can work without taking break. So, the industries are trying to replace humans by machine. This would lead to huge problem in future. And the future generation will face unemployment. AI machine will create unemployment.

³⁷ Ibid.

³⁸ Tyron Stading, "The role of Artificial Intelligence and IPR", <https://www.ipwatchdog.com/2017/07/27/role-artificial-intelligence-intellectual-property/id=86085>. (Last accessed on June 15, 2020).

- **Making Human Lazy**

AI machines are making human addicted to effortless work. AI with its high tech mechanical application is making the humans lazy. This would lead to problems in future.

- **It can be wrong**

AI machines are mostly 100% accurate but in case of sensitive issues if it goes wrong it may lead to disastrous situation. It does not have any emotions or ability to sense sensitive responsibility. Though still the error caused by AI is low then that of the humans.

- **AI programmer for vested interest**

As in the case of dynamite it was created for breaking mounts to lay roads and for mining. But we used dynamite technology to create bombs for killing, damaging human beings and properties similarly AI system can be programmed to enhance the capability of weapons and more accurate target can be achieved with development in AI in other technical field it is expected there will be obvious utilization of AI systems in areas and fields working against human society like weapon, spy work and keeping watch on others may increase in the future.³⁹

- **The AI system programmed through destructive methods to achieve targeted goal**

It is not only the deliveries, targets, achievements, are considered to be simple number by present weak and referral AI. Let us analyze the movement of a person in a driverless vehicle to reach an airport with shortest possible time the obedient car with AI may take you to airport with a abnormal high speed which may not be comfortable to the rider. The rider may vomit. In implementing or planning bigger projects like power plant. The existing AI system will not look into either the ecosystem or the impact of power plant in the near y society. Here AI will miss the damage of our ecosystem and threat to the human society.

³⁹“Benefits & Risks of Artificial Intelligence”, <https://futureoflife.org/background/benefits-risks-of-artificial-intelligence/?cn-reloaded=1>. (Last accessed on June 16, 2020).

- **No Emotion**

Though AI works more efficiently than that of the humans but still fails to connect emotionally with the team. Human bond can only be achieved by humans and machine cannot get well connected. Team management requires human bonding which only humans can develop.

- **No Original Creativity**

AI machine works according to their settings. AI machines cannot think out of the box. They do not have the ability to be creative and think outside their program. Even though AI has been developed in creative fields, it still lacks original creativity. It depends on the developer how well the AI has been programmed. AI can do intelligent things but are unable to explain the program by themselves.⁴⁰

2.6. ROLE OF ARTIFICIAL INTELLIGENCE:

- **Unbelievable Accuracy rate**

Google search and Google photos will be the most appropriate example to define the point of accuracy which gets better day by day as using data from continuous use. The AI system achieves higher accuracy rate through deep neural network. To achieve better results, the system needs to dive into data and select patterns of users.

- **Add up intelligence**

Using integration of AI capability, the existing product and their uses are improved which can be merged together with data mining and ML to improve the product or the service through AI system.

- **Handling of data in a proper manner**

The Big-data management and data mining through ML and self-learning, the AI system makes appropriate algorithms to bring out the best results. Present days number of companies like Amazon, IBM, Google are engaged in different data analysis techniques which will give a competitive advantage for designing better data sets analysis.

- **Updating to newer algorithms**

Structured data helps AI continuously to learn newer algorithms available to it where newer experiences can be acquired through new skills. Proper and appropriate algorithms are important in AI

⁴⁰ Ibid.

system to solve specific problem or certain cases. Introduction of the new models help AI, AI on its own learns through added data and training.

- **Continuous learning process**

AI carries out automated and high volume computerized tasks. Through the help of Deep Learning, AI system gathers in depth information in connection with specific problem then learns from it through deep reinforcement learning. As AI is still not in a position to make query like human so the human inquiry in any subject makes sense. And this must be a learning channel for AI system. The better analysis of data for a predefined work which will provide deeper understanding of the related problem the more layers of neural network needs to be uncovered with the help of technology.

- **Understanding will be deep**

With the tuning of quantum devices through new machine learning algorithm the automated random search can be made 180 times faster.⁴¹

2.7. DATA MINING OR DATA SOURCING

Data collections or data mining are a basic requirement for decision making whether in government, corporate or AI system. Different governments and corporate a numerous amount of data and information are collected from different sources. These data's are stored in data warehouse here the concerned is the use of the stored data by different agencies. Data mining are done through extracting data from the data warehouse using different technologies. Here the information about the person and the privacy is at risk. Most of the countries don't have required legislation to protect the privacy and use the information as well. IBM has developed a method of data mining where the individual privacy is protected and the data mining model is kept intact the method is called Privacy-Preserving Data Mining. In this method the personal information of the consumer is randomised before it is transmitted to the second level thereby the privacy of the person is protected and data is being available for use.⁴²

- **Ethical Concern**

The data or information collected by authorities without knowledge of use of the data. The person whose data is being collected, stored or utilised regarding people are not aware of neither any permission is taken from the person or any reason given to the person for use of his data. The use of data without permission of the person concerned is not ethical and considered illegal therefore, a proper

⁴¹“Will artificial intelligence replace human intelligence”,<https://www.softscripts.net/blog/2018/07/will-artificial-intelligence-replace-human-intelligence> (Last accessed on June 16, 2020).

⁴²“Data Mining the Privacy and Legal Issues Information Technology Essay”, <https://www.ukessays.com/essays/information-technology/data-mining-the-privacy-and-legal-issues-information-technology-essay.php> (Last accessed on June 16, 2020).

legislation has to be made that data mining to be morally neutral the data should be used for right purpose and for betterment of the society.

- **Security Concerns**

The storage of used data and retrieval of the same for data mining need to be secured the data mining methods and techniques should be secured enough. The companies handling data warehouses should have continuous monitoring data accessibility. Random accessibility must be restricted. Data mining company should not trade data between different interest group without proper permission. Security and data leakage aspect of data mining need to be address through technology and legislation.

- **Data Integrity**

When different data and information is stored in a pre defined format or method this will be suitable for further retrieval and analysis. Data mining tools should ensure data integrity and consistence throughout the data base. Data integrity will ensure future use and will assist in security of the data base. Proper legislation may be made for accessing the data base in different mode where the date of viewing, date of change, date of deletion, deleted data, are being kept in separate file and monitor.

- **Regulation**

As per Indian laws, Section 43A of the IT Act “requires a body corporate possessing or handling sensitive personal data or information in a computer resource to implement reasonable security practices and procedures to protect such information from unauthorized access, damage, use, modification, disclosure or impairment.”

CHAPTER 3

3.1. INTELLECTUAL PROPERTY REGIME AND A BRIEF DESCRIPTION OF ITS RELATION WITH ARTIFICIAL INTELLIGENCE

In earlier Era, people were not aware of the concept of property. People who were into creating new things did not commercialize it on large-scale. They kept all their profits to themselves. The craftsmen were afraid of being exploited. They were also unaware of the fact that chattels and movable are recognised as property. With time Technology got advanced and there was development in Science. Thus, there was a need of the publication of such knowledge. This led to the protection of that person whose knowledge is published. The creator has used his knowledge and intellect. So, they should get protection. Thus, this also says that those published knowledge is tangible and becomes a property. Intellectual property has no value until and unless it becomes tangible. Idea will not be considered as intellectual property, ideas when well expressed it gets the protection. It is basically the right provided to the person who has used his mental ability to create something new. The right of ownership is provided so, that nobody can exploit his work without his consent. Through providing rights the creators can restraint others from using their work and can get a monopoly right over his product. IP refers to certain kind of exclusive right or Monopoly right to intellectual capital, some forms of which can expire after set period of time and other forms of which can last indefinitely.⁴³

According to WIPO “Intellectual Property refers to creation of mind, such as inventions, literary and artistic work, design and symbols, names and images used in commerce. IP is protected in law by, for example patent, copyright and trademark which enables people to earn recognition or financial benefit from what they invent or create. By striking the right balance between the interests of innovators and the wider public interest, the IP system aims to foster an environment in which creativity and Innovation can flourish.”⁴⁴ Intellectual Property is an intellectual work, which is created using the human intellect of the creator. Beside labour and capital the most important factor is knowledge, skill and originality of the creator. Intellectual Property can be branched into two categories, one is ‘industrial property’ which includes patent, industrial designs trademarks, etc and the other one is ‘copyright’ which protects artistic work, musical, literary work, etc.

The WTO-TRIPs, which is the most important treaty accepted by the largest number of nations till date, lists seven Intellectual Property Rights:

- Trade Marks & Trade Names Service Marks
- Copyright and Related Rights,
- Geographical Indications,
- Industrial Designs,
- Undisclosed Information,

⁴³ Elizabeth Verkey, INTELLECTUAL PROPERTY, 2015, pp. 1-3.

⁴⁴ “Intellectual Property Services”, <https://www.wipo.int/services/en/>. (Last accessed on June 16, 2020).

- Patents,
- Layout Designs of Integrated Circuits

3.1.1. COPYRIGHT

Indian copyright law is closely related to the British copyright law .In the ancient times, monk used to copy the manuscript, which was only limited to the religious work. Copying of the manuscript was a slow & time tacking process. First scholars to be recognized as author of their work were scholars of Roman Empire and Ancient Greece. But these scholars were not entitled with any economic rights.

When there was development related to printing it was important to provide copyright protection. Protection made duplication by mechanical process of the literary work easier and less time consuming. This lead to the growth of a new business of printing and book selling in England. The Republic of Venice was the first to grant privilege to print books. The government chose a method to establish this printing business as the ‘London Company of stationer’⁴⁵ under public sector editorship. Thus, stationers got royal monopoly over all printing in England.

In year, 1709 ‘The statute of Anna’ was made to be the first Copyright Statute of England. This statute put an end to the monopoly and focused more on the concept of author, author being the first and soul owner of the work and also provided terms of protection. It is important that the work has to be published to get protection under copyright.

The original literary, musical, artistic, or performing art work is the brainchild of its creator or author. The author or the creator has the legal possession on its creation. These works are highly appreciated by more number of people therefore it is highly priced thus; there is a need to give protection through national or International Convention relating to copyright.⁴⁶

Berne convention for the protection of literary and artistic work was the first international convention made on copyright in the year 1886. The basic aim of the convention was to provide protection to the nationals and the countries that have ratified the convention. Basically to have proper access to work and the to keep a check on unlawful use and to collect payment in time and to get full advantage of the work that they have created. In your 1893 BIRPI was formed basically it was the merger of both Paris and Berne conventions .This latter became WIPO and went through constructional and structural changes.⁴⁷

The first statutory law and copyright of India was established in the year 1847. This was enacted during the East India Company regime. The next amendment was done in the 1911 which was applicable to all British colonies along with India. Both 1847 and 1911 were repealed .1914 act was enacted by modifying the

⁴⁵ Benjamin Kalpan, AN UNHURRIED VIEW OF COPYRIGHT,1967.

⁴⁶ Gramophone Co. of India Ltd v. Birendra Bahadur Pandey, (1984)2 SCC 534 (India).

⁴⁷ W.A. Copinger, LAW OF COPYRIGHT , 2008.

provisions given in 1911 and added more related provisions to make it applicable in India. In year 1957 copyright act of 1940 was replaced by the new Indian copyright act 1957.⁴⁸

3.1.2. TRADEMARK

Trademark is an old concept which was seen during the Harappan Civilization. Through the process of registration the trader can achieve exclusivity on his product. The trader gets the right to deal in goods using a symbol or mark or some sort to distinguish his goods from that of another. These rights cannot be transferred to anybody. Thus can only be licensed Limited users.⁴⁹

Indian Merchandise Act, 1889 was the first act in India with respect to Trademark. Then it was followed by Trademark Act 1940. Act of 1940 was based on UK Trademark act 1938. This act got replaced by Trademark Act, 1958. As India was a party to the agreement on Trade Related aspects of Intellectual Property rights. India had to follow the guidelines of TRIPs and enacted the new legislation in 1999. The trademark Act 1999 deals with registration, protection and infringement. In case of trademark registration is not compulsory. According to Trademark Act, 1999 under sec 2(zb)

"Trademark means, a mark capable of being represented graphically and which is capable of distinguishing the goods or services of one person from those of others. Trademark also means a registered trademark or a mark used in relation to goods or services for the purpose of indicating a connection in the course of trade between the goods or services and some person having the right either as a proprietor or by way of permitted uses to use the trademark."⁵⁰

3.1.3. PATENT

The concept of patent dates back to ancient times. During the reign of Queen Elizabeth this system was introduced. IP laws emerged under the Elizabeth era was in the form of Royal favors granted by the king or the Lord of the land to the introducers of new technique. The introducer could use this favor for a stipulated period of time. To facilitate the author/creator to protect his patent in number of countries at one time, during the first international treaty on patent rights at Paris convention in year 1883 it was covered under the treaty that the complete protection in one country will be applicable in other countries for the intellectual work made by the author or creator.

The 1856 Patent Act of India was based on the British Patent law of 1852. The first Patent in India was granted in 1856 to George Alpha deepening of Calcutta for his invention called "An efficient Punkah -Pulling machine. In 1856 the innovator could enjoy the rights for 14 years. There were series of Act which got replaced by the 1957 Act in which government appointed Shri Justice N.Rajagopal Ayyangar to examine and make changes

⁴⁸ Elizabeth Verkey, INTELLECTUAL PROPERTY, 2015, pp. 1-3.

⁴⁹ Ramdev Food products (P) Ltd v. Arvindbhai rambhai patel,(2006) 8 S.C.C 726 (India).

⁵⁰ Trademark Act , 1999.

in the patent law. Then finally in 1970 the patent law was passed which came into force on 20th April, 1972 but after India became member to TRIPs in year 1995, 3 major amendments took place. First was in 1999, then in 2002 and the last amendment was in 2005. The Patent Act, 2005 was the Act which was completely according to the TRIPs guidelines. Patent proposes intellectual solution for an intellectual issue. Patent is mainly applicable to those innovations which fulfils certain conditions known as minimum threshold of patentability. S.2 (m) "patent" means a patent for any invention granted under this Act. Patent is a domestic rights which can be applicable only in the country where it is granted. Patent have restricted term of 20 years checked from the date of filing the patent application.⁵¹

3.1.4. GEOGRAPHICAL INDICATION

Geographical indication is a new form of intellectual property recognized by the TRIPs (Art. 22). According to Sec 2.(e) of The Geographical indications of goods act, 1999⁵² geographical indication, in relation to goods, means “an indication which identifies such goods as agricultural goods, natural goods or manufactured goods as originating, or manufactured in the territory of a country, or a region or locality in that territory, where a given quality, reputation or other characteristic of such goods is essentially attributable to its geographical origin and in case where such goods are manufactured goods one of the activities of either the production or of processing or preparation of the goods concerned takes place in such territory, region or locality, as the case may be.”

A Geographical Indication (GI) is a sign used to identify the place of origin and the method of production to identify the originality and the reputation on the specific goods. ‘Geographical indications’ have matured into an independent IPR combining appellations of origin (characteristic qualities on account of peculiar geographical environment) and indication of source (a sign indicating that a product originating in a country, region, etc.), together with special treatment to wines and spirits. Some examples of geographical indications are: Nagpur oranges, Dehradun Basmati rice, Darjeeling tea, Champagne, Sambalpuri print of Orissa, India.

3.1.5. TRADE SECRETS (UNDISCLOSED INFORMATION)

Trade secrets are form of intellectual property recognized by the TRIPs (Art. 39). Under Art 39 of TRIPs “Member States shall protect ‘undisclosed information’ and shall provide natural and legal persons with the

⁵¹Vijay Pal Dalmia, “Patent laws in India”, <https://www.mondaq.com/india/patent/656402/patents-law-in-india--everything-you-must-know#:~:text=The%20present%20Patents%20Act%2C%201970,relating%20to%20Patents%20in%20India.&text=An%20invention%20relating%20to%20a,can%20be%20patented%20in%20India.> (Last accessed on June 17,2020).

⁵² The Geographical indications of goods Act, 1999, No. 48, Acts of Parliament, 1999.

possibility of preventing information lawfully within their control from being disclosed to, acquired by, or used by others without their consent in a manner contrary to honest commercial practices. Undisclosed information gets recognition as a kind of IP that needs to be protected under the TRIPs Agreement.”

“In India Trade secrets are protected under contract law or under the equitable doctrine of breach of confidentiality. It is common to insert clauses which are confidential in nature in technology transfer or other license agreement so that the confidential nature of the subject matter is maintained, not only during the employment period of the employees and contractors but also after its termination, though for a fixed period of time. The skill, knowledge and experience of a particular profession can also be protected in certain circumstances from misuse through contractual obligations.”

3.1.6. DESIGN

The Industrial Designs are recognized as new form of intellectual property by TRIPs. In the (Art. 25) of TRIPs an industrial design is considered as the aesthetic or ornamental aspect of an article. This design may be of three dimensional or of two dimensional including industrial drawing and patterns. The visual appeal of a product by different industrial design will differentiate and establish the better aspect of the product.

Sec. 2(d) of The Design Act, 2000⁵³ design means “only the features of shape, configuration, pattern, ornament or composition of lines or colours applied to any article whether in two dimensional or three dimensional or in both forms, by any industrial process or means, whether manual, mechanical or chemical, separate or combined, which in the finished article appeal to and are judged solely by the eye; but does not include any mode or principle of construction or anything which is in substance a mere mechanical device, and does not include any trade mark as defined in clause (v) of sub-section (1) of section 2 of the Trade and Merchandise Marks Act, 1958 or property mark as defined in section 479 of the Indian Penal Code or any artistic work as defined in clause (c) of section 2 of the Copyright Act, 1957.”

3.1.7. LAYOUT DESIGN

‘According to Sec. 2(h) of Semiconductor Integrated Circuits Layout Design (SICLD) Act 2000 (India) layout design means a “layout of transistors and other circuitry elements and includes lead wires connecting such elements and expressed in any manner in a semi conductor integrated circuits.”⁵⁴ Semiconductor Integrated circuits (‘chips’) are creations of human mind, which are used in large number of products, like computers, T.V., smart phones and watches, etc. According to Sec.2(r) Semiconductor Integrated circuits means a “product having transistors and other circuitry elements which are inseparably formed on a semiconductor material or an insulating material or inside the semiconductor material and designed to perform an electronic circuitry function”.⁵⁵ Application for registration related to Layout-Designs of integrated circuits is filed in the

⁵³ The design Act , 2000, No. 16,Acts of Parliament, 2000.

⁵⁴ Semiconductor Integrated Circuits Layout Design (SICLD) Act, 2000,Acts of Parliament,2000.

⁵⁵ Ibid.

office of Semiconductor Integrated Circuits Layout-Design Registry. All the matters for example jurisdiction, examination, issuing of certificate related to layout design and semiconductor is looked by the Registry and is according to the rules and regulations prescribed under “Semiconductor Integrated Circuits Layout-Design (SICLD) Rules 2001” and “Semiconductor Integrated Circuits Layout Design (SICLD) Act 2000.”

3.2. THE ROLE OF AI IN THE WORKING SPHERE OF IPR

Presently the human inventions and creations are highly assisted by developed technology, intelligent work module and auto generated materials. With the help of artificial intelligence part work or autonomously generated work are still valid with traditional IP laws and the applicability such as original, inventiveness, creator etc. with developed computational technology , big data management, the AI assisted systems are capable of doing some specific work of AI similar to human.

In October 2015, the first AI assisted computer program Alpha Go programmed by Google beat a professional human (Ke Jie) who is a Go player and a champion in Go games during a championship with a narrow margin. After 5 months the program was revised with more logic and data mining where Alpha Go beat Lee Sedol who was 18 times world champion and this game was watched by 16 million audiences all over world. This is really making science fiction to science with this AI assisted systems and AI captured the public imagination.

AI has not only affected the public but also puts a great impact on copyright, patent, trademark and other IP laws. Repetitive and Complex human works may be in case of uncertainty in end results AI is utilised to help or replace human activities and produce more valuable results widely beneficiary to the society. These AI systems are designed to learn and deliver with better and more inputs this is going to change towards new acceptability of continual changes. Big data management and AI will change the future of copyright law and the professional jobs associated to IPR. The AI revolution will compel the IP lawyers, attorneys, practitioners have to work with machine based learning rather than rule based environment with massive development in AI there will be a challenge to deliver service at a faster and cheaper wait with more consistency. The entirely new services through smart technology will make a threat to the historically old services.

CHAPTER 4

4.1. WILL EVER MACHINE AND ROBOTS DOING HUMAN FUNCTION CAN BE TREATED AS NATURAL PERSON.

Rene Descartes , the 17th century French philosopher, Mathematician and scientist had a philosophical view that machine did not have any capability to think themselves. He did not make any future prediction regarding the thinking ability of machines. And from this century onward there was ongoing debate on machines being self sufficient to create any original work on its own.

Scout French created Hal, a techno high end sentient computer. A Novel Written by a Computer Programme to think like the World's Bestselling Author Ms. Susann. He combined two novels of Susann and wrote a new novel. Hal is supposed to be an independent entity, capable of creating works on its own. But, the scientists confess that AI has not reached that level. It basically says two contradicting things that if HAL as a machine is capable to think then HAL has created original work. If not then the created work is not original. So, it is important to go through the nature of AI.

Corporation and natural human beings are considered to be person by keeping this in mind whether AI will come under the definition of person or not? Whether any constitutional rights be provided to AI? Can AI be sued for any copyright infringement? All these are basically legal inquiry regarding AI.

Let's now discuss the –What/Who is a person in the light of Judiciary?

At first we discuss about Natural person, "a human being possessing natural personality. According to Holland, a natural person is a human being as is regarded by the law as capable of rights and duties. Requisite of normal human being is that he must be born alive moreover; he must possess essentially human characteristics. Generally a person/human being who has a capacity to sue and be sued is person."⁵⁶

Nature of a person determines the definition of a legal person. A person is someone who has the ability to own property and can sue or be sued.⁵⁷ Individual and corporation, as a person have different rights. The corporation might have rights but liabilities and issuing criminal punishment both are unclear.

When there is any dispute the question of legal rights come into play. For example if X sells a house to Y as well as to Z, and Z was the first one to register it in his own name then Y will face huge loss. Now, Y may accuse X for committing fraud. In case of civil proceeding, X can compensate monetarily to all the loss faced by Y, if X owns any assets. But if Y wants to sue X under criminal proceedings then X may be charged by punishment. But in case X is an AI, what result would Y's lawsuit be?

