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FOREWORD

Nirma University Law Journal provides a new and exciting way of exploring the changing dynamics of law. The journal is designed to cover a broad spectrum of topical issues, which are set within the framework of a changing global scenario; highlighting the catalytic nature of legal frameworks for society. The result is a coherent exposition which offers the reader a clear overview of the broader thematic influences on the law generally whilst also focusing more specifically on current manifestations of legal questions.

Though leaders of today emphasize the need to embody all disciplines in one spectrum to analyze problems with creative zeal. Education in the real sense is the spirit of enquiry resulting in new knowledge and path breaking insights on mundane ideas and ways of living. The Nirma University Law Journal aims to encourage writings that are inter-disciplinary in nature expounding contemporary issues across discipline like Sociology, Political Science, Public policy and Economics in the context of Law. It showcases contemporary issues and challenges specific to law; with an inter-disciplinary approach towards knowledge. It is the endeavor of the Institute to become the beacon of legal education by encouraging synthesis of knowledge and best practices cutting across academia and research fraternity.

We thank all the contributors for their ingenuity in expressing new ideas and hope that the journey of legal research is fruitful for the fraternity and students at large.

Prof. (Dr.) Purvi Pokhariyal
Chief Executive, Nirma University Law Journal
Director, Institute of Law, Nirma University

SPECIAL EDITORIAL NOTE

During the past few decades, Artificial Intelligence (AI) has developed rapidly, and the effects of the AI revolution are already being keenly felt in many sectors of the society. It has the potential to deeply impact our lives and can be of enormous benefits ranging from efficiency gains to unprecedented improvements of life quality. However, the unique features of AI and the way AI can be developed entail social, ethical, policy and legal implications. Considering the same, Institute of Law, Nirma University had the opportunity to organize the International Conference on Justice Education, 2019 on the theme 'Artificial Intelligence and its Legal Implications' on 15th and 16th March, 2019. The conference aimed to garner a strong academic response addressing the recent and imminent changes in the legal framework in conjunction to AI and allied areas through research papers from all over India. It successfully received various research papers from professors, advocates, judicial officers, technocrats, researchers and postgraduate/undergraduate law students. Among all the papers, the most qualitative ones have been incorporated in this special edition of the journal.

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DEMYSTIFYING THE ROLE OF ARTIFICIAL INTELLIGENCE IN LEGAL PRACTICE

Darshan Bhora*
Kuldeep Shravan**

ABSTRACT

Artificial Intelligence in its literal sense means machine intelligence which is used to ease the workload of Humans. Marvin Lee Minsky and John McCarthy, two American computer scientists stated that Artificial Intelligence is when a machine uses its own intelligence to perform a task. Artificial Intelligence is designed to portray human-like qualities such as planning, reasoning, problem solving, speech recognition, thinking and many more activities; the difference being it is enabled to work at a much faster and more efficient way. The goal of this study is to find out the different complications an Artificial Intelligence can overcome in the legal field and the uses of Artificial Intelligence in the legal field. The use of Artificial Intelligence in the legal field can replace the paralegals. It can be used to overcome the difficulty of finding precedents of a case or to draft a contract for a company or between two individuals, it can also be used to scrutinize the terms of contract between two parties. The risk of error will be reduced to a bare minimum with the help of artificial intelligence. This paper also reviews the various Artificial Intelligence such as ROSS intelligence, KiraSystems, LawGeex and eBrevia which are put to use in the

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legal field. This paper focuses on exploring the various functions of Artificial Intelligence in the legal field. It is anticipated that this paper will give a brief understanding to the people about Artificial Intelligence and its application in the legal practice.

Keywords: *Artificial Intelligence, legal practice, Error, machine, Human qualities, efficient.*

I.   INTRODUCTION

Artificial intelligence in its literal sense means machine intelligence. It is the answer to the question "what if computers behaved like humans?" Humans are the most complicated beings on earth and they have brought so many advancements in the field of science and technology to solve their complicity. The use of computers has been prevailing for a very long time in legal practice for the purposes of storing, drafting and reviewing contracts. In the progression stage of law materials such as casebooks, textbooks, case reports, loose legal sheets, diaries were used for storing legal information which was an essential part of a lawyer's library. Managing and storing the data was an exhaustive and monotonous as everything was to be stored in the form of hard copy. In order to save time and human labor which is being spent on searching, storing and reviewing of cases there was a technological breakthrough in which digital libraries, digital materials and electronic instruments of storage such as Pen-drives, CD-ROMS, Cloud storage, Hard disks, were founded. This attracted the legal firms and lawyers towards computerization. There was a rapid increase of lawyers and clients with the advent of digital libraries such as Manupatra, Lexis Nexis, SCC Online, Casemine, and many more.[1] With the advent of Artificial Intelligence, the retrieving and processing of stored data has become easier than ever. Artificial Intelligence absorbs knowledge from its surroundings and learns to get better every day. It was created to ease the pressure on the people and making things easier for them. Robot and other machines which use artificial

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[1] https://www.nytimes.com/2017/03/19/technology/lawyers-artificial-intelligence.html.

intelligence were created to get the work done faster.[2] The history of artificial intelligence dates back to the year 1956 in the campus of Dartmouth college. Artificial intelligence has seen a lot of growth from the time of its inception, there had also been an AI winter which was caused due to the government withdrawing itself and its resource from the AI project.[3] Marvin lee Minsky, a cognitive American scientist who was concerned mainly with artificial intelligence and John McCarthy, an American computer scientist, stated that artificial intelligence is when a machine uses its own intelligence to perform a task4.