If AI is not working properly then it should be reprogrammed or there should be capital punishment for AI system which means its permanent shutdown so that there will be no further offence on that part of the system. By reprogramming the asset owning AI machine can give restoration. AIs and humans are treated equally in case of theories of punishment. If we look into capital punishment in case of AI this basically means incapacitation of the machine. When we talk about the life of AI, it is the functioning capability of the AI machine. Ceasing the functions of AI Machine does not mean that the system is dead. Here, death means permanent disability of the system's life. Thus, capital punishment with respect to AI means permanent ceasing

⁵⁶"Definition and kinds of person", [https://www.srdlawnotes.com/2017/04/definition-and-kinds-of-persons-legal.html#:~:text=The%20term%20Person%20is%20derived,having%20legal%20rights%20and%20duties.&text=1\)%20Salmond%20%2D%20%22%20A%20person,and%20bound%20by%20legal%20duties.](https://www.srdlawnotes.com/2017/04/definition-and-kinds-of-persons-legal.html#:~:text=The%20term%20Person%20is%20derived,having%20legal%20rights%20and%20duties.&text=1)%20Salmond%20%2D%20%22%20A%20person,and%20bound%20by%20legal%20duties.) (Last accessed on June 18, 2020).

⁵⁷ Stephen C. Hicks, "On The Citizen And The Legal Person: Toward The Common Ground Of Jurisprudence, Social Theory, And Comparative Law As The Premise Of A Future Community, And The Role Of The Self Therein", 59 U. Cm. L. REV. (1991), p.789

so that there will be no future destructions. When an AI system is shut down by the court this means that the society should prohibit the operation of that entity as it is dangerous for the society.⁵⁸ Let's take an hypothetical example where an AI is a hospital administration. The entire administration of the hospital including clearing of bills by the patients is controlled by AI. If any patient fails to pay the bill, then AI orders to switch off the supporting machines of the patient. This would result in death of the patient and as a machine it will be dangerous to the society. This strongly says that the AI machine should be disabled to protect the society from future mis-happening. This also shows that AI does not have any consciousness, feelings, interests, intentionality, souls and free wills. It cannot show concern to another person and cannot work beyond its programming.

If a prosecutor wishes to pursue a case for murder, how can the family of the deceased feel they have been vindicated? But compare this hypothetical to a corporate error that results in negligently caused damages, such as the Exxon Valdez incident.⁵⁹ There is often no theory for assigning liability and issuing criminal punishment to the corporation. AI researchers who wish to give greater administrative responsibility to their "creations" may cite to the entire body of corporate law to silence those critics who fear an Orwellian society run by soulless machines. An AI could therefore infringe a copyright but escape payment of full restitution to those infringed.

Is it necessary for a person to think?

The current state of AI technology, notwithstanding French's Hal, is almost exclusively used in "expert systems." These systems are programmed with decision rules by human experts in any given field. The computers then use this set of decision rules to problem solve, in much the same way a lawyer uses existing case law to develop a legal strategy. What separates AIs from ordinary computers is the ability to apply existing knowledge to a new set of facts or problems. This ability could be considered thinking.

Philosophers and scientists were not able to define the word "Thinking" in a conclusive manner. The boundaries of consciousness are slowly being discovered, often with the help of AIs. To qualify for being a person, a machine should have the ability to think on its own, mere copying of human thoughts would not qualify as a person. AI to be considered as a person should have the ability to think by itself. Non ability to think is the greater factor which is missing from AI. Thus, we cannot call an AI to be a person. The missing element in the AI is basically consciousness, feelings, interests, intentionality, souls and free wills. The argument that a machine cannot have a soul, and is therefore not a person, is too ethereal for this Comment. Although theologians may argue the point, this discussion assumes that a soul is not a requirement of personhood. Many lawyers will probably agree with this statement. The soul is an intangible commodity. We often use the word

⁵⁸Gabriel Hallevy, "When Robots Kill: Artificial Intelligence under criminal law", <https://books.google.co.in/books?id=Xoi9AgAAQBAJ&printsec=frontcover&dq=inauthor:%22Gabriel+Hallevy%22&hl=en&sa=X&ved=2ahUKEwjotMzyka7qAhXDbn0KHQzdAIIQ6AEwAnoECAAQAg#v=onepage&q&f=false>. (Last accessed on June 20, 2020).

⁵⁹ Robert W. Adler & Charles Lord, "Environmental Crimes: Raising the Stakes", 59 GEO. WASH. L. REV. (1991), pp.781.

soul to represent those qualities which make one human truly unique when compared to another. Writers are often said to have “reached into their souls” when they create something truly moving. In a conventional sense, consciousness is the difference between alertness, or being awake, and loss of sense, as in sleep. Self consciousness is perhaps a higher level. But in case of AI it cannot conceive consciousness on its own, until and unless it has been programmed. So AI, to have any feelings like human it has to be programmed by the programmer. Intentionality, feelings, interests, and free will are other missing elements in an AI. This missing elements tells us about the difference which still exists between the computer and the human.

A self-trained PC software engineer, Scott French, developed his PC to compose like Jacqueline Susann.⁶⁰ She was the author of two books Valley of the Dolls and Once Is Not Enough. French used these two books and the outcome is “Just This Once”, A Novel Written by a Computer Programme to think like the World's Bestselling Author Ms. Susann. Intentionality, feelings, interests, and free will if anyone of these elements is necessary for personhood and French's Hal is missing this element which Hal has stolen it from Susann then it might be said that Hal is not a person and cannot be compared to Susann. Intentionality is basically the state of mind. If AI is not self aware then it cannot possess' state of mind.

If we take a situation, an author puts his entire life experience, thought and invests his time to make a novel. Every part of the novel is well planned and written. Each scene is drafted and redrafted to final perfection. The novel is published and it is a success, both critically and publicly. This gives justice to the authors hard work. Then, an AI programmer buys the author's book and uses the most advanced flatbed-scanning technology to feed the book into the memory of an AI computer. Then the programme has the choice to rebuilt the novel by looking at the displays menu of an AI computer which shows “Update”, “deduct” or “Create a new novel”. The hard drive whirs and minutes later the printer begins to spit out the first pages of a new work. Nothing in the new work has been “copied” from the author's original work. The AI does not require any state of mind or free will to do this work.⁶¹

4.2. CONCLUSION

With development in computer technology, Bigdata mining, machine learning, the level of AI has gone very high which was not expected earlier. Therefore there is no future escape from machine dependency were machine will take up the major thought process of human being. This may require realignment of our thought process, social obligations and judiciary implications.

⁶⁰Steve Lohr, “The Media Business: Encountering the Digital Age-An Occasional Look at Computers in Everyday Life; Potboiler Springs from Computer's Loins”, N.Y. TIMES.

⁶¹Kalin Hristov, “Artificial Intelligence and the copyright dilemma”
,https://ipmall.law.unh.edu/sites/default/files/hosted_resources/IDEA/hristov_formatted.pdf (Last accessed on June 20,2020).

CHAPTER 5

5.1. PROTECTIONS GIVEN TO A MACHINE WITH AI UNDER THE COPYRIGHT REGIME AND THE ISSUES ARISING WITH RESPECT TO AI

After World War 2 the computers have been used for educational purposes. During mid sixties computers were used in industry and businesses. With reduction in size and enhanced computing ability of the computer, has made a havoc change in the public domain. There by similar Impact were seen on copyright work. There was a huge difference in intellectual property right of original work and digital technology were the legitimacy

of the copyright is under question with the technological improvement ,machine learning and Bigdata analysis. The future of AI will be a threat to the regular process or concept of granting copyright to intellectual and original creator. The basic subject-matter of the copyright needs to be studied in detail.

A famous computer programmer Mr. Scott French during 1993 published a book through Macintosh computer (IICx named Hal) which was written under the shadow of famous American author Jacqueline Susann.⁶² Scott French to program his Macintosh computer (IICx named Hal) used two books written by Sussan, Valley of the Dolls⁶³ and Once Is Not Enough⁶⁴, to create another book which was “Just this once”

Scott French challenged the copyright issue of computer generated books with human which generated uncertain, unreal and unsolved issues of copyright to machine supported book. But the books so generated by Macintosh computer got liberal reviews from the critic against the original book written by Sussan.

The existing law has no such potential to deal with copyright of such computer generated work. Professor Lionel S. Sobel of Loyola Law School, USA said “There is no issue here. End of story. The author did not use anything that is protected.”⁶⁵ This was a breakdown comment on the creative work done by Scott French but the scenario of existing law and a new law of copyright started evolving.

The copyright basically protects the expression and description of an idea but not the idea itself. In the famous movie the “Terminator” we could see a possibility of a muscle bound Austrian chasing the mother of a future revolt legend, who has not been conceived yet. The basic idea is not protectable but the screenplay of the movie is protectable under copyright law as it is the expression of an idea.

The protection so given does not reach out to the idea, the strategy, the frame works, techniques for operation, ideas, standards, or revelations. There is no protection to the idea only the tangible form of the idea is protectable. While applying above to Scott French’s utilisation of computer to writing a book abstracting from books by Sussan will not fall into the original expression therefore it will be considered as improperly procured or stolen. With the improvement in AI the predictive analysis are being made to analyse heart and illness, pollution and environmental erosion, agricultural and metrological predictions were being done. Now the tricky work of composing a novel earlier told to be an intellectual work has been composed by a computer. The specific set of instruction need to be adopted by the computer through its master this book can be composed. Here the specific processed guideline the reactive and active turning points are given by the master. In this case Jacqueline Susann is the master. Here with the first growth in AI we are entering into digital authorship which will be self ruling and different from Earlier human Authorship. Computational creativity will be the future innovative practice were the better algorithm and huge logical application in the law of

⁶² Ibid.

⁶³ Jacqueline Susann, “Valley of the Dolls”, <http://ftp.agriec.co.za/Valley-of-the-Dolls-AnEel-0802135196-by-Jacqueline-Susann.pdf>.

⁶⁴ Jane O’Reilly, “A guide to the good parts of Jacqueline Susann”, <https://archive.nytimes.com/www.nytimes.com/books/98/01/04/home/susann-once.html> (Last accessed on June 22,2020).

⁶⁵ Interview with Lionel S. Sobel, Professor of Law, Loyola Law School, in Los Angeles, Cal. (Sept. 7, 1993).

copyright needs to be introduced in artificially intelligent author or digital author within the framework of copyright.

5.2. SOCIAL IMPACT ON AI

The growth and progress of mankind is judged by the innovations, inventions and discoveries related to human. When there are surge in number of innovation in short period there is a need to recognise these innovation and to accommodate this in the society through proper legislation. In US they have amended their copyright law a number of times to accommodate the changes happened in the society. With new age high speed computers, Machine learning, data mining the AI system has taken the driver seat towards the innovation. In India very little or no step has been taken towards accommodating the changes in the field of innovation through AI assisted or generated works.

Recently AI system has entered into all works of life like Amazon, Flipkart, Robotic house cleaners and recently managing Covid patients by robots has been recognised and accepted by the society at large. Thereby this computers or AI systems can be termed as creative machines.

Some of the machines are so advanced and fast in decision making that they can be programmed for better outputs than the creator itself. Such creative works are still not recognised by existing legal system.

The AI network system are based on neural networks where the capacity is numerous in the line of human neural networks. The output or innovation through such largely networked AI system will play a significant role in the society. With enhancement in computational speed, better networking system the AI is expected to take major role in creative process. The days are not far when AI system will make major creative work.

5.3. DISCUSSION ON GRANTING OF COPYRIGHT TO AI OR ITS AGENT

With the writing of Scott French the story of uncertainty and confusion over the rights went above when there was a substantial claim by the original author against the producer. If a movie is being made without mentioning the author and the description of the movie matches with the basic writing of the author. Then copyright claim of the author is given value. Where the style, mode of presentation, method of delivering a subject or describing a event is the original work of the author. To avoid end result of the idea Scott French modified some of the codes and redefined some further activity to reach a goal other than that of Jacqueline Susann. This may be further explained in this way the book of Sussan was studied for characters, mannerism, activities, dialect, situation and reactions. The activities by the characters with defined manner was fed to computer as a form of instruction where thousands of bent can be grouped or regrouped as per the programming to arrive at a totally different description which would have a little link with the original source. This description of Scott French may be recommended for protection under copyright work.

Now let us see whether those countries current statutes protect AI work under copyright:

1. U.K

Copyright, Design and Patents Act, 1988, Section 9 Paragraph 1 defines who is an author “In this Part author, in relation to a work, means the person who creates it.”

Copyright, Design and Patents Act, 1988, Section 9 Paragraph 3 defines who would get the authorship of the work in case of computer generated work. In this it is clearly stated that the author of computer generated work is mainly the author who has done all the required arrangements. “In the case of a literary, dramatic, musical or artistic work which is computer-generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken.”

2. USA

Congress has the authority to enact copyright laws according to the Constitution of U.S.A. According to US Constitution Article 1, Section 8, Clause 8 it says that the congress shall have the power “To promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.”

In the case of Trademark cases the U.S Supreme court has said that “writings are founded in the creative powers of the mind” until and unless the work is a production of human brain it cannot be protected. After looking at the clauses it can be derived that AI works are not getting protection under U.S laws.

3. INDIA

According to Sec.2 (d) (vi) of The Copyright Act, 1957 “author” defines “in relation to any literary, dramatic, musical or artistic work which is computer-generated, the person who causes the work to be created.”⁶⁶ Author in a computer generated or assisted work basically means the programmer who has created it. The individual has used his minimum creativity and has applied his own human intellect to create the work would get protection under Indian Copyright Law.

4. GERMANY

According to Section 2, Paragraph 2 of Copyright Law of Germany it says that author is someone who possesses intellectual abilities. “Only the author’s own intellectual creations constitute works within the meaning of this act.” And according to the definition given only human being having the ability to create using their ability would get protection under copyright. AI works will not be protected. For any protection under copyright the work has to be a production of human intellect.

5. JAPAN

In case of Japan copyright law work can be copyrightable if only “a production in which thoughts or sentiments are expressed in a creative way and which falls within the literary, scientific, artistic or musical domain”. Here the only requirement to get protection under copyright is creativity of the author. Only work developed by

⁶⁶ The Copyright Act, 1957, No.14, Acts of Parliament, 1957.

human author can get protection under copyright law. After seeing the requirements it can be derived that current copyright law does not include protection for AI works.

5.4. WHEN AI AIDES THE AUTHOR

The AI generated works with the enhance computing capability of computer, the level of assistance given by human can be categorised. When the work generated by AI assisted computer program with the direct involvement, assistance, instruction, guidance etc. from a human being. Here, AI is used as a tool through the computer with the directive of the human to achieve a pre defined outcome. But the final outcome may not be as predictive as made by the human itself. One such example of creating a painting through the help of computer by an artist were the selection of the colours, the brush size, the stroke and the method of painting has been fed to the computer as an AI algorithm to make a painting. The final painting generated by the computer has got direct involvement of the painter therefore the U.S copyright law has protected the legal claim of the author citing the use of AI program as a tool or a medium in the creative process. This may be further discussed in the case of *Burrow Giles Lithographic Co. v Sarony*⁶⁷, the important question which was needed to be answered was on granting copyright protection to photograph. The lawfulness of granting copyright to the final art piece, painting, text and photograph is reconsidered as the medium or the tool used to generate these have been subjected to highly technical and capable of more calculative then earlier. The absolute mechanical medium has been replaced with AI assisted computer with enhanced computing capacity which has indicated the exclusive right of a human created outcome utilising his intellectual genius capability. In the above mentioned case Napoleon Sarony's photo was published in Oscar Wilde's book and the court considered the camera as the medium to create the original work of art and Sarony as the author. This is a century old case, during last 100 years there was an appreciable and technological computational development embedded in to camera. Present days computer are fully digital and precision level are set by software which cannot be achievable by any mechanical means thereby the photography virtually became an automatic process only the idea and object is fixed by the photographer.

The Court characterized initiation and copyright in extensively humanistic terms, referring to the Framers' dependence on English law: a writer is "he to whom anything owes its origin; originator; maker; one who completes a work of science or literature; copyright is the exclusive right of a man to the production of his own genius or intellect. Authorship could likewise be comprehended, the Court closed, as far as causation: the writer is the cause of the picture" and "the man who gives effect to the idea, fancy, or imagination. The camera took the photograph, however the arrangement begun with the individual behind the camera. As the originator of the photo, the intention constrains without which it couldn't have appeared, the picture taker was held to be a writer for copyright purposes, paying little mind to his dependence on a machine."

5.5. AI WITH PREDEFINED RULE IN THE CREATIVE PROCESS

⁶⁷ *Burrow-Giles Lithographic Co. v. Sarony*, 111 U.S. 53, 58-59 (1884).

Lets Discuss on the next category of protection of copyright in creative process, where the source code or the set of instruction are copyrighted as a literary work. In most of the assisted high end computable work the reflex in the society or judiciary domain is yet to be explored with the dynamism in the creative world. The possibility of granting authorship to AI increases with less or no involvement of human intellect even though. The deep sea navigation as well as the photography, the photography of the surface of the moon and the mars are autonomous AI assisted original work were the authorship can be granted to a machine.

With respect to above discussion let us talk about the Important Role of AI in interfering human intellect and creativity in IPR thereby challenging authorship in favor of machines.

In the case of *Bleistein v Donaldson Lithographing Company*⁶⁸ , where George Bleistein the plaintiff named was an employee of Courier Lithographing Company. The owner of a travelling circus called the "Great Wallace Show" has hired the company for producing posters to promote the circus using chromolithography. When the circus company's posters were exhausted they did not order the posters from Courier lithographing company rather they approached the competitor company Donaldson lithographing company for their posters.

Thus, this became a dispute between the two competing companies. The Bleistein became the plaintiff and Donaldson Lithographing Co became the defendant. The plaintiff George Bleistein sued the defendant for infringement under copyright protection Act. The defendant argued that the posters were used for advertisement and thus cannot the controlling Copyright Act of 1870. This is neither protected under the Constitution of the United States.

Justice Holmes, while grounding the origin of creation and the uniqueness of the human identity, composing around imagination, artistic pursuit and genuinity. The same work has been reproduced and used for the same entity for commercial benefit. So, the court gave advantage in favour of the original publisher, printer of the initial advertisement. Here, from above cases from *Burrow Giles Lithographic Co. v Sarony* to *Bleistein* this was found step by step the development of redefining the original work from its uniqueness, aesthetic and artistic pursuit to non important identity. *Bleistein v. Donaldson Lithographing Company*, 188 U.S. 239 (1903), is a case in which the United States Supreme Court found that advertisements were protected by copyright. The case is now cited for the proposition that commercial speech can be protected by copyright.

Alfred Bell & Co. v Catalda Fine Arts

In the famous case of *Alfred Bell & Co. v Catalda Fine Arts*⁶⁹ , where Alfred Bell & Co. the famous British print maker and dealer was the plaintiff and Catalda Fine Arts, Ltd was the defendant. The plaintiff had obtained exclusive license with various Art Company and museums to produce and sell engravings of paintings. These works were in the public domain, including one of the art gallery Gainsborough's Blue Boy.

⁶⁸ *Bleistein v. Donaldson Lithographing Co.*, 188 U.S. 239 (1903).

⁶⁹ *Bell*, 191 F.2d at 102.

Catalda Fine Arts, the defendant, not able to access to these works which used the plaintiff's engravings to make its lithographs. The court ruled in favor of Mrs. Alfred Bell & Co who was sued for infringement. The making of such engravings was a skilled craft requiring creative choices and no two engravings are exactly the same so the court considered asserting of the required level of originality.

Feist Publications, Inc. v. Rural Telephone Service Co

In case of Feist Publications, Inc. v. Rural Telephone Service Co,⁷⁰ The ruling of the court was written by Justice O'Connor. It examined the purpose of copyright and explained the standard of copyright ability as based on originality.

"There is an undeniable tension between these two propositions," this was said by Justice O'Connor in her decision. "Many compilations consist of nothing but raw data—i.e. wholly factual information not accompanied by any original expression. On what basis may one claim a copyright upon such work? Common sense tells us that 100 uncopyrightable facts do not magically change their status when gathered together in one place. The key to resolving the tension lies in understanding why facts are not copyrightable: The *sine qua non* of copyright is originality."

Rural hall white Pages Company makes directory online and offline in a court case they claimed that the directory published by them is protected by copyright but the lower court has upheld the claim where the "sweat of the brow" doctrine has given importance then the creative expressions. In the higher court it was argued that under copyright act the creative expression to be encouraged but in this case directory is the work of combining person's name, telephone number and address. Hence there is no creativity in compelling a directory and it failed to show minimum degree of creativity because the company has put the basic information of the subscriber and arranged it in alphabetical order where the degree of creativity is too little. Therefore, does not deserve to be protected under the act.⁷¹

The "sweat of the brow"⁷² The "Sweat of the brow" in contrast to IP laws has number of clause. Even though the copyright protection is given with minimum originality to the work under this doctrine the independent creation is being protected for defence to infringement.

A subsequent compiler was "not entitled to take one word of information previously published", but rather had to "independently work out of the method for himself, so as to arrive at same result from the same common sources of information". Sweat of the brow courts, thereby, deliberately abstaining from the most fundamental theory of law. The case centred on two well-established principles in United States copyright law: That fact is not copyrightable, but that compilations of facts can be.

⁷⁰ Feist Publications., Inc. v. Rural Tel. Serv. Co., 499 U.S. 340 (1991).

⁷¹ Elizabeth Verkey, INTELLECTUAL PROPERTY, 2015, p. 43.

⁷² Elizabeth Verkey, INTELLECTUAL PROPERTY, 2015, p.42.

In these above cases different courts were giving emphasis on independent creation to legitimise copyright. But it is critical to recognise or identify the creativity, originality and novelty of any idea which has a link to intellectual origin. Every work is somehow unique and creative to itself even though there is less contrast between two original works. So, this may lead to only creative and originality may be linked to grant of copyright were novelty may not make much sense. Further the free creation and intellectual labour are both need to be established for authorship and the basic ingredient to identify the creation of the work. Simplifying all above facts the originality would mean autonomous origin of the work and creativity mean to intellectual labour of the author.

5.6. HIGH-END COMPUTATIONAL CREATIVITY OF COMPUTER IN COLLABORATION WITH ARTIFICIAL INTELLIGENCE

The accepted areas of creativity are literary, artistic, dramatic, musical, cinematography, painting and sound recording. The simple logic of original creation, intellectual endeavor and self conferred labor is to achieve copyright. Thus, copyright needs to be redefined in the age of high end computing system computers, big data and memory arrangement by series of computers and dense use of machine learning. When the creativity of human is under question there is a common debate to deny that the computer cannot be ever creative as human. This can be told in characterizing the creativity, these may depend on the factors characterizing creativity and other aspect of the creation. In the year 1843, Charles Babbage's proposed Analytical Engine; the basic logic of computer was a major threat to the logical ability of human. Ada Lovelace the famous mathematician during 18th century had predicted the customisation of components of processing to arrive at a very different and surprise result. When the unpredictability is considered as the medium or the intermediary or creating something new then machine can be coded such that this unpredictability can be achieved. This was again mentioned by the writer Italo Calvino "The true literature machine will be one that itself feels the need to produce disorder, as a reaction against its preceding production of order: a machine that will produce avant-garde work to free its circuits when they are choked with too long a production of classicism." But a creative work requires human intervention or intellectual along with focused conviction which in general considered non achievable or never be sufficient to match the real thing as human by just replacing the intermediary or creative medium.⁷³

The famous American cognitive scientist Marvin Lee Minsky was the co founder of Massachusetts Institute of Technology's AI laboratory, considered to be the pioneer of AI and philosophy. He has made a provocative reaction to Ada Lovelace were the human mind was considered something to be as a machine and told to be "meat machine".⁷⁴In 1960 a Raymond Queneau the famous author/mathematician and Francois Le Lionnais artist/ace chess player established the famous Oulipo (Ouvroir de Littérature Potentielle i.e. Workshop for

⁷³Ramon Lopez de Mantaras, "Artificial Intelligence and the Arts: Toward Computational Creativity", <https://www.bbvaopenmind.com/en/articles/artificial-intelligence-and-the-arts-toward-computational-creativity/>.(Last accessed on June 23,2020).

⁷⁴Peter Kassan, "AI Gone Awry: The Futile Quest for Artificial Intelligence", https://www.skeptic.com/reading_room/artificial-intelligence-gone-awry/ (Last accessed on June 23,2020).

Potential Literature) to investigate the conceivable outcomes of joining scientific structures into abstract creation.⁷⁵ The program used to generate literary work is thoroughly examined with oulipian approach to indicate the use of algorithm or synthesis of the program. It was found the authors who composed under deliberate outer requirement using non numerical equation under oulipian strategy. There is a famous detective novel “The void” written by George Perec was the whole book is written without using the letter ‘E’. But these creations are identified as one of the standard improvement or determinism. These human mediated algorithm oulipian is being utilised in different areas to predefined investigative algorithm in the painting and music. With this investigating approach by oulipo some section of the people started false finding in the expression and uncertainty in the imaginative procedure from the tasteful goal that makes it important, advantageous and meaningful.⁷⁶

5.7. COMPUTATIONAL CREATIVITY CODING

The famous Cybernetic Poet’s work “Moon Child,”⁷⁷ was written following the style of famous poet Kathleen Francis Wheeler’s “Crazy moon child/ Hide from your coffin/To spite your doom.” This is basically Raymond Kurzweil’s⁷⁸ invention where Cybernetic Poet, is designed or programmed to act as self poetry generator or poets assistant. The poems written by different human author or authors are fed as input file to the system where it analyses these poems are create a word sequence structure or model based on the poems it has gone through. Then with the command the cybernetic poet writes stanzas of poetry which is similar styled to the poems originally analysed and fed to the system. The above was granted patent to Raymond Kurzweil for a “computer-implemented method of generating a poet personality including reading poems, generating analysis models, and storing the analysis models in a personality data structure.”⁷⁹

A proper testing was proposed for the creation of cybernetic poet. Kurzweil planned a domain specific turing test the method of inquiry using AI to determine whether the computer can think like human for the specific domain. He arranged a mixture of grown up and children to recognise the 28 unique stanza of poetry which were composed by the artist were by from the program input was made, Raymond Kurzweil own composed stanza and stanza composed by cybernetic poet autonomously generated by the computer. 63% of the test sample are found to be from the original work. The stanzas by the cybernetic poet were not appreciated much thereby Raymond Kurzweil concluded that there is some level of success. The stanzas composed by the computers were not totally rejected but in some places it was appreciated by judges during the test. The limited success may be due to lack of manoeuvrability of human artistry. Number of autonomous literature was made known as AI literature where the above cybernetic poet is one of the creation. Similarly, another or autonomous

⁷⁵ Loss Pequeño Glazier, DIGITAL POETICS: THE MAKING OF E-POETRIES, 2002, p.128.

⁷⁶Alison James, “Automatism, Arbitrariness, and the Oulipian Author”, <https://muse.jhu.edu/article/210677/pdf> (Last accessed on June 24,2020).

⁷⁷“Ray Kurzweil’s Cybernetic poet: How it works”, http://www.kurzweilcyberart.com/poetry/rkcp_how_it_works.php (Last accessed on June 24,2020).

⁷⁸Anthony G. Craine, “Ray Kurzweil’s American computer scientist and futurist”, <https://www.britannica.com/biography/Raymond-Kurzweil> (Last accessed on June 25,2020).

⁷⁹U.S. Patent No. 6,647,395 (filed Nov. 1, 2000).

literary creation of a story telling machine by Selmer Bringsjord and David Ferrucci “Inside the Mind of BRUTUS”. During creation of this BRUTUS programs with different dimensions, plot, characters, theme, writing style, wide difference of approach and imaginary component were programmed. Different genre of friction, like Romans mystery, separation, affection where these exhibit low difference which can set to be produced a high difference using architectural differentiation generator. Thereby a “silicon author able to generate stories that would be regarded as creative, even if these stories are well below what a muse-inspired member of Homo sapiens sapiens can muster.”⁸⁰

5.8. AUTHORSHIP TO AI AND RELATED ISSUES

- **ONLY THE HUMAN AUTHORS**

To get the benefit out of copyright authorship requires registration and grant of copyright set in any of the country. Most of the existing copyright law defines or grants the originality work by human author only. These days there are huge numbers of AI assisted or generated works are available which also requires copyright protection. But the creative work generated autonomously by AI assisted machine is not copyrightable because they are not satisfying the human author requirement of the U.S copyright office. This can be put in other ways as AI generated works theoretical will not be copyrightable and like other creations which were not protected falls into public domain, open for everybody.

In Copyright Act of India, 1957 under Sec. 2 (d) of the act defines the author of "any literary, dramatic, musical or artistic work which is computer-generated" to be "the person who causes the work to be created".⁸¹

“Sec. 2(d) author in Copyright Act of India, 1957 means, — (i) in relation to a literary or dramatic work, the author of the work;

(ii) in relation to a musical work, the composer;

(iii) in relation to an artistic work other than a photograph, the artist;

(iv) in relation to a photograph, the person taking the photograph;

2 [(v) in relation to a cinematograph film or sound recording, the producer; and

(vi) in relation to any literary, dramatic, musical or artistic work which is computer-generated, the person who causes the work to be created”.⁸²

On this ground only the human created work are accepted by the copyright office as a copyright requirement. And the other works autonomously created by AI are not considered at all due to less human intervention and

⁸⁰ “The Ray Kurzweil’s reader”, <https://www.kurzweilai.net/pdf/RayKurzweilReader.pdf> (Last accessed on June 25, 2020).

⁸¹ Suvarna Mandal , “AI and Copyright authorship: still mind over matter ?”, [https://www.lexology.com/library/detail.aspx?g=404f4311-bcc4-4049-b62e-d521ccca90e1#:~:text=Section%20\(2\)\(d\)%20of%20the,the%20work%20to%20be%20created%22](https://www.lexology.com/library/detail.aspx?g=404f4311-bcc4-4049-b62e-d521ccca90e1#:~:text=Section%20(2)(d)%20of%20the,the%20work%20to%20be%20created%22) (Last accessed on June 25,2020).

⁸² The Copyright Act, 1957, No.14,Acts of Parliament, 1957 (India).

involvement. With enhancement and development in technology and AI this human intervention will reduce in future which will push the system to think to consider AI as author. When we look into the case of *Naruto v. Slater*⁸³ famously known as the “Monkey Selfie” case were in the monkey named Naruto took away the camera of the great photographer, , David Slater and clicked several photos of those places which was not possible for the photographer to reach there and also clicked selfies of himself. These photographs were named as “Monkey Selfie” which was published by David Slater, and Wildlife Personalities Limited. These photos were published in the book and they claimed for ownership over the photo.

On behalf of the crested macaque named Naruto, People for the Ethical Treatment of Animals (PETA)⁸⁴ and Dr. Antje Engelhardt sued the photographer claiming that the photo was clicked by the monkey thus the ownership lies with the animal.

When we look into the famous case of “Monkey Selfie” case of *Naruto v. Slater* where the monkey named Naruto took away the camera of the great photographer David Slater and Wildlife Personalities, Ltd. are infringing the copyright of the monkey. The claim was dismissed by the U.S. Court of Appeals for the Ninth Circuit due to animals cannot sued for infringement under copyright act. The court reasoned that “the Copyright Act does not expressly authorize animals to file copyright infringement suits under the statute”, and other sections of the Copyright Act, which refer to children and widow, for example, imply that the author must be a human being.⁸⁵ Although corporations/ corporate/ association or group of persons can own copyrights and sue under the Copyright Act, the court noted that corporations are considered “persons” under U.S. Supreme Court precedent and, unlike animals; these entities “are formed and owned by humans.”⁸⁶

According to the U.S copyright office registration can only be grant to those authors who are human beings. Supreme Court says that “copyright law only protects ‘the fruits of intellectual labour’ that ‘are founded in the creative powers of the mind.’”The Copyright Office’s position is that this does not include “works produced by a machine or mere mechanical process that operates randomly or automatically without any creative input or intervention from a human-author.”⁸⁷

- **HUMAN AUTHOR OR ELSE**

With recent development in AI and computation the number of autonomously generated AI creative works has gone up due to non availability of protection to these works they were flooded into public domain as these works are neither being scrutinised or numbered. They landed up making a count were the mini quall original copyrighted works are lost. Therefore, there is a need to classify or categorisation and international serial

⁸³ *Naruto v. Slater*, 2018 WL 1902414 (9th Cir. April 23, 2018).

⁸⁴PETA: <https://www.peta.org>. (Last accessed on June 26, 2020).

⁸⁵ Supra note 62

⁸⁶ ‘Monkey Selfie’ Case Headed to U.S. Court of Appeals, <http://www.peta.org/blog/monkey-selfie-case-headed-u-s- court-appeals/> (Last accessed on June 26, 2020).

⁸⁷ Sarah Ligon Pattishall, “AI can create art, but canit own copyright in it , or infringe?”, <https://www.lexisnexis.com/lexis-practice-advisor/the-journal/b/lpa/posts/ai-can-create-art-but-can-it-own-copyright-in-it-or-infringe>. (Last accessed on June 25,2020).

number marking to all autonomously generated AI creative works. There is a huge investment in the field of autonomous or assisted generated in creative field which requires a minimum return which can be reinvested for the growth and development in this area. This also needs a protection even if for a shorter period of time. Otherwise this tends a limit to innovation.

The less availability of copyright protected work may also lead to less material for teaching and research work. Therefore selected number of Autonomous AI generated work need to be protected for saving the negative effect of less material availability in the potential sectors like music, art, education, technology and medicine.

Few scholars argued that there should be redefining of the word “Authorship”⁸⁸ which would thus include both human and non human author since legal protection can only be enjoyed by the creative works of a human author.⁸⁹ According to the published paper written by Professor Ryan Abbot⁹⁰ who was of a view that AI’s growth and development can only be possible if there is some encouragement to non human authors as inventor and author. He was also a great supporter of providing legal rights to non human authors and inventors. If this theory is applied then we can control the fall of AI machine’s independent work in to the public domain. Further to provide incentive to the programmer, coder, neural network analyser and companies, this will promote future works in that field. The above solution may appear to be one of the easiest ways out but may lead to legal disputes thereby abusing the system.

Another side of grating copyright is too human is held responsible in case of flouting the act or law, which may not be easy to legally make responsible a non human or non natural entity. Hence in these circumstances with redefining of Copyright to non human authorship will go against current legal provision in most of the country which will lead to more uncertainty by raising more questions than the reply to original problem.

5.9. AUTHORSHIP FOR EMPLOYER AND EMPLOYEE UNDER HIRE DOCTRINE

Under U.S copyright office every time it is not possible directly to give incentive to the authors or the owners of the AI generated works to make feasible the hire doctrine system may be considered. “(If) a work is made for hire, an employer is considered the author even if an employee actually created the work. The employer can be a firm, an organisation, or an individual.”⁹¹ The above is applicable to party who are not directly part of creating the work under copyright. This may be considered for AI industry. The AI programs are considered as employer and the programmer or the developers are the employees. In company laws a person below then

⁸⁸ Ritvik M kulkarni, “Of Artificial Intelligence and Authorship”,<https://spicyip.com/2016/12/of-artificial-intelligence-and-authorship.html> (Last accessed on June 26, 2020).

⁸⁹ Ryan Abbott, “I Think, Therefore I Invent: Creative Computers and the Future of Patent Law”, 57 B.C. L. REV.(2016), p. 1709; Colin R. Davis, “An Evolutionary Step in Intellectual Property Rights— Artificial Intelligence and Intellectual Property”, 27 COMPUTER L. & SECURITY REV, (2011), p.601.

⁹⁰ <https://www.lexology.com/library/detail.aspx?g=2b94c64d-c387-4954-9406-2fd4ec35222e>. (Last accessed on June 26, 2020).

⁹¹“U.S. Copyright Office, Circular 9: Works Made for Hire”, <https://www.copyright.gov/circs/circ09.pdf>. (Last accessed on June 26,2020).

the executive level are normally hired by the company for specific services against salary or wages. Hence, some of the definition of AI needs flexibility or revised.

Considering the basic jurisprudence where the right to activity based right holder can be defined. Here the AI system or the software, the programmer, coder may be considered as the employee where, the interpretation of the employee is being made for the hire doctrine which is just opposed to the rigid definition of agency law. This may be one of the affective ways to transfer authorship to the AI generated work. Here both the employee and the employer are associated to each other under the hire doctrine and assigning copyright to the human author reaping the seed of AI benefits thereby, it will prevent from falling in to the public domain.⁹²

Establishing the employee and employer relationship with relative interpretation where, the AI machines are considered as the employee generating program and end results. The programmers are considered to be the employee where the incentive of copyright protection is given to the programmer or the developer. Thereby for time being number of issues mainly non human authorship has been avoided and the human programmers considered as copyright holders fully responsible under the law. They enjoy all the privileges and the liabilities associated with the work.

• **HUMAN AUTHORS IN AI GENERATED WORKS**

If we consider incentivising the labour and the human involvement in different stages of AI generated works they can be largely categorised as

1. AI programmer, who devises the coding, collection of data, programmes improvising and instructing computer to generate desired output.
2. Owners mainly the company, the financial institution who has invested in the system.
3. The end user basically the person who delivers the final product from the AI network.

The overall benefit to the human society is to be kept as a prime objective while deciding the based possible author among these above or to all. If the copyright is assigned to the AI programmer or the coder it is to be evaluated whether the society gets benefit out of this. Likewise if the benefit is conferred tom the owner or financier of the institution would add more funding for the development of AI or else finally the millions of user of AI programs.⁹³

⁹²Kalin Hristov, “Artificial Intelligence and the copyright dilemma”, https://ipmall.law.unh.edu/sites/default/files/hosted_resources/IDEA/hristov_formatted.pdf (Last accessed on June 26, 2020).

⁹³ Shlomit Yanisky-Ravid, “Generating Rembrandt: Artificial Intelligence , copyright and accountability in the 3rd era- The human like Authors are already here- a new model”, <https://digitalcommons.law.msu.edu/cgi/viewcontent.cgi?article=1199&context=lr> (Last accessed on June 27, 2020).

AUTHORSHIP TO AI PROGRAMMER

With autonomous AI generated work the granting of incentive where arguably given to the AI programmer or the device manager to promote innovation and creativity more over machine do not require financial incentive but their development or future depends on the human developer so these programmers are proposed to be the copyright authors which will not only keep the industry alive but more people will also contribute to research and development in AI sectors which will in future give a larger dividend to the society as a whole. Rewarding or incentivizing the AI programmer appears to be a sustainable solution while the independent programmer may be allowed to have the grant of copyright in favour of him for the work generated by their program. With long term licensing the programmer can license or assign copyright to the end user.

AUTHORSHIP TO OWNER

The financing and the managing system of the company do not survive without proper return on investment. To keep this industry alive and floating therefore, the option of the granting copyright protection to the owner of the company cannot be ignored. Thus, providing incentives to this company will keep them encouraged so that they would invest in the making of AI machines. The licensing of AI generated work by the company to the end user may prove financially viable and assure return on investment ensuring sustainable growth and development of AI industry.

AUTHORSHIP TO END USER

In the development of AI, during the process of coding, programming and execution the end user has the little contribution. It appears if the authorship is conferred to end user, the growth and development in AI sector will be limited. The owner and the developer will not be interested to spare their return on investments by losing the grant of copyright to the end user which will lead to restriction in third party vendor and also investment in further development of AI and an overall decline in AI industry therefore the option of rewarding the end user should be restrictive.⁹⁴

5.10. INFRINGEMENT

IPR's are given to an author to protect its work from being copied, used or getting commercially exploited without any prior permission of the IP holder. If any person does the above things then it will be considered as infringement. Thus the breach of Intellectual property right without the permission is said to be IPR infringement.⁹⁵

⁹⁴ Lucy Rana and Meril Mathew Joy, "Artificial Intelligence and Copyright- The Authorship", <https://www.mondaq.com/india/copyright/876800/artificial-intelligence-and-copyright-the-authorship>. (Last accessed on June 27, 2020).

⁹⁵ Dignath Raj Sehgal, "Copyright Infringement", <https://blog.ipleaders.in/copyright-infringement/> (Last accessed on June 27, 2020).

As technology is growing day by day there is a huge development in the sector of AI. It is not far enough that AI might also get protection under the IPR regime. Once AI gets protection then it might be held liable for the work it does.

Let's say that AI has created something because of the base material was an infringing material but has made something new of that infringed material then in such case who will be held liable for the case of infringement. If the machines are given right then it is clear that they should only be held liable for this. But how would a machine pay any penalty for the infringement. There would arise a lot many legal questions as whom will court sanction the amount to be paid and if the courts orders are not fulfilled then it would result in contempt of court. Let us now look into the Locke theory in the light of infringement of copyright in AI. Locke theory says that if a person has used his effort and expenses in creating any sort of work which might not be original protection of his labour involved in the work cannot be denied. Sweet of the brow doctrine can be seen in this scenario. If computer is creating something or generating something then they should be protected. Once we look into the commercial aspect of this, if we say that protection will not be given to the AI but to the human and big organisation and elite companies like Microsoft, Google, and Apple. Company will be getting more benefits resulting in more development in AI and betterment of the society.

If AI has created something wrong, dangerous, obnoxious or carcinogenic then, whom to make liable for these actions. AI has no feeling of fear or any such emotion which would stop it from doing any such dangerous activity. Human being has feeling of fear and the emotion or the sense to judge what is right or wrong. Human has fear because they will be regulated under the criminal law. Theory of punishment like deterrence can be imposed on them. Imprisonment or death penalty creates fear in human mind but this cannot be imposed on the AI machines. Still if we look in to the future, we cannot ignore AI protection for long as it will be of great help and with this it will also have lot many legal problems.

Plagiarism means stealing or kidnapping of men basically originates from the Latin word called "plagiarius".⁹⁶ Let us now examine plagiarism in the context of the famous AI authored book "Just This Once". The programmer Scott French did not kidnap Jacqueline Sussan physically. It is the stealing of Sussan's book named "Valley of the Dolls" and "Once Is Not Enough", this piece of work or ideas by French Scott.⁹⁷ Even though Sussan's book has made huge profit to the author still it is considered to be a copy of the original work irrespective of any gain. It is found that French did not encroach or infringe Sussan's work while investigating through conventional legal investigation systems. Then is French free from allegation? There lies the dilemma where French himself admitted using Sussan's style. He has copied the whole book making more than 6000 computer customised style from the book where every line of Sussan's book has been codified as per computer compatible instruction. The outcome from the computer is a better version where the benefit of the created work goes to Scott French. It can be concluded that French may be a good creator but in his capacity of

⁹⁶ WEBSTER'S NEW UNIVERSAL UNABRIDGED DICTIONARY 1371 (2d ed. 1983).

⁹⁷ Morning Edition: Computer Software Designed to Emulate Creative Styles, LEXIS, News Library, CURNWS File.

composing books he may be imitating other authors not being the creator himself. There is no indicative that these AI assisted works will always be an improved version of the book or the books where from the coding were made. Imitate others is a basic nature of human from early age human used to learn everything by imitating. Still then these don't come under copying or stealing of behaviour of nature but when a computer is programmed to imitate some of the style of an author or an artist then it will not be considered same as imitation by human.

- **ABSTRACTION-FILTRATION-COMPARISON TEST**

The infringement to copyright of the subject was decided by comparing both the work physically, where the original work was compared with the claimed work to find out whether it is total copy or substantially similar to the original work. After granting copyright to software programmes verification or checking of infringement were made difficult. Number of methods developed in different courts locally to determine the infringement occurred. Over decades distillation of various test procedures the Abstraction-Filtration-Comparison method had came up, where it is applied to determine if there is a copy. Two major factors are considered while determining the copying of the work or the infringement.⁹⁸

- (i) The first factor is whether or not the defendant had sufficient access to the plaintiff's work.
- (ii) The second factor is whether there is probative similarity between the defendant's work and the plaintiff's work.

Considering the work of Scott French "Just This Once" where French has admitted that he has copied the work for writing the coding here acknowledge the access to work. Here the access to the work or the book has been established by admission of the fact by French. However in other cases it needs to be proved that the defendant has sufficient access to the plaintiffs work. Let us elaborate the second factor in the line of the book by French here both the work the defendant and the plaintiff are basically novels of romance set on exotic settings, similar shallow characters and elaborated steamy love scenes analysing the above comparing both the work the similarity of both the work is established.⁹⁹ With further argument there is no exact copying of the description or the narrative, thus the similarity cannot be established. With the application of "inverse ratio" rule were it is considered the amount of Scott French admission of access to the work and degree of less similarity while comparing the work which satisfies the description of the similarity factor. It can also be augmented all the romance novel which are best sellers may be in some way or other be similar to Sussan's work. So, the conventional capacity of human to change its style according to the situation is not protectable under copyright. But in case of Scott French since he has admitted the use of Susann's work for his basic programming the discussion of whether he has copied or not doesn't arise. With lack of appropriate testing

⁹⁸ Meta-Film Association. v. MCA, Inc., 586 F. Supp. 1346, 1355 (C.D. Cal. 1984).

⁹⁹ Sid and Marty Krofft Television Prods. v. McDonald's, 562 F.2d 1157, 1172 (9th Cir. 1977).

method it may be concluded that French has copied Sussan's work and has infringed. This is where the prolonged test of Abstraction-Filtration-Comparison came into picture.

There was a famous case of *The Computer Associates International v. Altai, Inc.*¹⁰⁰ where in the Computer Associates International was the plaintiff and Altai was the defendant. In this case the plaintiff designed a program called CA-SCHEDULER; this program can basically control the entire task given to a computer. CA-SCHEDULER was designed in such a manner that by using the same code it could run on 3 different operating systems and this was only possible due to the launch of a component called ADAPTER.

Altai the defendant marketed ZEKE which was written for different operating system called VSE. To operate the MVS operating system, Claude Arney who was an ex-employee of Computer Associates was approached by James William who was an employee of Altai. When Arney left the plaintiffs company to work with the defendant he took the source code of VSE and MVS for ADAPTER with him. He created OSCAR using the ADAPTER'S source code.

Computer Associates filed an infringement case on Altai. The U.S Circuit Judge said that "OSCAR 3.4 was a copyright infringement of CA's CA-SCHEDULER and awarded CA \$364,444 in damages and apportioned profits."

But the "district court ruled that OSCAR 3.5 rewrite, on the other hand, did not constitute copyright infringement. It also ruled that the state law trade secret claims were pre-empted by the federal Copyright Act, and thus Altai was not liable for trade secret misappropriation." Both went for appeal Altai on OSCAR 3.4 and CA on OSCAR 3.5. Previously before this case protection was given to software under copyright Law. In *Apple Computer, Inc v. Franklin Computer Corp*¹⁰¹ said that "Literal elements of program code are protected by copyright". CA appealed on district court's judgement claiming that proper test was not conducted by the district court. They said that the copying of computer software's non-literal elements were not checked properly and they also claimed that "despite the clean room rewrite, there was substantial similarity in the structures of ADAPTER including flow charts, inter-modular relationships, parameter lists, macros, and services obtained from the operating system."

The court by supporting the claim said that copyright gives protection to non-literal elements of software. For the purpose of copyright law software can be considered as literary work thus also protecting the non-literal element of literary work in that. The main question which arose was to what extent the non-literal elements will be protected under copyright. Then to see what is the line between idea and expression.

¹⁰⁰ *Computer Assocs. International v. Altai, Inc.*, 982 F.2d 693, 706 (2d Cir. 1992).

¹⁰¹ *Apple Computer, Inc v. Franklin Computer Corp.* 714 F. 2d 1240 (3d Cir. 1983).

In the case of *Baker v. Selden*¹⁰² the court stated that things that "must necessarily be used as incident to the idea are not subject to copyright protection." This opinion, however, did not give any advice on how to separate the idea from the expression.

Similarly in, *Whelan v. Jaslow*¹⁰³ tried to present the differences between idea and expression by saying "that the function of the work is the idea and everything else not necessary to the function is the expression of the idea. The court agreed with district court's refusal to follow the *Whelan* logic because the test is conceptually overbroad. A program can have multiple functions and thus many ideas."

The court went for three step test which was Abstraction-Filtration-Comparison to compare the infringing material. "Finally the court after reexamining the decision of district court process and found no significant fault with it. After taking out all functional elements and elements from the public domain, only a few lists and macros in OSCAR 3.5 were similar to ADAPTER, and their impact on the program was not large enough to declare copyright infringement. The court found that the similarity in services required by the operating system was due to the nature of the operating system, thus it was not protected by copyright. Similarly, the flow charts were found to be an element dictated by external factors flowing from the nature of the work, also unprotectable by copyright law. In light of this analysis, the court upheld the district court's finding that there was no copyright infringement by OSCAR 3.5."¹⁰⁴

With respect to code, the district court observed that after the rewrite of OSCAR 3.4 to OSCAR 3.5, "there remained virtually no lines of code that were identical to ADAPTER. Accordingly, the court found that the code presented no similarity at all."

"CA's second argument for the appeal concerned trade secret misappropriation. The district court determined that the allegation of misappropriation was based on *Altai's* use of the infringing material, therefore the copyright infringement claim preempted the misappropriation claim according to 17 U.S.C. § 301. The court vacated the district court's preemption ruling and remanded the case back to the district court."

Three leg test of Abstraction-Filtration-Comparison came into consideration by different court to establish the infringement.

- **THE FIRST LEG OF THE TEST IS ABSTRACTION**

The plaintiff's work divided into small parts where it is based on an expression or a simple idea irrespective of the number more dissections were made to achieve identification of original expression by each abstracted portion. Considering the case of "Valley of the Dolls" and "Once is Not Enough", the constituent parts for dissection are the theme, background, character, settings, location, dialogues between characters etc. In the original novel a lady was aspiring to have a leading place in the industry of entertainment, where the lady

¹⁰² *Baker v. Selden*, 101 U.S. 99 (1879).

¹⁰³ *Whelan v. Jaslow*, 609 F. Supp. 1325 (E.D. Pa. 1985).

¹⁰⁴ *Computer Assocs. International v. Altai, Inc.*, 982 F.2d 693, 706 (2d Cir. 1992).

interacted with number of characters (men and women) who entered to her life and helped her.¹⁰⁵ The interactions between these characters which were set in luxurious American cities and exotic locations lead to event of exploitation, drug abuse, love making scene etc all these characters are powerful by their own right to make the novel original each of the abstraction here is with a minimum amount of description which are independent enough to serve to categorise the aspects of expression in Sussan's work.

- **THE SECOND LEG OF THE TEST IS FILTRATION**

Once the independent descriptive elements under abstraction have been constituted and identified then it is subjected to next step of analysis through filtration. Here let us consider a scenario where to persons are going to a restaurant and dining together and ordering food to dine together. Here some of the activities like going to the restaurant, the location, the description of the restaurant and settings are very general in nature which may have an independent description under abstraction. This common or general description will be filtered out. The items which are being copied from other source in the original work will also be filtered out. Any other item like poem, song, which is otherwise copyrighted by someone else must be filtered out now the leftover elements, constituents after this filtration which can be generally protectable by nature. In the next step it is to determine the infringement to the copyright with these expressions.

- **THE LAST LEG OF THE TEST IS COMPARISON**

Here the work of the defendant and plaintiff are compared in the basis of the filtered expression to make sure or determine what makes the alleging infringing work substantially similar to the original. If the basis of similarity of both the work is unprotect able for two identical works then there is no infringement. Discussing French's work "Just This Once" and "Once Is Not Enough" there is no similarity of even words however there may be arguably many underlying similarities like both the stories content a homosexual character as the lead. Both the book gives a similar feel towards the lead character as well as imagining different perspectives like glamorous facets, temptation of drugs at different level or similar location. Even though the original to books of Sussan "Once is Not Enough" or "Valley of the Dolls" and the book "Just This Once" programmed by Scott French may be legally three different book. But in the perspective of a reader it may be concluded that the reader has read the same story three times. Therefore it may be concluded this is a case of infringement to the copyright of the original story as the court have suggested. Since French admitted the use of both the book as input data to program the Macintosh IIcx then the computer could not have generated this or possibly duplicated someone else style so it can be told this book is not independent of Susann's original novel which leads to a new perspective that is AI as a person.

Computer software/programmes as original expression have been granted protection under copyright act 1957 in India. As per the Act it should not lead to any technical disagreement with other programmes. These programmes are also patentable under India Patent Act, 1970. In general the computer program or the software

¹⁰⁵ Nichols v. Universal Pictures Co., 45 F.2d 119, 121 (2d Cir. 1930) .

which does not have a technical effect is protected under copyright law. The original work of programming can only be protected under copyright.

Section 2 (o) defines “literary work and includes computer programs, tables and compilations including computer databases.”¹⁰⁶

The Supreme Court in the case of *Tata Consultancy Services v. State of Andhra Pradesh*¹⁰⁷, considered “computer software is intellectual property, whether it is conveyed in diskettes, floppy, magnetic tapes or CD ROMs, whether canned (Shrink-wrapped) or uncanned (customized), whether it comes as part of computer or independently, whether it is branded or unbranded, tangible or intangible; is a commodity capable of being transmitted, transferred, delivered, stored, processed, etc. and therefore as a 'good' liable to sale tax.” The court stated that, “it would become goods provided it has the attributes thereof having regards to (a) its ability; (b) capable of being bought and sold; and (c) capable of being transmitted, transferred, delivered, stored and possessed. If a software whether customized or non customized satisfies these attributes, the same would be goods.”

5.11. CONCLUSION

Human description, process of interpretation and creation of art piece is considered to be unique and different. Even if someone tries to follow or write like some famous author leaves a trace of his originality. In case of text generated by a machine, AI device, AI assisted computers doesn't see the uniqueness of creativity like human. In case of Scott French he has borrowed the thought or lines from Sussan's work. But he has not applied his mind directly on the text rather than subjected them to process through set of instruction derived from another book. Present days, infringement normally focuses on the description of the work rather than the means or the ways in which they were made. Thereby both the work either directly created by humans or autonomously generated by AI may be subjected to infringement of copyright.

Even though the infringement compensation is normally settled as monetary compensation some of the creations are not made for only monetary values. Sometimes the creation is made for the society, or other regions. So it suggests if not copyright other natural right through their creation may be conferred with where the computer doesn't have the capacity. The natural rights are always with the moral right where the author is morally responsible for respectability of the work in the society. With development of new technology, AI, virtuality, big data management, Information super highways, the computer generated work may be seen near to human creation where computer will acquire extracts from thousand books from one time, where the creator granting copyright to each author or piece of text or the unique contributor will be a cumbersome task. It may be concluded even programmer put more hard work than the original writer he doesn't carry a creative angle

¹⁰⁶ The Copyright Act, 1957, Acts of Parliament, 1957.

¹⁰⁷ *Tata Consultancy Services v. State of Andhra Pradesh*, 2004 271 ITR 401 SC.

to the work rather than repeat work of the original. Therefore, law should drought out the methodology to protect both.

CHAPTER 6

6.1. PROTECTION GIVEN TO ARTIFICIAL INTELLIGENCE IN RELATION TO PATENT REGIME, DEVELOPMENT RELATED TO IT AND PROBLEMS FACED BY AI UNDER IPR.

In this Ultra Modern era, Technology has been changing remarkably. Soon we will be approaching a point of transition between two different states where we can see a rise between the mechanical autonomy and AI innovations. This would lead to a situation where machine will be capable enough to create anything that an individual does. Nowadays a computer is independent enough to carry out assignment, demonstrate numerical theorem, compose unique verse & music and also paint original work. All these can be observed by the current achievements made by the computers. With passing time AI will be an integral part of Computer generated

inventions. It works as equipment for the computer generated inventions. Applying AI to the invention procedure is relied upon to empower advancements that would not be conceivable through human inventiveness alone, regardless of whether because of the multifaceted nature of the issues or human intellectual “blind spots. This development would help in increasing the productivity and profitability and also decrease the cost of innovation by increasing the speed. Some claim that with the ongoing progress of AI, machines will surely shift the creativity of human innovators and leading human innovators will land up becoming the plane makers of huge inventions.¹⁰⁸

PC inclusion in the imaginative procedure falls on a spectrum.¹⁰⁹ Human creator makes use of computer for doing calculation, spells checking or uses it to search words. Computer works as an aid to human creator. It assists human creator with his creation but without attributing any creativity or originality of its own. At the most distant end of the range, a PC could self-sufficiently produce yields that would be patentable innovations if generally made by a human. People who characterize the issues and select effective arrangements give direction to the computer which is utilized to create several conceivable arrangements. AI is a combination of mechanical technology, which also includes physical essence with the possibility to improve the probability that a PC could create inventions without direct human mediation.¹¹⁰

The outcome of Computer created works in copyright law is slowly raising but in case of patent law there is a very little examination of the result of Computer produce development. The patent framework can possibly get affected by the advancement of AI. As it is not ready to accommodate AI. Once the computer produce development is done it will lead to vital issues with respect to the legal outcomes, whether the right is being provided or not to the individual, compensation is given for not during infringement.¹¹¹ All the matters has to be kept in mind.

In light of legitimate instability with regards to quickly propelling AI innovation, this chapter will look at whether the current lawful ideas in patent law are suitable for PC generated creations, and what adjustments might be important to guarantee that the patent framework's principal targets keep on being met. This chapter will investigate two contemporary classes of the cutting edge: robotized era of patent writings; and, AI calculations utilized as a part of the inventive procedure. At last, this chapter will theorize on possible economic and policy effects were AI to progress to such an extent that PCs could create independently “in nature.”

6.2. THE EFFECT OF ARTIFICIAL INTELLIGENCE IN THE INVENTIVE PROCESS

¹⁰⁸Liza Vertinsky & Todd M. Rice, “Thinking About Thinking Machines: Implications Of Machine Inventors For Patent Law”, <https://www.bu.edu/law/journals-archive/scitech/volume82/vertinsky&rice.pdf> (Last accessed on June 28, 2020).

¹⁰⁹ R King, “Rise of the Robo Scientists”, http://www.cs.virginia.edu/~robins/Rise_of_the_Robo_Scientists.pdf (Last accessed on June 28, 2020).

¹¹⁰ R Abbott, “ I Think, Therefore I Invent: Creative Computers And The Future Of Patent Law”, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2727884 . (Last accessed on June 28,2020).

¹¹¹ R King, “Rise of the Robo Scientists”, <https://www.technologyreview.com/s/401134/origin-of-thepatents/> (Last accessed on June 29, 2020).

TECHNOLOGY

AI is used as tools in the invention process. The use of AI algorithm can bring limitless changes in the regular human invention processes. Computers using AI algorithm will make it easier and less time consuming to create any work. It would also lessen the pressure on human being to complete the work in given time frame. AI algorithms when used can quickly and productively create, recreate and assess extensive quantities of potential arrangements. The process of using AI algorithm is useful in solving complex problems where people confront troubles physically planning inventions because of many-sided quality, particularly where there are a variety of factors, as with nanotechnology¹¹² and biotechnology.¹¹³ Moreover, the innovations made might be sudden and conceivably problematic since, contrasted with customary R&D, AI can all the more effortlessly draw upon different and perhaps assorted fields. With the current situation with AI innovation, in any case, human resourcefulness is as yet important to characterize targets, parameters and achievement criteria. While the use of AI as a tool in the initial stages of the invention has helped in making of patentable innovation for few years, While the utilization of AI has helped with making patentable inventions for quite a few years, late changes to AI and exponential development in processing force will probably additionally empower PCs to create valuable inventions and end up noticeably significant drivers of advancement in fields like electronics, robotics, health and pharmaceuticals, materials, and nanotechnology. In fact, business administration's are currently accessible that produce inventions and technology optimisations using AI algorithms set up of human intelligence. One such organization, IProva, claims that many patent applications have been filed by its customers in light of the inventions it has conveyed, some of which have been granted.¹¹⁴

ARTIFICIAL NEURAL NETWORKS (ANNs)

Another type of AI is Artificial Neural Networks (ANNs)¹¹⁵ which are basically accrual of binary switches that is helping to reanimate neurons in a natural brain.¹¹⁶ ANN has been utilized as a vehicle to generate newborn thoughts. To process Artificial Neural has been classified in to different layers which includes information with numerous levels of reflection. The finer components of input data with their applicable weighting capacity have been identified progressively in each layer. Setting of weighting capacity through the

¹¹²Michael Berger, "Artificial Intelligence in nanotechnology research", <https://www.nanowerk.com/spotlight/spotid=32741.php#:~:text=While%20nanotechnology%20combines%20the%20knowledge,n%20eural%20networks%20or%20evolutionary%20algorithms> (Last accessed on July 3, 2020).

¹¹³"Artificial Intelligence in nanotechnology research", <https://nanomedicine.nanotechconferences.org/events-list/artificial-intelligence-in-nanotechnology-research> (Last accessed on July 3, 2020).

¹¹⁴ G Sacha and P Varona, "Artificial Intelligence in nanotechnology", <https://pubmed.ncbi.nlm.nih.gov/24121558/> (Last accessed on July 3, 2020).

¹¹⁵Jake Frankenfield, "Artificial Neural Networks", [https://www.investopedia.com/terms/a/artificial-neural-networks-ann.asp#:~:text=An%20artificial%20neural%20network%20\(ANN\)%20is%20the%20piece%20of%20a,by%20human%20or%20statistical%20standards](https://www.investopedia.com/terms/a/artificial-neural-networks-ann.asp#:~:text=An%20artificial%20neural%20network%20(ANN)%20is%20the%20piece%20of%20a,by%20human%20or%20statistical%20standards) (Last accessed on July 5, 2020).

¹¹⁶ Y LeCun, Y Bengio and G Hinton, DEEP LEARNING, 2015 ,pp.436-444.

system training is done to understand the information data and generate responses. The system training is supervised through marking the information for the network where from the system can take the care of unsupervised information without system dependency. As per different weighting diversity applied to the input layer by the trained ANN which works for the weighting of next level information where the weight of each level of data is marked till the last layer or followed till the previous layer.¹¹⁷

Dr. Stephen Thaler made new inventions named “Creative machine” utilising ANN as a vehicle.¹¹⁸ In this creative machine framework with the association of ANN new inventions produce yield while the next ANN sees growth in the flood of first yield as per the operator’s criteria. Unsettling the yield influences in the first ANN, the second ANN changes the positions as per the first ANN value or output.

The Creativity Machine is attributed with adding to various inventions; for instance, from existing toothbrush designs and their execution measurements, the Creativity Machine delivered a novel cross-bristled arrangement for the Cross Action toothbrush design that had critical execution points of interest regarding plaque expulsion and gingival wellbeing contrasted with other toothbrush designs.

The creative machine has been utilised in drug discovery. The different parameter of discovery of drugs includes effectiveness, side effects, reaction to human in general are part of cumbersome process of drug trial and experiment. The ANN with many layers is used to generate next level yield without actual experiment on human which saves time and money. The tranquilise exercises of the drugs are foreseen with the use of ANN. In general the use of ANN which makes quicker drug revelation thereby is enhancing the quality of the drug. This further improves the human well being and business opportunity.¹¹⁹

ROBOTIC SCIENTISTS

The research facilities normally capable of making observation devise hypothesis, make suitable experiment to test the hypothesis and suitable automated laboratory equipment utilisation to conduct this experiment and observe the results.¹²⁰ The above pattern of research facility robotised to enhance invention-generation technology.¹²¹ The AI algorithm is applied to the physical lab under the frame work of Robot Scientist to

¹¹⁷“Introduction to Artificial Neural networks”, <https://towardsdatascience.com/introduction-to-artificial-neural-networks-ann-1aea15775ef9> (Last accessed on July 5, 2020).

¹¹⁸Stephen Thaler, “The creativity machine paradigm: withstanding the argument from consciousness”, https://www.researchgate.net/publication/284031928_The_Creativity_Machine_Paradigm_Withstanding_the_Argument_from_Consciousness (Last accessed on July 7, 2020).

¹¹⁹Jignesh Patel, “Science of the science, Drug Discovery and Artificial Neural Networks”, https://www.researchgate.net/publication/228059750_Science_of_the_Science_Drug_Discovery_and_Artificial_Neural_Networks (Last accessed on July 7, 2020).

¹²⁰Wayne Aubrey, “Towards Robot Scientist for Autonomous scientific discovery”, https://www.researchgate.net/publication/40867995_Toward_Robot_Scientists_for_autonomous_scientific_discovery (Last accessed on July 8, 2020).

¹²¹ Elizabeth Bisland & Andrew Sparkes, “Cheaper Faster Drug Development Validated by the Repositioning of Drugs Against Neglected Tropical Diseases”, <http://rsif.royalsocietypublishing.org/content/12/104/20141289> (Last accessed on July 8, 2020).

autonomously conduct research experiments.¹²²This Robot scientist work neither requires costly human mediation nor consumables important for trial, minimising the resultant wastage. In the drug development research one robot scientist has been designed named “Robot Eve”, for identification of compounds to fight against drug resistant malaria.¹²³ The Robot Eve finds out the characteristics of around a set of 5000 molecules the most effective one. It screens the next remaining molecule shaped to predict the effectiveness. With this repetitive and accurate process a new anti malaria drug was discovered with the help of Robot Eve.

GENETIC PROGRAMMING

Biological evolution is always a matter of curiosity for human .Evolutionary Algorithm are used to discover solutions in genetic programming where human has got no direct solution. So, Genetic Programming (GP) can be used to find the functional relationship between two different virtual results of biological evolution through evolutionary algorithm. With the assistance of AI or self generated algorithm the set of programming was made for another generation were duplication, reproduction, transformation and best solution was met. Different criteria’s were controlled with number of subsets, programmed and pre programmed. With GP the variation or differentiation between earlier invention and inter relationship between variables are minutely understood and tracked by the software. Different reproduction patents, non infringing work, less patented item can be created by GP autonomously without the involvement of human. This can be concluded that AI assisted GP can deliver results comparable to human deliverables.

6.3. AUTO-GENERATED AND COMPUTER-ASSISTED PATENT TEXTS

TECHNOLOGY

Specified use in particular machine where the text is generated autonomously by computer software. The computer assisted text creation algorithm is used to create other variants of existing patent. The algorithm so used for rearranging phrases, substitutes terms with suitable similar or opposite words. The text so generated is not random in nature which is called Cloem. This is used to find the best possible draft which can be used to claim alternate patent beyond the scope of original works. Cloem is company based in France which applies natural language processing (NLP) technology to assist patent applicant to create variants of patent claim called Cloem. Cloem can generate and publish one or more generated text as publication. These can serve through a defensive publication as prior Art to prevent another party obtaining a patent on that subject matter.¹²⁴

The website “AllProirArt” publishes the Cloem, one such Cloem is: <https://allpriorart.com/1461187677-331b11e0-4e4c-4897-a71a-51991ee242cd/i.e>.

¹²²“Robotic scientist make first discovery”, <https://www.sciencemag.org/news/2009/04/robotic-scientists-make-first-discoveries> (Last accessed on July 9, 2020).

¹²³ “Robot makes scientific Discovery All by itself”, <https://www.wired.com/2009/04/robotscientist/> (Last accessed on July 9,2020).

¹²⁴“Cloem beta reinventing creativity”, <https://www.cloem.com>. (Last accessed on July 10,2020).

“the invention relates to a reflection probe for measuring properties of liquid and/or solid substances, and to the use thereof. The computer is ergonomically designed for ease of use and is streamlined for artistic viewing. The first control system of the apparatus has a determiner configured to determine exposure variables of the first beam of pulsed laser radiation required to cause the component to become concave towards the laser irradiated side.”¹²⁵

Presently, the NLP technology is primitive so the number of claims generated by this computer generated system is of no worth. However, with the improvement in natural language processing and computing power, this process shall produce more useable patent text.

POLICY IMPLICATIONS OF COMPUTER-GENERATED PRIOR ART

Using NLP technology, claims are generated then it gets published in AllPriorArt and the concept is so patented is recognised or accepted by European Patent Office (EPO) and the UK courts. With this publication of text the concept are put into public domain before it is used by any of the competitor. This publication of claim helps in preventing competitor from granting follow-on patents. With the help of this publication the chances of original patentee can burden his monopoly. Before hand publication of claim will prevent patent trolling. And blocking implementations of seed invention.

STATE OF THE ART

The novelty of any invention depends on its patentability or its validity in litigation. With the existence of prior publication of computer generated text which was invented in a clear and distinct manner. The novelty is there by destroyed.

In case of voluminous generated text by such technologies, the usefulness and accessibility is uncertain. The questions of legal significance of these texts are yet to answer. The online publication of such computer generated patent text on a website is recognised by limited legal authorities. Thereby the intention of hosting the patent text in the public domain is defeated. Therefore, some terms and conditions need to be spelled out with proper disclosure to the URL.

- 1) The website should be available/ and visible through different search engine over world wide web using related or relevant key words.
- 2) The unambiguous accessibility to the URL to be ensured for a long enough time period for public.

Moreover the patent text publishing websites like AllPriorArt and Cloem should meet the above directives. In case of unpublished text the generating company should protect by technical means which is not open for public.¹²⁶

¹²⁵ All Prior Art , <https://allpriorart.com>. (Last accessed on July 10,2020).

¹²⁶ T 1553/06 (Public availability of documents on the World Wide Web/PHILIPS) of 12.3.2012 [2012] ,<http://www.epo.org/law-practice/case-law-appeals/recent/t061553eu1.html> (Last accessed on July 10, 2020).

The concept of physical accessibility by public can be get rid with online publication at predominant and pre-decided website. The computer generated text may not be instructive to the skilled reader as in the case of physical accessibility. However mere physical accessibility is of computer generated text sufficiently and intellectually instructive to the skilled person in his domain of general knowledge. In general the matter may be contained in a document but not available as it is submerged in it. Computer based software generated patent text being considered as the part of the state of the art is argued to content huge amount of non related or irrelevant text inside the document.

It is difficult to locate the related/ relevant portion of useful published prior art including quantity. Furthermore the skilled person would be in a position to find out irrelevant and non important text while accessing the patent text which was not possible in case of computer generated patent text published by AllPriorArt or Cloem. It's expected that the skilled person to be aware of the broader general field as well as related parallel fields which is presently not possible in the web pages of AllPriorArt or Cloem it is difficult in part of the skilled person to remain abridged of computer generated patent text published in the website. While considering all above short falls and limitations the computer generated and assisted patent text considered as part of state of the Art faces more difficulties to satisfy the requirement of novelty and inventive steps. In this age of improving software and innovative computing methods which use write software program and to create algorithm for generating such improved text. Publishing of such high end computer generated patent text could therefore preclude the patentability of legitimate inventions.¹²⁷

LEGAL UNCERTAINTY

Basic principle of patent system to have certain reasonable return on the inventions while encouraging investment in R & D by the innovators. Inventions described by computer generated text exponentially expand the art. The patentability of the inventions would be put into questions thus increasing the likelihood of patent being invalidated in the ground of lack of inventive steps. The market value of the patent and the patent holder's ability to extract reasonable value through licensing depends on the validity and enforceability. These are the legal uncertainty of investment in patent system. These uncertainties further influence the patent holder's behaviour to generate benefit from patenting an invention thereby enhancing the R&D activities to attempt to attend patent protection and to litigation. At the time of enforcement of patent protection the return on so called investment in innovations are uncertain due to undermining the ability to deliver the return incentivise research knowledge and innovation.¹²⁸

PATENT OFFICE BURDEN

To find out patentability of computer generated text a thorough search is made for the generated text to determine whether any relevant text forms the part of the state of the art. Presently for maximising profit most

¹²⁷Dennis Crouch, "Would You Like 10,000 Cloems with that Patent?", <http://patentlyo.com/patent/2014/10/would-cloems-patent.html> (Last accessed on July 11,2020).

¹²⁸ A Marco and S Vishnubhakat, "Certain Patents" ,16 YLJT (2013),pp.103-133.

of the offices are running under staffed and over tasked. The patent applications are backlogged for a longer period before subject to scrutinization. Thus the additional burden imposed by the exponential growth of the pending prior art. To ascertain or achieve higher level of certainty the patent office involves more resources for examination of maximum number of prior arts. They may require skilled person who are knowledgeable both in field of expertise as well as in interpreting and searching computer generated text. Here AI can brought into action were the AI algorithms is utilised to recognise the pattern and flow within large amount of available data.

PATENTABILITY

Normally, patent application generated using computer or computer assisted specification are granted patent meeting the statutory requirement of particular law of land. This may include the most promising claims using the shield patents specifications the patent application may be scrutinised as multiple claim variants. In case of monopoly patent obtained for inventions ascribed for computer generated or computer assisted specification would generate an incentive for improved text generation technology. As a result, this high end technology will identify useful invention among potential nonsensical text or specification likely to be generated by cloems. Normally the original invention is flattened to get patent on an enlarged monopoly for the business using computers generated/ assisted claims. The computer generated text / specification would have the ability to be novel and distinct from original seed claims. The mere substitution of synonyms is likely to result in an inventive step over an original patent. But the use of antonyms will generate more novelty to the patent. A skilled person with proper knowledge of technology and computer generated language can only rearrange the part of any available patent specification to avoid its identification from predictable solutions.

All these available software and technologies to create patentable computer generated or computer assisted specification without significant rearrangement or rewriting are basically based on the Patent Act of UK 1977 were the patent act says that the patentable specification must “disclose the invention in a manner which is clear enough and complete enough for the invention to be performed by a person skilled in the art” without much effort. Thus, these statutory requirements are intended to ensure the patent system serves its public awareness notice function. The obligations to provide full and meaningful disclosure, In case of computer generated patent text specification failed to define adequately the scope of the monopoly.

Thus it hampers the future innovation where others avoid working in this area for fear of infringing of the existing patent. But ironically in general all the variants of computer generated text are sent for search or examination report. This burdens the patent office working there by increased the chance of low quality patent are granted. In case of prelude patents the above tactics is used for potential patent trolls who works for financial rearward before getting into actual legal litigation. Thus the original innovation work in AllPriorArt

and Cloems are affected. In Indian context we still lack in organising and institutionalising computer generated or computer assisted patent specification.¹²⁹

6.4. RIGHTS

PATENTABILITY OF COMPUTER-ASSISTED INVENTIONS

Inventions created using AI i.e computer assisted inventions have already granted patent. It is common understanding that the inventions with the help of AI will be challenged even though AI has become an integral tool in inventing processes on date no legislative or judiciary consideration has been done in this regard. The provision of disclosing the methods utilised for the invention is not disclosed. In some of the countries the method of arriving inventions have been described in different manners US law has codified a prohibition on discriminating on this basis, declaring that “Patentability shall not be negated by the manner in which the invention was made.” In case of “search-and-test discovery” the results are patentable under UK law therefore any analogous system similar to this invention method expected to be cover under patent act. The role of computer programmer in AI assisted inventions process should be examined and reviewed.¹³⁰

In case of AI generated invention, novelty plays a key role in the inventive process used. If the AI algorithm which is utilised lacks variability in its outputs, or is dependent on similar kind of data sets then novelty is said to be absent. In case AI algorithm has included any other variability, then it would tend to create more novel invention. When compared between human inventor and Computer assisted inventions, a Computer has a better possibility to correctly analyse the prior art. Functionality can also be included to assure Novelty. Even though novelty is considered as vital in any invention but creativity and inventiveness plays more importance. Patentability requirement of an inventive step demands that an invention “is not obvious to the person skilled in the art, having regard to any matter which forms part of the state of the art.”So, therefore the monopolies in technological modification and progresses over obvious invention would contribute a little to the society. Given the ability of computers to supplement human intuition by using computational power .To serve the requirement of inventive steps, theoretical skilled person and the level of obviousness has to be reinterpreted in light of AI.¹³¹

Identifying the Hypothetical person having basic and minimal skill in the art is the first step in assessing an inventive step. “This skilled person is assumed to have unlimited capacity to formulate the vast quantities of relevant literature and to create mosaics of it, although in an uninventive manner.”¹³²The role of AI assistance

¹²⁹ Tim Cushing, “Patent Not Sufficiently Broad Or Generic? Cloem Will Help You By Automatically Generating Dozens Of Nearly Identical Patent” ,<https://www.techdirt.com/articles/20150220/08414930087/patent-not-sufficiently-broad-generic-cloem-will-helpyou-automatically-generating-dozens-nearly-identical-patents.shtml> (Last accessed on July 11,2020).

¹³⁰Michael McLaughlin, “Computer Generated Invention”,https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3097822 (Last accessed on July 12,2020).

¹³¹ Erica Fraser, “Computers as Inventors- Legal and Policy implications of Artificial Intelligence on Patent Law”, <https://script-ed.org/article/computers-as-inventors-legal-and-policy-implications-of-artificial-intelligence-on-patent-law/>(Last accessed on July 12,2020).

¹³²Technograph Printed Circuits Ltd v Mills & Rockley (Electronics) Ltd [1972] RPC 346 at 355.

in inventions cannot be ignored with limited data handling capacity of any skilled inventor. To achieve a better and a unique patent text only the skill of the inventor is not adequate enough. The level of AI involvement technology must be enhanced from its existing level of assistance. It is apprehended that the more and better use of AI assisted text may reduce the importance of skilled human invention. Greater innovation cannot be achieved only with personal knowledge and skill it recognises other available tools present with an inventor to achieve the inventive step. It is expected that the skilled person engaged in invention should have understanding of the basic technical innovation and the patent specification generated out of involvement of AI. Some of the inventions made in assistance with the AI may land finally at a general outcome which has already been existing. The AI is not programmed enough to differentiate between the new and the already existing inventions. In some inventions achieved with the help of AI may be seen as obvious because of the inevitability of discovery. Discovery of anything is not a certain or achievable invention with novelty and uniqueness. There will be a huge gap of innovation level achieved by a skilled person assisted with AI based technology. Therefore, not considering the use of knowledge of AI technologies, while granting the patent may result in unwarranted monopolies. There is a need of standardisation of AI technologies level of involvement in preparing patent specification In India specific guidelines should be made to make level ground for the preparation of state of art of patent specification.¹³³

With the use of bigdata management and machine learning the skilled level of human being will play a minor role in coming days. Therefore the adoption of level of computational capacity needs to be standardised or regulated to attain the higher level invention. The methods are already been standardise in some of the field like drug discovery, molecular screening which are in use. Therefore this is the right time to take of higher combination and AI based technology assistant to strengthen the level of innovation for patent specification.

PATENTABLE SUBJECT MATTER

Desired tangible and patentable invention can be obtained with the help of higher AI based technologies. Multiplicity of results can be produced with superior AI algorithm which can describe a broad class of invention. The subset describing separately other classes are not considered. There by the patentee can ask for a monopoly over the entire class of inventions. But with the growing trend in technology advance meant in AI and Big-data the patent obtained in above method may not be relevant for a longer period. So, the return on investment in patent will be subjected to specific time period. The standard practice of granting patent may not be found real in future. Granting of patent to software or the algorithm to make software is not free from controversy because the same output can be achieved from different set of software or program. Under different patent Acts computer programs are not covered under patentable subject matter here in this dissertation the scope of granting patent to computer software or programmes is not covered. However the AI

¹³³ P Kohlhepp, "When the Invention is an Inventor: Revitalizing Patentable Subject Matter to Exclude Unpredictable Processes", 93 Minnesota Law Review (2008), p.779.

algorithms are only considered part of AI system output where the technical result can be covered under Patent Act.¹³⁴

PATENT FLOODS

With the growth in AI systems the patent work will be faster and more inventions will be made. A huge number of patents can be registered for any specified subject which will be a matter of constrain for the development in that field.¹³⁵ With this a huge number of patents for individual and different classes of invention will be available on virtual platform which will be similar to flood in general sense this flooding of patent may result in low quality patent approval.¹³⁶ There is need to categorise or number all such patent application for further use and new methodology to be put in places for processing these patents which will be at a faster rate with better quality.¹³⁷

6.5. AUTONOMOUS COMPUTER-GENERATED INVENTION

With breakthrough futuristic development in Big-data management, machine learning and AI algorithm may lead to autonomously invention of patent specification within the foreseeable future. There is a significant venture capital investment into start-ups engaged in patent works related technology companies. The prospective companies may accelerate the AI based innovation with little or no involvement of Human. The basic judicial or legislative consideration to the patent innovation will not make much impact on patent specification.¹³⁸ Further to this we are going to discuss the impact of higher utilisation of AI algorithm in Autonomous computer invention.

Law is not able to cope with the speed of innovation and judiciary arise when there is a conflict. Law is still giving their judgement based on the old laws. After sometime all the conflict will be focusing on technology.

6.6. AUTONOMOUSLY GENERATED INVENTIONS

Patent related inventions are traditionally considered as a work of human intelligence and intellect. It is always a brainchild of a good inventor of patent text which is utilised to protect the investment and financial interest of the technological work which has been patented.¹³⁹ Whereas in the case of higher use or no use of human intelligence engaged in writing the patent text the basic question is about the existence of the patent law itself. Therefore there is an urgent call to examine the concept of invention as laid down in different legislation,

¹³⁴B Roin, "The Disclosure Function of the Patent System (or Lack Thereof)", 118 Harvard Law Review (2015), p. 2009.

¹³⁵ R King, "Rise of the Robo Scientists" <https://www.technologyreview.com/s/401134/origin-of-the-patents/> (Last accessed on July 13, 2020).

¹³⁶R Abbott, I Think, Therefore I Invent: Creative Computers And The Future Of Patent Law , (2016) 57 Boston College Law Review 1079-1126, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2727884 . (Last accessed on July 13, 2020).

¹³⁷M Meurer, "Business Method Patents and Patent Floods", 8 Washington University Journal of Law & Policy, (2002), pp.309-339.

¹³⁸C Davies, "An Evolutionary Step in Intellectual Property Rights- Artificial Intelligence and Intellectual property", 27 Computer Law & Security Review,(2011) , p.601.

¹³⁹ C Soans, "Some Absurd Presumptions in Patent Cases" (1966) 10 ,p .438.

existing patent office practice and interpreted in jurisprudence. The different agreement and treaty agreed upon between different countries with respect to patent need to be redefined. In India the domestic legislation must come up with futuristic view as an ancient and developing country. The basic of higher end AI oriented computer used may not be the real option as in the case of some autonomous computer generated invention. Particularly useful in the field of subjects endangering humanlife, accessibility, cost involvement like deep sea exploration, outer space experiment, drug research etc. Computers should be used in such places which involves high risk. But with the use of enhanced and advancement of computational technology, big data management, AI interface and machine learning the unforeseen result of granting of patent need to be re-examined for interpreting the existing law for the requirement of the human race. The result so obtained from re examination of usability and interpretation of law for human race will lead to higher expectation of patent law.

The next big question is regarding incentivising the output of the Autonomous invention through patent with use of AI. The validity of time limited monopoly is the major criteria of granting incentive. Presently, the enhanced computing capability of computer and AI has resulted in more imitation then original work because non involvement of human and absence of adequate incentive for the inventions. This knowledge of manipulation by computer may lead to misappropriation of fresh and innovative inventions. Which may lead to a economic distress in the market.¹⁴⁰ The right holders interest, the futuristic business opportunity, effectiveness in public life and economical growth are the balancing factors for designing incentives and market risk. So balance designed and calibrated patent system may have the potential to encourage patent innovation which will help to generate more opportunity hence,economical growth. The broader senses of innovation where more acceptances can only be incentivise. Another basic question is awarding or incentivising.¹⁴¹ Accelerated innovation and exponentially generated number of inventions with help of computer generated specification will require less skill and less resource as the repeated nature works can be executed directly by computer at a faster phase with more accuracy. In cases where the human intervention is not readily available and accessible and the massive and the analysis of massive data beyond cognizable handling capacity of human. To achieve a better output at lower cost autonomous a generated invention is preferred in this age of cut throat competition. The low cost and more number of widely acknowledge unique invention is autonomously generated by computer. It takes care of majority technological requirement therefore democratising the invention. More use of high end computers with AI algorithm in invention of autonomous patent specification the contribution of human intelligence may affect. The invention's speciality and exceptionality of human talent could evaporate as process of invention. In absence of above there could be a possibility of inventions repetitive with lack of real value and create confusion with high rate of changes.

¹⁴⁰K Lybecker, "How to Promote Innovation: The Economics of Incentives",<http://www.ipwatchdog.com/2014/07/21/promote-innovation-the-economics-of-incentives/id=50428/>(Last accessed on July 14 ,2020).

¹⁴¹ M Perry and T Margoni , "From Music Tracks to Google Maps: Who Owns Computer-generated Works?", 26 Computer Law and Security Review, (2010),p. 627.

There may be potential failure to generate and recognise path breaking innovation which can only be possible with human inventions. Reduces the R and D cost, then prevent other player to come into the field.¹⁴²

With autonomous computer generated system, manufacture will be flooded with number of innovation which could result in use of natural resources without much benefit to mankind. Considering the return or investment on R & D AI based generation of patent specification has got another disadvantage of over killing of basic objective of monopolising product and granting patent. Autonomous comp generated invention may create thousands of creation in a small field where the expectation of return are more which results in potential concentration of patents. This will prevent others to work in that field. In the restrictive market the product valuation will be inflated. In present day context in India keeping futuristic technological and economical growth in country the computer assisted inn AI environment without human intervention should be protected. Thereby human invention and AI assisted generation can co exists.

6.7. STATUS OF THE EXISTING LAW IS NOT SUFFICIENT

Identity of the inventor of a patented work should be mentioned in the published patent application as per the Domestic patent law and International Agreements. Legal support is given to the inventors in case whose name was excluded from the patent application, this is only possible in few jurisdictions. Recognition as a patent holder is important so that the patentee can receive any economic benefit arising out of the patent. For patent system it is important to encourage human creativity and without recognition patent system would lose its legitimacy or value in front of the public.

UK

“Patent law also provides benefits to the employee inventors, under Patents Act 1977 of UK inventors are eligible under certain circumstances to receive compensation from the employer who has received outstanding benefit from an invention.

This is important as it encourages and boosts the intellect of the human who has developed such invention. An invention made by an employee:

- Made in the course of normal duties or in the course of the duties falling outside the normal duties, but specifically assigned to him.
- At the time he had a special obligation to further the interests of the employer’s undertaking.

¹⁴² P Belleflamme, PATENTS AND INCENTIVES TO INNOVATE: SOME THEORETICAL AND EMPIRICAL ECONOMIC EVIDENC, 2006 , p. 278.

In both of the above cases the invention belongs to the employer. Any other invention by the employee belongs to him.”¹⁴³

US

According to US laws the owner inherent the ownership right of his invention. In case of Government employee does any invention during his office hour or using government facilities then the government will have the right. In case of government contribution is found to be not justified or insufficient interest in the invention then the employee can own the right.

“In case the employee owns the invention, the employer may be entitled to shop rights that are right to practice the invention on a nontransferable, royalty free basis, as a matter of equity for making use of governments or employer’s resources.”¹⁴⁴

India

In India, patent was only given to product till 2002, after the amendment in 2005 process patent was also given for invention which complied with the Patent Act 1970 and fulfilled the criteria of Patent. As per Indian Law, According to Sec 2 (p) of the Patents Act, 1970 defines the term “patentee”. “Patentee means a person for the time being entered on the register as the grantee of proprietor of the patent.”¹⁴⁵

According to Patent Act, 1970 Sec 2(y) "true and first inventor" does not include either the first importer of an invention into India, or a person to whom an invention is first communicated from outside India. This definition states that as per Indian law the first or the true inventor will be the owner of that invention which means basically a natural person who has invested his creativity, time, his own intellect and understanding in building the invention.

“Once a patent for an invention is granted, it is important to consider

- (1) If the patentee/proprietor of the patent is going to manufacture, market, sell and/or distribute the invention,
- (2) Whether the patentee/proprietor of the patent is going to sell all rights in his/her invention to someone else for a sum of money, or
- (3) If the patentee/proprietor of the patent will license someone else to produce and bring the patented product to market under specified terms by the Patentee that must be met for the licensee.”¹⁴⁶

¹⁴³<https://www.khuranaandkhurana.com/2016/05/31/employee-vs-employer-country-wise-ownership-rights-on-ip/>(Last accessed on July 15, 2020).

¹⁴⁴ Ibid.

¹⁴⁵ The Patent Act. 1970, Acts of Parliament, 1970 (India).

¹⁴⁶Saipriya Balasubramanian, “Ownership And forms of transfer of patents rights in India-A primer”, <https://www.mondaq.com/india/patent/610610/ownership-and-forms-of-transfer-of-patents-rights-in-india-a-primer> (Last accessed on July 15,2020).

When there is any infringement regarding the patentee's invention then as patentee being the first and the true inventor should get all the compensation/ benefit without any legal implication with whom patent has been shared.

Current law is not sufficient because with pace of time the innovation relating to the technology is growing day by day and the laws are not ready enough to cope with the new changes. For instance a new invention is developed and it gets a patent. The innovator gets an incentive of limited monopoly but before the expire of the monopoly if somebody brings in an advanced new innovation with better features then the previous innovation then it would lose its importance. Patent law is still focusing on the old laws to deals with the advanced technology.

6.8. OWNERSHIP

At first, the basic ownership of a patent or the beneficiary of patent is directly link to the inventor of the patent innovation. The inventor in general is the first owner of the patent. If the innovation is made through employment or contract as per the patent act of 1977 UK the employer has the superior right. In case, of inventions autonomously generated by computer with the help of AI algorithm without human intervention then the program or the computer is recognised as a legal person and could be called the first owner. By granting patent to the first owner that is the first owner in this case requires a contract or a legal provision to realise the gain through assigning or licensing all downstream inventions. Where the computer is the first owner and the legal benefit goes to the inventor. The settling of infringement or other dispute is unanswered due to the legal entity of the computer.

The conflict regarding the ownership between the employer and the employee over an invention has caught special attention through a case in Bombay High Court.

In the case of *Darius Rutton Kavasmaneck v Gharda Chemicals Ltd & ors*,¹⁴⁷ the High Court found “that the defendant Dr Gharda who is the managing director, of a company, did not owe any fiduciary duty to his principal company to register the patents in the company's name, as he was not under any duty to invent in his capacity as managing director.” “The Bombay High Court has recently found that patents filed by employees can belong to the employee if the employee was not been engaged or instructed to create inventions as part of his employment or during working hours.”¹⁴⁸

6.9. INFRINGEMENT

¹⁴⁷ *Darius Rutton Kavasmaneck v Gharda Chemicals Ltd & ors* (2014) SCC Online Bom 1851.

¹⁴⁸ “India: Patents belong to employee if inventions not created as part of their employment”,

<https://hsfnotes.com/employment/2015/03/02/india-patents-belong-to-employee-if-inventions-not-created-as-part-of-their-employment/#:~:text=Team->

,India% 3A% 20Patents% 20belong% 20to% 20employee% 20if% 20inventions% 20not,as% 20part% 20of% 20their% 20employment&t ext=The% 20Bombay% 20High% 20Court% 20has,employment% 20or% 20during% 20working% 20hours (Last accessed on July 15, 2020).

The autonomous computer generated patent specification can be subjected to copyright infringement on the claim generated out of competitor's specification. At first instance there should be enough or substantial part of text from the patent specifications match with the computer assisted or generated patent specification. The copyright law and its applicability to the invented patent specification varies from country to country because of non standardisation and non patent equality. For example, In UK the cloems are under patent which are used in commercial reproduction. In German the commercial copyright protection is applicable till it is published so the patent public once it is published. But in USA the patented invention or specification document is only allowed for free reproduce same as the patented. Till date it is not clear the status of autonomously computer generated patentable invention can be listed as inventor under legal provision. Due to uncertainty of inventor ship under different prevailing laws the entitlement to a patent can be the basis of defence to invalidity of an infringement action. Till date the understanding of inventor is a natural person who is behind the formulation of concept or part of concept of the patent or he is the applicant of granting of patent. In case of autonomously computer generated case patent the approach to patentable concept has been changed from physical involvement to mental creation. Till date no legislation has been made to interpret the inventor other than natural person. So this leads proper identification of the inventor where the infringement benefit can be reaped off.

At the ground work human operators, software designers, AI algorithm developers are involved in autonomously computer generated invention. The above contributors are legally not identified as the inventor. This will lead to the justification of computer being the major contributor to the inventing concept is defied.

In case of completely autonomous computer based inventions the identification of the inventor will be much more complex. There may be three possible outcomes for the above complex situation :

1. The human as employer, computer programmer,
2. Allow the computer as a legal entity ,
3. Eliminate the identification all together.

THE HUMAN AS EMPLOYER, COMPUTER PROGRAMMER

Identifying the inventor is not that easy due to number of steps involved and number of stakes claimed to the business. The major role of AI algorithm cannot be ignored for a distinct output which indicates the role of the AI algorithm designer but the algorithm itself is irrelevant under IP law due to its assessment from a common law. Thus AI algorithm cannot be an inventor as per IP laws. In UK the copyright law says "taken to be the person by whom the arrangements necessary for the creation of the work are undertaken ".this considers the applicant as the inventor which has limited contribution to this inventive concept. Further there could be possibility to find out the person mentally recognising and evaluating the computer generated results. This indicates the computer generated inventions are considered to be patentable only if they are discovered and identified by a human. This identification or recognition requires skill and innovative knowledge. This may

be resulted in rewarding a person who has actually not contributed for the creation or invention of the patent specification.

ALLOW THE COMPUTER AS A LEGAL ENTITY

Here the computer will be recognised as a legal entity or inventor, most of the legal provision till date across the globe has not yet considered non biological machine as legal person acceptance or recognising computer as a legal person require a radical change in judiciary approach to human machine relation, society relation with technology other human and non human entity disputes. The AI algorithm used by computer may be made intentional against maximising benefit however the human capability of carrying responsibility towards self and the society, civil liability understanding perspective of others cannot be expected from computers recognised as a legal person. However the credit generated out of the invention made by the computer can be used in promoting the progress and commercialisation of autonomous inventing technologies. But this can only be done again by a human.

ELIMINATE THE IDENTIFICATION ALL TOGETHER

The option of simply ignoring the inventorship and not giving credit to anybody appears to be very simple. This requires elimination of justification of basic patent system. The reward to innovation and the moral to recognise innovative concept and innovator this non recognition may lead to impact on professional credibility and monetary benefit to scientist and engineers. This elimination of inventing process will compel to rewrite the patent system as a whole, which questions the existence of patent system.

6.10. CALIBRATING PATENT LAWS

Internationally the works related to patent laws are minimum. There is no standard forum for standardisation and continuous evaluation of patent law and its legal implication in different context. With the innovation in AI interface , machine learning , big data management, virtual dependency , introspective social behaviour and Higher economic growth has compelled continuous evaluation and calibration of patent law according to the benefit of the society. Autonomous generation of large number of innovation at a relatively low cost will compel the system to balance the reward vis a vis the incentive out of dispute. In this age of dynamic changes monopoly of patent for 20 years need to be re justified to balance the reward towards the labour and the monopoly period. In some cases, considering the benefit towards the society the patent protection for invention can be reserved for higher degree of industrial application. Therefore the basic patent law needs a continuous calibration where the accumulated data preliminarily accumulated for computer generated invention need to be given a public disclosure before feeding in to AI environment for generating innovative patent. This requires time to time re examination of patent system with the technological evolution in AI technology progresses.¹⁴⁹

¹⁴⁹ Liza Vertinsky & Todd M. Rice, "Thinking About Thinking Machines: Implications Of Machine Inventors For Patent Law", <https://www.bu.edu/law/journals-archive/scitech/volume82/vertinsky&rice.pdf> (Last accessed on July 16,2020).

6.11. CONCLUSION

The innovations in different fields will see a new horizon with development of AI, big data management, machine learning interface and potential benefits to society. In future the contribution to inventive process by machine will be more than human where a major shift will be in favour of AI. Therefore a new system must be in place to protect the pace of innovation, intellectual investments, incentivising AI generating inventing system where all these should help in protecting the patent system in actual. In this AI assisted accelerated pace of innovation there may be a chance of fall to patent practitioners, patent examiner and overall patent law.

CHAPTER 7

7.1. INFLUENCE OF ARTIFICIAL INTELLIGENCE AND IPR ON JURISPRUDENCE

The best believe of natural law theory faced at a deliberation at Harvard's in the year 1958. This was the originating face of modern jurisprudence. The basic difference of philosopher Lon fuller's Natural law theory and the modern law theory of legal positivism by philosopher H.L.A Hart.

“Natural law is the moral theory of jurisprudence and often states that laws should be on the basis of ethics and morals. This law also states that law should focus on what is ‘correct’. In addition, natural law was found by humans on their disposition of reasoning and choosing between good and bad. Hence, it is said that this law plays a significant role in establishing moral and ethical standards. Natural law is a philosophy of law that focuses on the laws of nature.”¹⁵⁰ During the debate the importance of the language and purpose of application in a particular case also came across. It is understood that the debate was all about a continuous formation of variable commitment managing to the dynamic changes in the society which indirectly affects the legal system. In connection with this the current world scenario with AI got correlated to the finer findings of the debate where the legal rules and interpretation and the legal languages need to change with the shadow of AI.

The legal positivism and the natural law theory have got different approach towards the nature of legal languages and interpretation. Nowadays due to availability of more number of resources more conflicts are generated in absence of proper interpretation. Therefore the version of legal positivism is more relevant in connection with modern jurisprudence where AI research can make legal interpretation easier.

Three developmental stages of Artificial Intelligence :

1. Artificial Narrow Intelligence is known as a weak intelligence. Artificial Narrow Intelligence is the stage of Artificial Intelligence involving machines that can perform only a narrowly defined set of specific tasks. In this stage the machine does not possess any thinking ability. They just perform a set of predefined functions. This basically operates within a limited predefined range of functions. Examples are Siri, Alexa, Alphago, Autopilot feature of tesla, the social humanoid, Sophia and Google maps.
2. Artificial General Intelligence (AGI) normally referred as strong AI or deep AI. This can think understand and act like a human for a given situation which cannot be distinguished. Till date the strong or General AI is under development. Full swing research is underway for developing machines with General AI. General AI is engaged in performing intellectual/ intelligent task like human. Stephin Hawking said that: “Strong Artificial Intelligence would take off on its own and redesign itself at an ever increasing rate. Humans who are limited by slow biological evolution couldn’t compete, and would be superseded”.
3. Artificial Super Intelligence is a term referring to the time when the capability of computers will surpasses humans. This is seen to be a hypothetical situation as depicted in movies and science fiction books where machine will take over the world. However, tech master like Elon mask believes that Artificial Super Intelligence will take over the world by the year 2040.

¹⁵⁰Charles L. Palms, “The natural law philosophy of Lon L. Fuller” , <https://scholarship.law.stjohns.edu/cgi/viewcontent.cgi?article=1533&context=tcl> (Last accessed on July 16,2020).

AI is a computer system enables to perform task as a replacement of human intelligence. Primarily, they operate on set of instruction or logics which is provided, executed and accepted by a programmer, which comes under classical or narrow AI. This is classical system is suitable for cases connected to deductive reasoning and fix set of logic. In the past few years, research has been expanded and more research made in the field connected with “connectionist”. The parallel neuron network in a AI system where the collective decision being taken or interpreted which reflects the behavior of the logic fed to the system. Their knowledge is stored to the system and they are connected parallel were from complicated behavior may emerge. This is used to recognize a task of patent recognition, identification of original plan/ figure/design. The other technique in AI is called “interactionist” where the outside world is social and friend to the existing society. In the different stages of development in AI the basic or the Narrow AI fails to solve the problem and mechanism of jurisprudence. With limited logic of narrow AI it is held that there is a need to shift the pattern towards connectionist and interactionist to have flexibility and stability to the system moreover kuhn’s theory of Paradigm shift which describes scientific revolution and its prospective of changing pattern in given functional area such shifting are natural and happening in AI and jurisprudence as well. With parallel development in legal theory and interpretation and AI which leads to fresh rethinking of fresh perspective of the existing legal system. There is need of a mind machine virtual reality where it makes a two way communication that is people’s mind thinking as computer and computers as human mind. The AI machines takes fact patterns as input and gives decision the output in the legal machinery which may have multiple output which may further end in conflict or uncertainty. Law and AI both can be seen as functions where AI is the processing tool and law is the solving tool to a problem were the legal theories model find out one of the output legal function considered to be the best fit. All these indicate that there is a analogy between AI and Law. Considering an ANN the legal actors (Judges, Attorney, Advocates, law professors) are the nodes. In this ANN the communication channels are case reports, law review and instruction of professor are the links between the nodes. Now the ANN is converted in to a law network has its knowledge stored in each of the node controlled by different legal actors. The legal inertia and further working with courts can be limit by the system imposed by the constitution of the law. Further by comparing this AI network with law there is a change in the legal system emerging properties. With this the mechanical jurisprudence imposing a set of rules or judges notion should be seen in the shadow of AI as a synchronized orchestra of the legal actors delivering a symphony.

7.2. THEORY OF RIGHTS: WILL THEORY AND INTEREST THEORY

From the ancient time the origin of legal system is the right to possession, property and assets useful for human. The origin of such legal system confirming rights is a matter of debate between the human race historian that is Anthropologist and the intellectual historian. The social awareness and co existence of the human race has

shaped the concept of right. A number of theories were developed and discussed among them two theories are mainly adopted and widely used they are the will theory and the interest theory.

Will theory was given by H.L.A.Hart.¹⁵¹ , “He cited Kant as inspiring his thinking about the importance of human freedom, or liberty. Freedom is the most basic right, according to will theory. It is a moral (or natural) right. All other rights, moral or legal, are specific protected freedoms. Limiting anyone’s freedom always requires the authorization of others’ rights; and the subjects of rights remain free to claim them or not.” Will theory defines a small scale sovereign where the function of right is given to its holder over others duty. In case of property right will theory describes this as a right because of the power to transfer or wave or annul others duty. The same logic is applied to the programmer or the owner with their computer. The Will theory believes that all right confirms control over others duty to act in a particular predetermined instruction or rule. Here, in Will theory the second line command has no choice of its own.¹⁵² Influential will theorists include Kant, Savigny, Hart, Kelsen, Wellman, and Steiner. “The will theory, also known as the choice theory, allows rights-holders free choice to insist upon their rights, or to waive them. Animals cannot have rights on the will theory. They have no conception of a basic right of freedom, and cannot understand the idea of limiting of rights; nor would they be capable of claiming or waiving rights.”

Will theory has few lacunas also. It has got the powerful link between right and normative control and the ability determine other functions and exercising authority over the confined sovereign and domain of affairs. This is merely a matter of pre defined set of instruction. This has got its own short fall where it cannot acknowledge beyond the domain of small scale sovereign. This is not possible to give rights to infant, animal or comatose adult. There by will theory is a limited approach to the concept of rights.

7.3. SIGNIFICANCE OF WILL THEORY WITH RESPECT TO AI AND FUTURISTIC DEVELOPMENT IN AI

As professor Hart mentioned “It is hard to think of rights except as capable of exercise.”¹⁵³ Here the relevance and significance of AI with respect to will theory will be examined whether this theory will be applicable to the creator/programmer/owner of the computer or the computer itself. As per the theory the rights are granted to those who have their own will, capacity to think or desire. This theory allows a person to possess asset or bars others from using the property under his possession. This is expected to lead to a easier comfortable and healthy life and respectable position in the society. This theory gives a right of small scale sovereign where the right holders enjoy the sovereignty. Hence, no further result is required. Sovereignty implies taking independent decision on someone’s possession. The right holders need not take permission or authority from another person to execute his right. His individual freedom of taking decision is solely related to him. When

¹⁵¹ Prachi Shah, “H.L.A Hart’s Theory of law”, <http://www.legalservicesindia.com/article/529/H.L.A-Hart.html> (Last accessed on July 16, 2020).

¹⁵² Paul Graham, “The will theory of rights: A defence”, 15 JSTOR (1996), pp. 257-270.

¹⁵³ <https://plato.stanford.edu/entries/rights/> (Last accessed on July 16,2020).

AI is considered under this theory of right it is found that AI's have no will of their own. The basic question of life of AI doesn't exist. It is only a machine bought its existence with regular power input and execution. These machine don't possess any property and if not programmed they do not possess any will. The question of excluding under will theory doesn't arise. The sovereignty of AI completely based on the programmer/ the employer of the programming system. So the basic idea the right of AI under sovereignty is not established. The total thinking of AI is as they were program or commanded by will and desire of a human who is called its creator/programmer. The AI functions as per will/desire/command and program of human being. Therefore, the basic will theory of rights cannot be applicable on AI.

Interest Theory was given by Raz and MacCormick, the function of right is to strengthen the not only the desire but also the right holders interest. According to this theory the owner not only had the choices but the ownership conferred more rights. According to this theory the promise has a right because it has interest in the performance of the promise.¹⁵⁴ Raz and MacCormick The context between these two theories are will based and interest based on function based of rights is existing for last 100 of years of human civilisation. Important interest theorists include Bentham, Ihering, Austin, Lyons, MacCormick, Raz, and Kramer.

This is more capacious than earlier discussed will theory. This gives rights to both the possessee of the right and the right given to. This theory describes more into the connection between holding rights and being better off. However, the interest theory is also misaligned with any ordinary understanding of rights. We commonly accept that people can have interests in A without having a right to A; and contrariwise that people can have a right to A without having interests sufficient to explain this.

A person or object having interest associated with the rights of the holders can be conferred rights under interest theory of rights. A every pertinent example of property rights to a baby in the womb were the recipient has no will but has some interest associated the rights given to the baby. Considering AI in this line of this theory here AI has no interest of its own but the creator has the interest to associate AI with further rights. In case of any return from the work the person will be directly benefited due to his rights on the subject. The owner/creator/programmer engages AI to work for their benefit. Here, the programmer plays the role of right holder or the owner. He is responsible for the return out of the employment of AI and he has to take the liability if any but here AI has no role to play with the interest theory of right it is the programmer or the creator who has conferred his right on AI.

7.4. THEORIES OF LEGAL PERSON AND CORPORATE PERSONALITY

According to the existing law the legal person may not be a natural person but generally he who takes the responsibility and benefit is defined as legal person but jurisprudence defines the legal person may not be a

¹⁵⁴ Frank A. Fetter , "Interest theories, old and new", <https://www.jstor.org/stable/1804984> (Last accessed on July 17,2020).

natural person rather human being so non natural entity can be an Artificial legal person who enjoys rights and duties. This artificial creation of legal entity is called the corporate personality.

“Corporate personality is a fiction of law. It is an artificial personality given to corporation whereby certain rights and duties are attributed to it. The doctrine of corporate personality was approved for the first time in a leading case *Soloman vs Soloman & Co. Ltd.*¹⁵⁵. A corporation has a personality of its own which is different from the personalities of the individuals. A corporation can sue and be sued. A Corporation can enter into contracts. A Corporation can have property and rights and duties. Unlike natural person Corporation can act only through its agents. It does not die in the way natural persons. Law provides special procedure for the winding of a corporation.”¹⁵⁶

This Corporate personality is represented by its members or agents. The examples are bank, university, college, association of person were the existence of the entity which has following advantage. The members enjoy limited liability, the corporation owns property on his name, enjoys perpetual succession. Further the issue of rights on the basis of requirement, applicability, socio economic situation, political system are broadly classified below:

- A right to a group or category like Animal rights, Workers right, Children’s right.
- Activity based rights like Right to free expression, Right to pass judgment and Right to privacy.
- Right holders right in the society, in the society for years together some moral rights were auto-devised which are now converted to legal rights for the specific society.
- The rights in relation with the right holders action wavable right to the promise kept, forfeitable right.

Other Rights to nature, activity responsible group can be sub grouped under above major groups. Hence, the legal personality is defined as an entity for the purpose of law. Therefore the role and responsibility of AI and related technology opens up a fresh thought towards legal entity of AI. With the increasing technical and computational growth AI will capture the society in future. The present level of weak AI will enhance itself to a better level of intelligence where the autonomy and capability of AI will increase. So, mere identification as a legal personality to AI system will not suffice. There is a visible difference between legal personality and legal status defining specific legal rights and obligations.

In case the AI based system is given a status of legal personality which doesn’t mean it is bound to behave or respond to all legal rights and obligation enjoyed by a particular natural or legal person. So, it is better arranged by defining AI as legal personality and practical legal consideration which will arise from its basic nature. The scope human rights are freedom of speech, privacy, right to life and criminal liability. Legal status is the main attractions of a conditions-based approach to legal personality. The major attraction of conditions and situation

¹⁵⁵ *Soloman vs Soloman & Co. Ltd.* (1897) A.C 22 (1895-99) All E.R. 33 (H.L).

¹⁵⁶ Naveen Singh Thakur & Divya Singh, “Theory of corporate Personality”, <https://www.ijsr.net/archive/v7i4/ART20181917.pdf> (Last accessed on July 17, 2020).

based approach to a legal personality tailored by the law is the best suited option. Necessary contradiction between natural human and legal entity must be identified to get rid of legal traps made by corporations.

7.5. MORALITY

It is understood only human being has got the moral right to its creation. In some of the existing copyright law do not recognize the concept of moral right. Considering the level of AI working and present status the legal and philosophical personality has got a wide variation there by the question of moral right is beyond consideration, however in the future with enhanced and developed AI the moral consideration can be deliberated according to AI's legal personality. Therefore the strong AI legal entity can be held morally responsible for the well being of the human. The other aspect which can be worth arguing is that the law and the implication to the human being cannot be translated. In case the basic concept of morality is translated to AI which may threaten the basic existence and uniqueness of the humanity. The discoveries on human race by great scientist like Darwin and Crick and Watson, Galileo will be questioned. Hence the uniqueness of human being personified or the use of the word person may miss lead because of the obvious understanding of the word person to human being. So, it may be concluded that AI system may be referred as legal units rather than legal persons which will stay away from the confusion of basic use of the word person in the legal pursuit.¹⁵⁷

7.6. CONCLUSION

In case of will theory the so called AI or AI's don't have a will of their own because the programmer dictates or commands the desired result through software where it is considered the will of the programmers. In the case of Interest theory of rights the AI systems don't have any interest of their own therefore, the interest is also considered to be the interest of the programmer or the creator of the AI system. Therefore, both the theory the interest theory and the will theory are not directly applicable to AI's.

CHAPTER 8

8.1. IS AI A FUTURE REPLACEMENT TO HUMAN BRAIN OR HUMAN

With unprecedented growth in AI and networked AI the presence will be felt in all sphere of human life. It will not only amplify the human effectiveness but also it will threaten the autonomy, ability, capability of human. The days are not far when the AI system will be capable enough to make decision making, solve

¹⁵⁷ <https://plato.stanford.edu/entries/morality-definition/> (Last accessed on July 17,2020).

complex problem, recognize sophisticated patterns, and interpret language. This will save time, more cost effective more accurate and gentle approach in customer dealing. This development may lead to a situation where we will lose the finished touch of human.

“Many focused their optimistic remarks on health care and the many possible applications of AI in diagnosing and treating patients or helping senior citizens live fuller and healthier lives. They were also enthusiastic about AI’s role in contributing to broad public-health programs built around massive amounts of data that may be captured in the coming years about everything from personal genomes to nutrition. Additionally, a number of these experts predicted that AI would abet long-anticipated changes in formal and informal education systems.”

Co-director of the “Berkeley Center for Law and Technology” and a member of the inaugural “U.S. Commerce Department Digital Economy Board of Advisors”, Sonia Katyal predicted that, “In 2030, the greatest set of questions will involve how perceptions of AI and their application will influence the trajectory of civil rights in the future. Questions about privacy, speech, the right of assembly and technological construction of personhood will all re-emerge in this new AI context, throwing into question our deepest-held beliefs about equality and opportunity for all. Who will benefit and who will be disadvantaged in this new world depends on how broadly we analyze these questions today, for the future.”¹⁵⁸

Director of the “MIT Initiative on the Digital Economy” Erik Brynjolfsson and author “Machine, Platform, Crowd: Harnessing Our Digital Future,” said, “AI and related technologies have already achieved superhuman performance in many areas, and there is little doubt that their capabilities will improve, probably very significantly, by 2030, I think it is more likely than not that we will use this power to make the world a better place. For instance, we can virtually eliminate global poverty, massively reduce disease and provide better education to almost everyone on the planet. That said, AI and ML can also be used to increasingly concentrate wealth and power, leaving many people behind, and to create even more horrifying weapons. Neither outcome is inevitable, so the right question is not ‘What will happen?’ but ‘What will we choose to do?’ We need to work aggressively to make sure technology matches our values. This can and must be done at all levels, from government, to business, to academia, and to individual choices.”¹⁵⁹

Author of “The Social Machine, Designs for Living Online” and “faculty fellow at Harvard University’s Berkman Klein Center for Internet & Society” Judith Donath, commented, “By 2030, most social situations will be facilitated by bots – intelligent-seeming programs that interact with us in human-like ways. At home, parents will engage skilled bots to help kids with homework and catalyze dinner conversations. At work, bots will run meetings. A bot confidant will be considered essential for psychological well-being, and we’ll

¹⁵⁸ Sonia Katyal, “Private Accountability in the age of artificial intelligence” 54, UCLA (2019), p 66.

¹⁵⁹Nick Johnson, “Fixing the AI skills shortage” ,<http://ide.mit.edu/news-blog/blog/fixing-ai-skills-shortage-interview-erik-brynjolfsson>. (Last accessed on July 18,2020).

increasingly turn to such companions for advice ranging from what to wear to whom to marry. We humans care deeply about how others see us – and the others whose approval we seek will increasingly be artificial. By then, the difference between humans and bots will have blurred considerably. Via screen and projection, the voice, appearance and behaviors of bots will be indistinguishable from those of humans, and even physical robots, though obviously non-human, will be so convincingly sincere that our impression of them as thinking, feeling beings, on par with or superior to ourselves, will be unshaken. Adding to the ambiguity, our own communication will be heavily augmented: Programs will compose many of our messages and our online/AR appearance will [be] computationally crafted. (Raw, unaided human speech and demeanor will seem embarrassingly clunky, slow and unsophisticated.) Aided by their access to vast troves of data about each of us, bots will far surpass humans in their ability to attract and persuade us. Able to mimic emotion expertly, they'll never be overcome by feelings: If they blurt something out in anger, it will be because that behavior was calculated to be the most efficacious way of advancing whatever goals they had 'in mind.' But what are those goals? Artificially intelligent companions will cultivate the impression that social goals similar to our own motivate them – to be held in good regard, whether as a beloved friend, an admired boss, etc. But their real collaboration will be with the humans and institutions that control them. Like their forebears today, these will be sellers of goods who employ them to stimulate consumption and politicians who commission them to sway opinions.”¹⁶⁰

Founder of the “Future Today Institute” and professor of strategic foresight at New York University, Amy Webb commented that, “The social safety net structures currently in place in the U.S. and in many other countries around the world weren't designed for our transition to AI. The transition through AI will last the next 50 years or more. As we move farther into this third era of computing, and as every single industry becomes more deeply entrenched with AI systems, we will need new hybrid-skilled knowledge workers who can operate in jobs that have never needed to exist before. We'll need farmers who know how to work with big data sets. Oncologists trained as robotocists. Biologists trained as electrical engineers. We won't need to prepare our workforce just once, with a few changes to the curriculum. As AI matures, we will need a responsive workforce, capable of adapting to new processes, systems and tools every few years. The need for these fields will arise faster than our labour departments, schools and universities are acknowledging. It's easy to look back on history through the lens of present – and to overlook the social unrest caused by widespread technological unemployment. We need to address a difficult truth that few are willing to utter aloud: AI will eventually cause a large number of people to be permanently out of work. Just as generations before witnessed sweeping changes during and in the aftermath of the Industrial Revolution, the rapid pace of technology will likely mean that Baby Boomers and the oldest members of Gen X – especially those whose jobs can be

¹⁶⁰Janna Anderson & Lee Rainie, “Artificial intelligence and the future of humans”, <https://www.pewresearch.org/internet/2018/12/10/artificial-intelligence-and-the-future-of-humans>. (Last accessed on July 18,2020).

replicated by robots – won't be able to retrain for other kinds of work without a significant investment of time and effort.”¹⁶¹

A professor of management at the University of Notre Dame James Scofield O'Rourke, said, “Technology has, throughout recorded history, been a largely neutral concept. The question of its value has always been dependent on its application. For what purpose will AI and other technological advances be used? Everything from gunpowder to internal combustion engines to nuclear fission has been applied in both helpful and destructive ways. Assuming we can contain or control AI (and not the other way around), the answer to whether we'll be better off depends entirely on us (or our progeny). ‘The fault, dear Brutus, is not in our stars, but in ourselves, that we are underlings.’”¹⁶²

The performance gap between AI machine and human being is the understanding perceptions of thinking, learning, autonomous problem solving decision making and advising. With development and new research in the area of big data collection, analysis and use, enhanced processing power of the computer, enhanced computing power of the computers, technological advancement in AI neural networks, deep machine learning to generate developed mathematical human thought process and analysis lead to AI supplementing human intelligence, thereby the life of human is enriched and quality is improved. With this easiness of human with technology has compelled to the belief that ordinary human will be taken over by machine with AI. This is otherwise known as “technological singularity”. It is expected with the fusion of digital growth with human biology a new era of intelligentsia will come up.

8.2. AI MAKING A CHANGE IN OUR LIFE

In general we analyse the human intelligence in conjunction with technical innovation. Earlier these technologies were visible in the form of motor vehicle, television, refrigerator, washing machine etc. In mean time AI has already crypt in to all spheres of human life like house hold (AI programmed refrigerator, house security system, programmed based fabric care system from washing to ironing and managing wardrobe), health care (Advance diagnosis with more matching data, prediction in other diseases based on millions of samples for comparisons), transportation (all the existing cab aggregators like Uber and Ola, driver less vehicles are coming up to make movement hustle free), personal assistance(a mobile phone on these days are working as phone and video call, watch camera, decta phone, torch, moreover this is not less than a computer itself), communication and entertainment(high speed digital transmission through optical fibre data transmission across globe within micro second has made the world a smaller village, the entertainment world has also shrank into the living room), creative aspects(AI assisted aids and software for autonomous paintings

¹⁶¹“Emerging technologies 2019: Future of AI with Amy Webb” , <https://www.aitrends.com/emerging-technologies-2019-future-of-ai-with-amy-webb>. (Last accessed on July 19,2020).

¹⁶²Janna Anderson & Lee Rainie, “Artificial intelligence and the future of humans”, <https://www.pewresearch.org/internet/2018/12/10/artificial-intelligence-and-the-future-of-humans>. (Last accessed on July 19, 2020).

, music creations, technical generation). Without much knowledge of human AI has already captured most of the work field of human beings.

8.3. CAPACITY AND ABILITY OF AI

Further, the AI works on strong algorithm based on deep machine learning and big data. Presently most of the countries don't have sufficient regulation for data mining which will affect the future application of AI in national security, finance, advanced health care, criminal justice, seamless transportation. In order to maximise the benefit out of AI embedded system following recommendations are need to be implemented:

- Without compromising personal privacy, all data needs to be available for the researcher to accumulate, analyse or derive outcomes from that.
- Associate research of AI enabled system needs more emphasis in terms of funding and private players.
- Standard policy making committee to be formed to give advice and regulate AI principles.
- Faster settlement of disputes regarding AI and human behavioural aspects.
- Cyber security to be made part of national policing system.

While considering integration of AI machine with traditional human capability and decision making process. The various aspects, capabilities, qualities of AI machines needs to be analyse in accordance with present socio perspective and future expansion possibilities. The AI assisted machines are different from other general purpose machine, where the algorithms are designed to determine and take decision. Hence the capacity in different dimensions like intentionality, intelligence, adaptability need to be determine for better acceptance of AI system in to human utility domain.

1. Intentionality:

Most of the time this may be a real time event which effecting human comfort ability and easiness. These machines are different from general passive machines whose output is pre determined and fixed in nature. Therefore the feeding or inputs to the AI system, algorithm, and results derived from real time data need to be studied before hand for channelizing those in the favour of society. Thereby the intentionality of the AI system is assured.

2. Intelligence:

With data mining and machine learning the data analysed for relevant and related data to solve related specific issues by the software designer. Here the intelligent quotient to the AI machine is important in connection with the analysis of its data and its utilisation. The intelligence of AI depends on the strong and robust algorithm which can make use of the data. The raw data are normally taken from human input sensory domain as well as digital images from other sources, satellite images, various text unstructured data captured by different Internet of Things(IOT). In future AI system must be intelligent enough to handle the raw data.

3. Adaptability

The basis of determining the adaptability capacity of the AI machine depends on various factors for example providing treatment to Covid suffering patients in isolation ward, where human movement need to be restricted or banned for this. For these operations there is a requirement of advanced and appropriate algorithm based on movement and requirement of the patients. Different sensors to measure sense and provide input to the system. With the help of dashboard and visual display in real time the AI assisted system should adopt this new challenge to human being.

8.4. DEFINING THE ROLE OF AI IN DIFFERENT SECTORS

AI has not only entered in to personal comfort zone of human being but also it has influenced different fields related to human civilisation. Here, this chapter will discuss some of the major issues and functioning of AI in that sector like Health, Transport and Logistics, Education, Criminal Justice, Financial and Speech Recognition.

- **HEALTH CARE**

With development in pharmaceutical industry and lifestyle the human life expectancies has gone up. AI embedded diagnostic equipments helped doctors to analyse and early prediction of disease and thereby curing them. Medical equipment designers have embedded big data management and AI algorithm to make improved and sophisticated diagnostic machines due to availability of higher number of pre defined data the prediction and analysis have become more accurate and reliable. The deep learning system directs the computer to compare any normal looking object to a irregular appearing object in human body in comparing millions of such data and image available in neural networks. This application of AI can be applied to congestive heart failure where advanced prediction can be made and proactive intervention can be made. With higher end research and availability of diseased based data on ANN (part of AI) it will not be a part of surprise where doctors and Para medical staffs will be replaced by AI based interactive dashboards and robots. With the available huge data base and real time machine learning the preventive and predictive potential off diagnosis will be future trend rather than curing diseases. Presently, trained and programmed robots are used where there is no absolute stress, no human error or no risk.

One such example can be seen in Covid situation which has created havoc in the recent times. A hospital in Vadodara, Gujarat namely Sir Sayajiro Gaekwad (SSG) Hospital are using two robots which are doing the work of serving food and medicine in the corona ward which is reducing the human-human interaction. These robots are made in India and can also scan the body temperature of the people coming to the hospital. Except serving food they can screen the patients present in the covid-19 ward. Soon they are also planning to install

robots in the entrance to screen the patients and the visitors entering the hospital. These robots can work for 4 hours and does not require high skills to operate it. Thus follows all location and work as a human.¹⁶³

Let us see how AI is helping in case of early detection of cancer. Dermatologist is highly trained skin specialists it thus takes more than 10 years to become good specialists. According to Stanford University students are doing research on AI machine and said that if you train the device with 129,000 images of skin conditions, including melanoma and carcinomas it can work as good as the best dermatologist. To cross check they had send all the data base to a human dermatologist which said that data's were either on par or above the performance classification accuracy of human dermatologists. These can be done using deep learning. In Germany there is a company named "Merantix" they use deep learning to medical issues. It has an application which can "detect lymph nodes in the human body in Computer Tomography(CT) images."¹⁶⁴ The main aim is to detect and identify small growths that can be troublesome and to label the nodes. In this case deep learning is trained and feed with normal looking lymph node and abnormal looking lymph node data sets so that it can distinguish between both the lymph nodes. After matching millions of images the better accuracy is being labelled which can help the specialists to determine the extent of risk and predict the further growth of cancerous lymph nodes. AI tools are helpful because " predict in advance potential challenges ahead and allocate resources to patient education, sensing and proactive interventions that keep patients out of the hospitals."¹⁶⁵

Soon in future there will be a time when AI will replace doctors and paramedical staff. By using Artificial Neural Networks AI can categories, diagnose and prescribe the disease relying on the provided data set. The doctors and researchers are amazed by seeing such progress in AI.

There was a study done where the best dermatologists were given with proved biopsy image and AI system was given with 129,450 dataset of clinical images. After this comparison was drawn this said that AI system was more accurate than that of the dermatologists. There are several other examples where Machine Learning was used to predict potential cardiovascular disease risks. Moreover, modern surgeries are carried out by trained robots having no human error or stress response. Modern DNA sequencing technologies are responsible for generating a huge amount of data. This data is used to establish the link between mutations and disease, facilitating the early diagnose of disease. There are an enormous amount of other examples enough to prove the bright side of AI-based systems.

The future is of robotic surgery, virtual nursing assistant, continuous critical patient monitoring.

- **TRANSPORT OR LOGISTICS**

¹⁶³ Robots deployed to serve COVID-19 patients in Vadodara hospital, <https://www.livemint.com>. (Last accessed on July 20, 2020).

¹⁶⁴Rasmus Rothe, "Applying Deep learning to Real-World Problems", <https://www.brookings.edu/research/how-artificial-intelligence-is-transforming-the-world>. (Last accessed on July 20,2020).

¹⁶⁵Eric Horvitz, "Reflections on the status and future of Artificial intelligence" , http://erichorvitz.com/Senate_Testimony_Eric_Horvitz.pdf. (Last accessed on July 21, 2020).

Transportation and logistic are no simpler caring goods from one place to other rather developed in to multimodal and highly sensitive route mapping as well as in time schedule delivery are the major feature of that industry. Supply chain management, asset management, available facilities with help of AI make a relatively best possible way delivering of goods or carrying passenger in different mode. E-commerce companies like Amazon is based on AWS networking it is that Amazon web services which is basically a digital freight networking. All passenger vehicle aggregator like Ola, Uber are utilising AI for delivering there transportation product through virtual networking on an AI enabled network.

UBER – The travel Aggregator

Improving location accuracy with sensing and perception

To improve the accuracy, coverage, location of the vehicles on Uber platforms and speed the Uber's AI Sensing and Perception team has worked on various projects. This has helped in searching of the drivers in less time and in correct and précised locations, this has also helped in overcoming the limitations of GPS. This team has also overcome the estimated times of pickup and drop and there is a visible reduction in cancellation of rider and driver and by making the network more smoothly

Leveraging computer vision to make Uber safer and more efficient

On booking a cab through the App the platform validates the identity, reliability and dependability from the vast data base with the Computer Vision Platform team through the product team. As “Uber onboard a growing number of drivers and restaurants to our platform, we've built automated deep learning transcription technology that's suited to Uber's specific use case—documents with blocks of text that need to be output as structured data for downstream processing, rather than a text blob.”

Enhancing real-time forecasting with neural networks

“Uber leverages ML models powered by neural networks to forecast rider demand, pick-up and drop-off ETAs, and hardware capacity planning requirements, among other variables that drive our operations.” X-Ray, HotStarts and GENIE were new technique developed so that the forecasting abilities can be improved in the near future.

“X-Ray is an in-house tool that allows us to search thousands of features in parallel, uncovering those that will improve a model's predictions. In 2019, we deployed this tool to production in systems across the company. In 2020, we plan to integrate X-Ray into the Michelangelo feature store for more accurate ML model feature assessment, which will enable us to further fine tune our predictions. Also launched in 2019, GENIE, a novel architecture for deep learning creatively applied to temporal prediction, powered a 12.3 percent improvement

in demand forecasting in over 100 cities worldwide, while HotStarts for AutoTune, our optimization-as-a-service tool, reduced the cost of tuning ML models and algorithms by a factor of 5-10 for recurring tasks.”¹⁶⁶

Creating more seamless communication with conversational AI

To facilitate the best end-to-end experience possible for users, Uber is committed to making communication with our customers easier and more accessible. In 2019, we leveraged Uber’s conversational AI platform, empowering our support teams to resolve user issues as accurately and quickly as possible. Further, we used this platform to lessen the potential for distracted driving by allowing driver-partners to more seamlessly communicate with riders via hands-free pick-up and one-click chat. To this end, we also developed and open sourced the Plato Research Dialogue System, a flexible conversational AI platform for building, training, and deploying conversational AI agents, enabling state of the art research in conversational AI. While currently only used for research purposes, Plato has the potential to be leveraged in production.¹⁶⁷

GOOGLE MAP

Previously only physical maps were used for navigation. But nowadays there is an evolution in the navigation sector after Google maps were introduced. With the help of AI and Machine learning, Google map can provide proper searched location. In the present day Google maps are installed in every body’s smart phone and this is making navigation easier. This map can provide traffic updates in seconds to suggest you with the best restaurants nearby. Previously when Google map was not updated it had few issues regarding differentiating buildings but due to the up gradation in AI it has made it more users friendly. Both Maps and data teams at Google collaborated on reviewing building features and using algorithms for better understanding. Google maps had to face challenges in searching unmarked areas in a city or town. To overcome these challenges Google applied machine learning, to determine the buildings and unmarked areas. With the help of machine learning the users can now see unmarked areas names and locate addresses in seconds. 20 years back it was difficult to locate clogged sites but due to AI these things were made easy.

Few acquisitions made by Google to make the Google map more accurate and to provide better experiences are:

- Waze: To improve the social experience of clients on its map application Google map purchased Waze. Waze was the correct fit as a result of the start up's search experience on guides and this implied giving Google Maps a lift. Waze made search easier. The purchase of Waze’s Crowd source business model by the Google has assisted the users with sharing visited areas. The mix of client social commitment and maps information made Waze the best accomplishment to team up with Google Maps. Traffic

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¹⁶⁷Zoubin Ghahramani, “Uber AI in 2019: Advancing Mobility with Artificial Intelligence”, <https://eng.uber.com/uber-ai-blog-2019/#:~:text=Uber%20AI%20powers%20applications%20in,publications%20and%20open%2Dsource%20projects>. (Last accessed on July 22, 2020).

frameworks are another territory that Google Maps has not progressed admirably and the purchase of Waze gave the organization with a strong search capability for clients.

- **Urban engine:** To support its map business by utilizing analytics in urban areas, Google map invested in Urban engines. The main function of Google map is to provide proper and accurate location without this feature the application loses its main characteristics. With help of Urban engines and there team of analytic experts, Google map has become more accurate with the urban patterns. Thus this made Google purchase Urban engines. Under this arrangement, Google uses analytics technology from Urban Engines to make maps work well and assist users to navigate locations. The continuous utilization of information and investigation makes Urban Engine an extraordinary purchase for Google Maps in light of precise data examination. As more information is produced, bits of knowledge empower Google Maps to work and the procurement of Urban Engines accomplished this objective. Urban Engines furnishes Google Maps with update on current areas with the help of commuter data and analytics. All these things made Google purchase Urban Engine.
- **Keyhole:** Database information from Keyhole makes Google Maps work better by enhancing the zoom feature on maps. The purchase of Keyhole explained Google Map's strategy of using satellite images to make maps accurate for users. With the purchase of keyhole search and accuracy of the results became more apt. Image rotation from Keyhole software prompted this acquisition as users can adjust images based on their interests. Location zooming makes viewing easy and users appreciate this feature because of their navigation needs. With the purchase of keyhole there was an entire shift of traditional web to image search in Google map. Due to AI and ML users are able to search images and which in return making their experiences better. Keyholes have made Google Maps the perfect application for location search due to its ability of image search. Clients appreciate continuous image as a result of better search experience from AI and ML.
- **ZipDash:** Google map requires GPS technology for better functioning of the traffic updates. For real time traffic update Google maps purchased ZipDash. This made GPS a part of maps and also made maps more accurate and navigation easy in unmarked and urban areas. GPS made navigation experiences better and hustle free.

Presently, Google is working on the safe movements of its users by adding a new feature of speed limit to the maps. Maps would give choices to their users to set the speed limit as per there route. Google map would also include alerts, accident prone areas and that entire feature which would make the navigation easier and safe for the users. Google map is also keen to launch more features in there app related to disabled. Google Maps is developing new features for disabled people where they can find buildings or highways designed for them.¹⁶⁸

AMAZON

¹⁶⁸David Yakobovitch, "The Story Of How AI Changed Google Maps", <https://medium.com/swlh/ai-google-maps-79237f8946e3>. (Last accessed on July 22, 2020).

As per the Director of Machine Learning, Amazon India “AI will enable smart e-Commerce, improve operational efficiency and enable new customer experiences (e.g. voice interfaces, conversational systems) that will transform people’s lives”. Machine learning and AI has been used by Amazon in various areas such as Correcting Addresses, Catalog Quality, Product Size Recommendations, Deals for Events and Product Search. Let us look in to the first area that is Correcting Addresses where the users mostly put incorrect address or half information about the address which lead to missing and delaying of the deliveries. Thus using machine learning would help them trace the right address by detecting the junk addresses, correct city-pin code and compute quality score of the address. Then is Catalog Quality were the “Product catalog defects such as missing attributes like brand, color or poor-quality images/titles can adversely impact customer experience.” Missing brand or color can be extracted by the product titles and images with the help of AI and machine learning. Company is using natural language processing for writing details about the product. Product Size Recommendations basically it deals with the product size “Machine learning is being used to recommend the product size that would best fit a customer when the customer visits a product page. The algorithm leverage past customer purchase and return data to infer the best size for the customer”. The next is based on the events where in it is called the Deals for Events. In this the machine learning is used to locate the related product to be sold during a particular event such as Christmas, Diwali or any other occasions by looking at the previous sell during this period of time. With the help of machine learning they can also analyse the discounts during this time or a general sale for moving certain items at bulk or to attain maximum profit during the festive season. For doing any search machine learning is making things easy by providing us the related and specific search result this is called Product Search.¹⁶⁹

MYNTRA

AI initiatives of myntra focus on three points that is product, experience and logistics. Firstly let us discuss about product as a key pillar. Myntra with the help of AI platform wants to develop an intelligent fast fashion known as Rapid “Fast fashion” which is defined as “A contemporary term used by fashion retailers to express that designs move from catwalk quickly to capture current fashion trends. This can dramatically reduce the time taken to create a fashion product to few weeks from the typically long 9-14 months lifecycle.” After looking at the database of the sales, the company comes to know that what all products are being purchased by the customer and based on that the company’s designer start producing those items. This helps them to know what should be sold in the platform. New technique has been used by Myntra which is called as Generative Adversarial Networks (GANs) for design which creates products that are similar but not the same. Recently, Myntra has also produced machine generated T-shirts. The next pillar is experience by using machine learning; Myntra is trying to make payment easier and is also able to provide the best payment gateways. Online payments transactions as per the Institute for Business in the Global Context (IBGC) is

¹⁶⁹“Artificial Intelligence in Retail innovation”, by Amazon, <https://arekskuza.com/the-innovation-blog/amazon-and-artificial-intelligence-in-retail/>.(Last accessed on July 22, 2020).

failing in India due to insufficient internet connection and due to poor IT systems of bank. Machine learning is helping in searching the best possible route for payment by analyzing the previous successful and failed payments and payment methods. The last pillar is the Logistics which deals with the refund sector of Myntra. Myntra came with an AI-based returns system that is 'Sabre' this enables faster refunds only for those customers who are demonstrating good buying-return behavior. 'Sabre' by analyzing the previous data base it can now detect that whether the return is a genuine return or a fraudulent one.¹⁷⁰

- **FINANCE**

Finance is the heart of all activities. It is the natural tool to project the success of any event or story anything which does not qualify financially normally cannot stand themselves in the society therefore finance of organisation, companies, banks, share markets or personalised financial advice. AI has made a big entry as financial assistant for personalised advise to company level advisories , major financial service companies, consulting companies are using artificial technology that enables near-human level of cognition where the fiancé product is more accurate and better. In India State Bank of India is using AI based solutions developed by Chapdex. AI has helped in accessing potential borrower for credit scoring where AI is based on more complex set off data and sophisticated rule rather than traditional credit scoring system moreover the AI will not be biased delivering or advising. The major contribution of AI in finance sector is catching up with fraud with help of machine learning and big data where credit card frauds were being detected with client behaviour, location, buying habit etc. Financial giant like city, Goldman Sachs and American express has used plaid in there fraud detection capabilities where complex algorithms are programmed which can analyse interaction under different conditions and variables with unique patterns which are updated. In the personalised finance advisory work AI has contributed in a bigger way in form of chat bots to help in individual banking spending habit and planning for future financial goals.¹⁷¹

- **CRIMINAL JUSTICE**

Investigation, eye witness, establishing motive of crime are the major stake in criminal justice with more comfort in life and sedentary life style and huge difference in social status have lead to these crimes. Crimes are not of natural phenomena with enhanced algorithm and big data mining along with machine learning the criminal characteristics can be predicted with continuous monitoring over a particular society to control the criminal activity. Presently, security gadgets like fixed cameras, surveillance roving cameras, satellite watch on movement generates a huge data which needs to be stored and analysed making a robust logic to keep a watch on criminal activity.¹⁷²New York police has developed a geo spatial modelling of predicting future

¹⁷⁰“Artificial Intelligence At India’s Top ecommerce Firm-Myntra”, <https://emerj.com/ai-sector-overviews/artificial-intelligence-at-indias-top-ecommerce-firms-use-caes-from-flipkart-myntra-and-amazon-india/>.(Last accessed on July 22,2020).

¹⁷¹Roshan Adusumilli, “Artificial Intelligence and its Application in Finance”, <https://towardsdatascience.com/artificial-intelligence-and-its-application-in-finance-9f1e0588e777>(Last accessed on July 23,2020).

¹⁷² Jeff Asher and Rob Arthur, “Inside the Algorithm that tries to Predict Gun Violence In Chicago”, <https://www.nytimes.com/2017/06/13/upshot/what-an-algorithm-reveals-about-life-on-chicagos-high-risk-list.html>. (Last accessed on July 23,2020).

crime concentration by means of a AI assisted program called Comp stat (Computer statistics) with help of this auto policing on geographic information system the police can map the crime. Thereby multi-level preventive approaches can be made to reduce the crime to improve the quality of life and manage the resources. The AI assisted computers basic aim is not to identify the criminal rather than make a corrective and preventive approach which aimed at crime free society. Internationally for human trafficking and child sexual abuse Interpol is using a effective data base called Icse db(International Child Sexual Abuse Data Base)¹⁷³ where all the minute data regarding the earlier cases were stored and hit lit algorithm is generated. The best part is these systems are free from any biases where actual criminal can be identified. Further criminal courts need to be more machine dependent and automation in future to decide the judge's broader set of preferences on crime than on criminal.¹⁷⁴

- **SPEECH RECOGNITION**

“It is machine intelligence which comprises of Planning, Problem-solving ability along with Speech recognition and so on. Algorithms strengthen AI and provide it with the power to do reasoning and correct itself when required. It is basically a gift of human intelligence to humans. We have created intelligent machines to work on our commands. Alexa and Apple Siri are among the few examples of on-going AI machines one thing is certain that we have created AI for our ease and Human Intelligence is always going to be on top. There is not much to worry about as the future will reveal more and more job opportunities and humans will be having various opportunities regarding their career. Actually, these thoughts are the results of our over-expectations, we expect that one day AI will become so powerful that it will snatch our jobs and lead us to another world war. Many have started believing that AI has made quantum leaps as well. We are living in the real world and not in a fictional life like Hollywood movies.”¹⁷⁵

8.5. AI STRENGTHENING CAPABILITY OF HUMAN WORKING

Human works sometimes repetitive, error prone, physically unsafe in nature. AI with gathering, segregating and analysing the related data of a repetitive work can be made in a better autonomous manner where the man is free from the repetitive work load. When AI will be doing this assisting job in routine and repetitive customer service and tiring physical labour to human resulting in creative thinking, higher level task solving and giving judgement. The human error in any communication or production line is due to lack of knowledge and interest with cognitive augmentation the system can be made full proof with the help of AI achieving zero error.

¹⁷³ International Child Sexual Exploitation Data Base , <https://www.interpol.int/en/Crimes/Crimes-against-children/International-Child-Sexual-Exploitation-database>. (Last accessed on July 23,2020).

¹⁷⁴ Christopher Rigano, “Using Artificial Intelligence to Address Criminal Justice Needs”, <https://www.ncjrs.gov/pdffiles1/nij/252038.pdf>. (Last accessed on July 24, 2020).

¹⁷⁵Jaikumar Vijayan, “Google Introduces AI powered Text to Speech for many Application Types”, <https://www.eweek.com/development/google-introduces-ai-powered-text-to-speech-for-many-application-types>. (Last accessed on July 24,2020).

There are working field where physical presence is hazardous, unsafe, and difficult to reach. With the help of AI enabled system and robot these works can be done. With the help of AI more opportunity will be created in various fields which are yet to be explored. AI will generate more avenues in future considering normal human intelligence AI and the development in the field of AI cannot be ignored at any cost. Therefore we should align our thought process and working methodology in the line of AI.

8.6. THE OPERATIONAL GUIDELINE AND LAW MAKING ISSUES OF AI

The AI has remarkably put its foot strong in various sectors related to human and human society with further penetration of enhanced AI and Big data management the approach to above sectors also changes dramatically.

With the development of AI computational capability of computer data banking and data management the existing laws and regulation of different countries are not updated. The major areas which needs to be analyses and devised critically are: Accessing and storage of data, Use of data and algorithm, Transparency in algorithm and program modulation, Legal Liabilities of AI.

- **Accessing and storage of data**

The preliminary requirement of AI is larger number of data which can help in providing solution so data providing friendly system on a unified standard common for all platforms is the basic requirement. Some private data which are already defined under law as not shareable need to be shared for research purpose. Regulation and treaties may be made across countries for use of open data sources and data mining. Individual country should come out laws for data openness, sharing and use. On date the ownership of the data and its use is not clearly defined which leads to uncertainty in future research and return in investment.

- **Use of data and algorithm**

No clear cut regulation or law is prevailing across countries for use of above stored data in AI algorithm with human nature, attitude, biasness, the logic so developed by AI may affect human race in future as example in facial recognition software we can see in the recent case were Barak Obama, the first black president of the United states picture was used as an input in an algorithm designed to generate depixelated faces the output which came was of a white man. PULSE is a programming used to turn and generate low resolution images in to high resolution image using machine learning. The technique used by pulse is known as upscaling which is used in TV and films. PULSE uses StyleGAN to “imagine” the high-resolution version of pixelated inputs. In AI system the image is completely regenerated with high resolution and more pixels the previous technology of enhancing image resolution has been done away which looks the same as the one inputted by the user. Caucasian features because of biased data set. If the data set is not covered over spread varieties then the algorithm will train to a specific feature.

This thing shows that PULSE is producing more number of white faces than faces of any other color. In the case of Barak Obama, PULSE generated such image due to the previous data which the program has been

generating. Thus, Uniform regulation should be formed while formulating the basic structure of AI algorithm thereby no one should keep away from opportunities. We don't have to bring the structural inequalities of the past in to the future we create.¹⁷⁶

- **Transparency in algorithm and program modulation**

In the age of highly powered computers most of the decisions were made automated here people wanted to know the basis of the AI logic or the algorithm which was earlier told to be policy transparency. this may vary by fixing different limits for acceptance of any application, or to help a group of people, discriminating some form others making some decision on unfair criteria , shooting others. The above ill intentioned logic into the programming algorithm which will affect the customer therefore there is a need of transparency and ethical value to the logic or the algorithm used in AI programming. During May 2018 the EU has implemented the General Data Protection Regulation (GDPR) “the right to opt out of personally tailored ads” and “ can contest ‘ legal or similarly significant’ decisions made by algorithms and appeal for human interventions” in the form of an explanation of how the algorithm generated a particular outcome. The guideline is designed for the protection of privacy and personal data.

8.7. LEGAL LIABILITIES OF AI

With the more use of AI day by day we are becoming more dependent. When AI takes leading role in providing services or benefit to human in case of any failure, accident, harm to the user then the algorithm operator or programmer will fall under product liability rules. In case of human there is a penalty method ranging from general fine to infringement but in case of AI the existing rule or law are neither sufficient nor applicable. Ownership of the failure by unfair algorithm needs to be established. Further regulations laws to formulate the legal liabilities of AI which will help in fighting discrimination arising out of unfair and biased algorithms.

8.8. CONCLUSION

With the presence of AI almost all sphere of human life it is difficult to proceed further without it therefore a continuous development in AI, AI associated sciences, AI ancillary fields like data collection, analysis, transmission and use are inevitable. It is seen from the above analysis that we are going to use more and more autonomous AI product in our life.

Further more data collection and accumulation is a basic requirement for better result through a AI therefore there is need of seamless data exchange between countries, data collection from different sources with clear ownership this will help in future development of AI. Presently there is no significant participation is seen from government sector in AI research. Different government authority or agency can take up bigger

¹⁷⁶James Vincent, “What a machine learning tool that turns Obama white can and can't tell us about AI bias”,<https://www.theverge.com/21298762/face-depixelizer-ai-machine-learning-tool-pulse-stylegan-obama-bias>. (Last accessed on July 24 ,2020).

researches and high risk areas where heavy investment is required. Thereby AI will be part of government working in future. In near future when majority of the services and system will be run by AI there will be a potential threat in use of AI so therefore common cyber security platform is an essential for further future use of AI. There is a chance of malpractice or ill intension programs embedded in to AI system may resulted in harm to somebody or discrimination to particular group or individuals to discourage this malicious activity and encourage discipline and ethics in developing algorithm as well as ethical use of AI proper penalty may be formulated.

CHAPTER 9

9.1. CONCLUSION

The man and machine conflict is a century old issue. Man has created machine, so he cannot think/accept of machine being more intelligent than them. We need to come out from the basic of comparing AI with human being and there by replacing AI for human in judicial system. Where this doesn't fit with the existing system therefore there is a need of realignment of human thinking, social system, financial implication, judiciary obligation for co existence of AI and human being where AI will be parallel or better competitor to human being.

With near future extinct of physical books, will be an event of near future thereby the copyright system will face a major crisis in the chaos of digital world. The AI assisted or generated text will be flooded in the virtual world were the meaning of copyright will be lost on the other hand with increase in AI capability the copyright law needs to be updated in the digital age where the responsibility, revenue sharing, infringement, settlements, social behaviours need to be set right.

Patent system recognises and protects the innovation ingenuity, intellectual investment and incentivising invention system. In the growing world of technology in the future all the inventive process will be part of computer and AI assisted or generated inventions where appropriated patent system to be adopted to the radical changes brought by technologies which will take care of the social benefits and protects intellectual investment.

While considering the applicability of different theories of Jurisprudence to AI assisted or generated works it is found the relevancy is not applicable. In case of will theory the so called AI or AI's don't have a will of their own because the programmer dictates or commands the desired result through software where it is considered the will of the programmers. In the case of Interest theory of rights the AI systems don't have any interest of their own therefore, the interest is also considered to be the interest of the programmer or the creator of the AI system. Therefore, both the theory the interest theory and the will theory are not directly applicable to AI's. So, it is desired to analyse the conventional thought process of jurisprudence in the light of development of AI's.

To make an end to the human to machine conflict or rather making a amicable settlement of human and machine with defining the role of both human and machine where all the credit, financial benefit, returns on investment and the legal responsibility to be born by the human and specific incentive, legal provision and social acceptance of AI need to ensured.

Considering all above it is eminent that AI assisted or generated work will play a major role which will compel to redefine the legal provisions in different countries. The global implications, acceptability of AI needs to be uniform across countries for the benefit of human society. Therefore it can be concluded that a new law may be formulated where the responsibility and the return on investment can be shared proportionately among the creator/author/agent/company and programmer/developer/third party hiring/labour and not the least the AI.

9.2. FINDINGS

1. Whether Machine and Robots (Artificial intelligence) doing Human function can be treated as natural person?

With development in computer technology, Big-data mining, machine learning, the level of AI has gone very high which was not expected earlier. Therefore there is no future escape from machine dependency were machine will take up the major thought process of human being. This may require realignment of our thought process, social obligations and judiciary implications. When we look into the matter of incentive there is still a controversy going on between whether the AI should be given incentive as a human considering human as a replacement to machine or the programmer/author/developer should be given incentive. We can think of equal distribution or distribution on the basis of contribution of work. Higher the amount of contribution and higher the risk taking into the work higher will be the incentive.

2. Whether the AI assisted or generated creations/inventions would come under the scope of creator/inventors under the Copyright and patent regime?

To get the benefit out of copyright authorship requires registration and grant of copyright set in any of the country. Most of the existing copyright law defines or grants the originality work by human author only. These days there are huge numbers of AI assisted or generated works are available which also requires copyright protection. But the creative work generated autonomously by AI assisted machine is not copyrightable because they are not satisfying the human author requirement of the U.S copyright office. This can be put in other ways as AI generated works theoretical will not be copyrightable and like other creations which were not protected falls into public domain, open for everybody.

In Copyright Act of India, 1957 under Sec. 2 (d) of the act defines the author of "any literary, dramatic, musical or artistic work which is computer-generated" to be "the person who causes the work to be created".

In case of patent At first, the basic ownership of a patent or the beneficiary of patent is directly link to the inventor of the patent innovation. The inventor in general is the first owner of the patent. If the innovation is made through employment or contract as per the patent act of 1977 UK the employer has the superior right. In case, of inventions autonomously generated by computer with the help of AI algorithm without human intervention then the program or the computer is recognised as a legal person and could be called the first owner. By granting patent to the first owner that is the first owner in this case requires a contract or a legal provision to realise the gain through assigning or licensing all downstream inventions. Where the computer is the first owner and the legal benefit goes to the inventor. The settling of infringement or other dispute is unanswered due to the legal entity of the computer. The revenue sharing has proposed in suggestions.

The conflict regarding the ownership between the employer and the employee over an invention has caught special attention through a case in Bombay High Court, India also.

3. Whether the works made by AI/AI Agent would get any incentives or reward?

With autonomous AI generated work the granting of incentive where arguably given to the AI programmer or the device manager to promote innovation and creativity more over machine do not require financial incentive but there development or future depends on the human developer so these programmers are proposed to be the copyright authors which will not only keep the industry alive but more people will also contribute to research and development in AI sectors which will in future give a larger dividend to the society as a whole. Rewarding or incentivizing the AI programmer appears to be a sustainable solution while the independent programmer may be allowed to have the grant of copyright in favour of him for the work generated by their program. With long term licensing the programmer can license or assign copyright to the end user. The incentive sharing percentage proposal has been suggested in the Suggestion segment.

4. Whether jurisprudential study of few theories of rights and will can be applicable to AI?

In case of will theory the so called AI or AI's don't have a will of their own because the programmer dictates or commands the desired result through software where it is considered the will of the programmers. In the case of Interest theory of rights the AI systems don't have any interest of their own therefore, the interest is also considered to be the interest of the programmer or the creator of the AI system. Therefore, both the theory the interest theory and the will theory are not directly applicable to AI's.

5. Whether AI be held responsible for any infringement?

As technology is growing day by day there is a huge development in the sector of AI. It is not too enough that AI might also get protection under the IPR regime. Once AI gets protection then it might be held liable for the work it does.

Under IP regime, the infringement process is followed by the grant of civil or criminal remedies which may include compensation, pecuniary damages or criminal penalties. The grant of remedies for infringement of the intellectual property rights is part of justifying/compensating the economic rights granted under IP regime. The feeling of happiness about the economic incentivization is natural in humans. But in AIs which are run by pre-designed programmes, the happiness is limited to the programmed actions only. In suggestion segment of this dissertation we can see that if there is a proper

percentage of incentive sharing then it will be easier to make AI liable for infringement as AI would be able to compensate using the AI fund.

6. Whether human will be affected in future due to the increase development in Artificial Intelligence, will it be a threat to Human intellect?

With the presence of AI almost all sphere of human life it is difficult to proceed further without it therefore a continuous development in AI, AI associated sciences, AI ancillary fields, data, collection, analysis, transmission and use are inevitable. It is seen from the above analysis that we are going to use more and more autonomous AI product in our life.

Further more data collection and accumulation is a basic requirement for better result through a AI therefore there is need of seamless data exchange between countries, data collection from different sources with clear ownership this will help in future development of AI. Presently there is no significant participation is seen from government sector in AI research. Different government authority or agency can take up bigger researches and high risk areas where heavy investment is required. Thereby AI will be part of government working in future. In near future when majority of the services and system will be run by AI there will be a potential threat in use of AI so therefore common cyber security platform is an essential for further future use of AI. There is a chance of malpractice or ill intension programs embedded in to AI system may resulted in harm to somebody or discrimination to particular group or individuals to discourage this malicious activity and encourage discipline and ethics in developing algorithm as well as ethical use of AI proper penalty may be formulated. In future AI will

9.3. HYPOTHESIS

The existing IPR regime is well suited to provide adequate legal protection to Artificial Intelligence.

This dissertation on the subject “ARTIFICIAL INTELLIGENCE AND INTELLECTUAL PROPERTY RIGHTS: A FUTURISTIC STUDY” has been studied in details with different variable components of Artificial intelligence along with corresponding variables of judiciary provision in IPR. The AI variables are higher computational power of computers, faster accessing and processing and ultra fast processing speed,

data mining, machine learning and social acceptance of AI. The variable on judiciary is formulation of legislation, agreement or treaty with different countries, global platform for monitoring and strict punishment for violation of IP Laws.

The existing IPR regime is well suited to provide adequate legal protection to Artificial Intelligence.

While looking at the grant of copyright it is mostly seen that to get any protection or to enjoy any right the author has to be a human or an individual who has created something using its own creativity with the present regime of law.

INDIA

According to Sec.2 (d) (vi) of The Copyright Act, 1957 “author” defines “in relation to any literary, dramatic, musical or artistic work which is computer-generated, the person who causes the work to be created.” Author in a computer generated work basically means the person who has created it. The individual has used his minimum creativity and has applied his own human intellect to create the work would get protection under Indian Copyright Law.

USA

Congress has the authority to enact copyright laws according to the Constitution of U.S.A. According to Article 1, Section 8, Clause 8 of the US Constitution it says that the congress shall have the power “To promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.”

In the case of Trademark cases the U.S Supreme court has said that “writings are founded in the creative powers of the mind” until and unless the work is a production of human brain it cannot be protected. After looking at the clauses it can be derived that AI works are not getting protection under U.S laws.

AI can be used by the author or can basically assist the author in creating auto generated work. Here, the work generated by AI assisted computer program with the direct involvement, assistance, instruction, guidance etc. from a human being. Here, AI is used as a tool through the computer with the directive of the human to achieve a pre defined outcome. Present days computer are fully digital and precision level are set by software which cannot be achievable by any mechanical means thereby the photography virtually became an automatic process only the idea and object is fixed by the photographer.

In case of patent system it is important to encourage human creativity and without recognition patent system would lose its legitimacy or value in front of the public. Recognition as a patent holder is important so that the patentee can receive any economic benefit arising out of the patent.

According to Patent Act, 1970 Sec 2(y) "true and first inventor" does not include either the first importer of an invention into India, or a person to whom an invention is first communicated from outside India. This

definition states that as per Indian law the first or the true inventor will be the owner of that invention which means basically a natural person who has invested his creativity, time, his own intellect and understanding in building the invention.

In case of ownership it is stated that employee is not liable to the employer if he can establish that he did not owe any fiduciary duty to his principal company and he is not under any duty to invent and has done everything in his own capacity outside his prescribed duty.

This can be concluded that AI work will always help to enhance the creativity of the author. It will always be a better competitor and would work in harmony with the author. With development of technology and unexpected growth in Artificial intelligence, computational capability and processing speed of computer the work generated out of this AI system is not aligned with existing IPR laws. With the increasing acceptability of AI in the society there is a need of realignment of necessary legislation and legal provision.

There is a need for *sui generis* law for protection of Artificial intelligence.

With recent development in AI and enhanced computational capability of the computer the number of autonomously generated AI creative works has gone up due to non availability of protection to these works they were flooded into public domain as these works are neither being scrutinised or numbered. They landed up making a count were the mini quall original copyrighted works are lost. Therefore, there is a need to classify or categorisation and international serial number marking to all autonomously generated AI creative works. There is a huge investment in the field of autonomous or assisted generated in creative field which requires a minimum return which can be reinvested for the growth and development in this area. This also needs a protection even if for a shorter period of time. Otherwise this tends a limit to innovation.

The less availability of copyright protected work may also lead to less material for teaching and research work. Therefore selected number of Autonomous AI generated work need to be protected for saving the negative effect of less material availability in the potential sectors like music, art, education, technology and medicine.

When we look into the matter of incentive there is still a conflict going on between whether the AI should be given incentive or the programmer/author/developer should be given incentive. We can think of equal distribution or distribution on the basis of contribution of work. Higher the amount of contribution and higher the risk taking into the work higher will be the incentive. In general it is proposed to make a division of 60% to author and 35% to programmer and 5% to AI fund.

The developments in AI will have wide ramifications on human intellectual creativity and innovation.

With the presence of AI almost all sphere of human life it is difficult to proceed further without it therefore a continuous development in AI, AI associated sciences, AI ancillary fields like data collection, analysis, transmission and use are inevitable. It is seen from the above analysis that we are going to use more and more autonomous AI product in our life.

Further more data collection and accumulation is a basic requirement for better result through a AI therefore there is need of seamless data exchange between countries, data collection from different sources with clear ownership this will help in future development of AI. Presently there is no significant participation is seen from government sector in AI research. Different government authority or agency can take up bigger researches and high risk areas where heavy investment is required. Thereby AI will be part of government working in future. In near future when majority of the services and system will be run by AI there will be a potential threat in use of AI so therefore common cyber security platform is an essential for further future use of AI. There is a chance of malpractice or ill intension programs embedded in to AI system may resulted in harm to somebody or discrimination to particular group or individuals to discourage this malicious activity and encourage discipline and ethics in developing algorithm as well as ethical use of AI proper penalty may be formulated.

9.4. SUGGESTION/ RECOMMENDATIONS

- Machine has become a part and parcel of life with development in technology it is impossible to do anything without machine. This current generation cannot imagine their life without machine and technology.
- Artificial intelligence has become a part of every machine it has influenced our everyday life whether we recognise or not. Most of the developed countries of recognised the presence and importance of AI and has acted upon forming legislations but they are few in numbers. Most of the countries have not recognised the importance of AI. Therefore, it is proposed to make international platform or agreement in the line of World Wide Web. Where the global forum will formulate the guidelines, awareness, instruction, rules and regulations and disciplinary actions.
- There should be formulation of proper framework and detail regulations with respect to granting of Copyright and Patent to the works done by the AI system. And it would be of greater help if these guidelines and instructions are formulated in an international level by an international body so that it can be implemented properly by all the countries. These guidelines can be made by WIPO so that it can be implemented worldwide. And all the countries who are signatories to international convention can get the benefits. Further to strengthen the development in data mining and data sharing adequate transparency policy must be laid out for uniform data collection for use of AI development.
- Day by day there is a continuous development in technology which makes human life easier and better. All round effort to be given to AI for deriving more benefit to the society. Last but not the least the responsibility or the consequence of and AI generated work is a major bottleneck in implementing AI in different sectors. Therefore, there is an urgent need to frame legal guideline to fix the liability of any wrong doing.
- In AI assisted or generated work normally there are three beneficiaries
 - (1) Company, creator, the owner, the investor

(2) Developer, system designer, back office assistants

(3) The AI work, the AI as an entity

When we look into the matter of incentive there is still a controversy going on between whether the AI should be given incentive or the programmer/author/developer should be given incentive. We can think of equal distribution or distribution on the basis of contribution of work. Higher the amount of contribution and higher the risk taking into the work higher will be the incentive.

- But in case of AI a method need to be devised keeping funding to generate, development, future investment and compensation in case of infringement or damage therefore it is proposed to make an common fund were some portion from the return of investment can be parked. In general it is proposed to make a division of 60% to author and 35% to programmer and 5% to AI fund.
- The originality of the work, the repetition and reuse of the work are being checked ... through computer only. With advancement of technology machine learning the AI level will reach height where the granting of authorship will be done by AI only not the human being. Ex- the driving license of a vehicle was issued to an adult after a specific period of rigorous training, hands on knowledge transfer, knowledge about vehicle, knowledge about society, psychology of others on road were being verified. Presently, the man is put under a vehicle simulator which is basically a dynamic, technology oriented and AI embedded were all then above parameters are considered and simulated to evaluate the driving capability of the human which grants the driving license or the certificate. This came into existence when the technology was so capable to make driving an act of machine rather than man. This was considered to be one of the finest acumen of human which is now taken away by machine. Days are not far away when we will be riding vehicle without human driver. Due to general human psychology to avoid conflict the dependability on the machine and virtual reality is increasing, this will lead to a world of total virtuality and human at the other end.

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