There are two kinds of artificial intelligence, Narrow artificial intelligence and General artificial intelligence. Narrow AI is found in all the systems around us, they are used in speech and text recognition, virtual assistants and many more. These types of artificial intelligence are taught to do a specific or a narrow work. On the other hand, General AI is more flexible and work like humans. They are not assigned to do a specific task. They are programmed to function and work like human beings5. Artificial intelligence is used in various fields such as News anchoring (Erica robot), Legal field (ROSS) and many others. Though artificial intelligence is making the lives of people easier it is also at the same time knocking down the work-life of many paralegals and labors by snatching their positions in their respective work place. Many labors have been replaced with machines and also are functioned to count and categorize things as the humans do but at a faster pace. Advanced machines are being used by many companies to get their work done efficiently.

II. ARTIFICIAL INTELLIGENCE IN THE LEGAL FIELD

Leibniz, who was one of the grandfathers of AI and a lawyer once said: *'It is unworthy of excellent men to lose hours like slaves in the labor of calculation which could safely be relegated to anyone else if machines were*

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[2] https://www.livelaw.in/will-lawyers-judges-replaced-artificial-intelligence-ai/
[3] https://www.lawcareers.net/Information/CommercialQuestion/Olswang-LLP-Artificial-Intelligence-and-the- legal-profession.

used.[4] Accuracy and precision, the tool which is found only in an adroit lawyer, can be found in abundance in an Artificial Intelligence. With the help of predictive coding and various other tools the information can be reviewed in real- time. The accuracy and precision of AI enables the lawyers to be more confident while providing their clients with advice on a particular case. Law firms employing AI can easily evaluate the end results and safeguard their clients from possible risks arising out of the case, at the same time these firms can also shield their reputation. All the tedious and complex work of a legal firm, which requires the effort of months or sometimes even years together, can be easily assessed, categorized and completed with the help of Artificial Intelligence within a matter of few days. Time management plays a crucial role in the world of a lawyer. A lawyer needs to manage his time efficiently so that he doesn't miss out on the necessary deadlines and completes the work on or before time. Lawyers need to scrutinize large number of documents and search for errors in a contract, this requires enormous amount of time. With the use of Artificial Intelligence, the time that is spent on such tedious tasks can be saved.[5] Natural data processing helps the AI to scrutinize and edit errors in large number of documents and contracts within a short span of time, this can help the lawyers to save time and focus on other important things. The work done by an Artificial Intelligence is unerringly precise. Natural language feature of Artificial Intelligence helps in keeping the language legal throughout the contract and with the help of contract comparison tools the AI finds for missing clauses and loopholes in a contract by comparing them with similarcontracts.

III. RESTRUCTURING E-DISCOVERY WITH THE HELP OF AI

In the pre-technological period, discovery meant pre-trial procedure in a civil or criminal case where the parties to a case had to exchange evidences with the opposition side. Evidences at the time of technological deficiency meant loads and loads of papers and other tangible evidence. With the

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[4] Ibid.
[5] https://www.sydneycriminallawyers.com.au/blog/the-importance-of-time-management-in-legal-practise/

advancements in technology throughout the years, discovery has been completely transformed into Electronically Stored Information (ESI). The data is now electronically stored in the computer systems via various means. E-discovery is a mechanism which lets the parties to preserve, collect and review the information which was stored in an electronic format. Electronic format includes everything from mails to social media messages and texts which are stored in the form of tapes, PDF, networks and various other means. Electronic discovery takes data from its original source and separates the evidence which can then approve or disapprove the claims in a case. The data is first identified, then it is collected and processed after which the data is reviewed by the attorneys and lastly it is produced to the opposition side. The clients of a legal firm expect their lawyers to be faster and more efficient than ever before, along with efficiency they also expect lower cost and better budgets from the lawyers. With the rising developments in the technology, E-discovery is becoming obsolete. Processing and reviewing huge amounts of data can become difficult and time consuming. Artificial Intelligence can help E-discovery by processing and reviewing humungous amount of data and cutting down the time to a bare minimum, it does not stop with processing and reviewing, it uses the stored data to learn new concepts and put them to use in the future. Technology Assisted Review (TAR) has started taking big steps in the legal industry. Artificial Intelligence breaks down the humungous amount of data into well-organized files and it helps the lawyers to search precedents for the current cases by going through the past data which was stored as a form of E-discovery.[6]

IV. LIABILITIY OF ARTIFICIAL INTELLIGENCE.

Research advancements within the sphere of artificial intelligence are solely responsible for the creation and formation of trailblazing technology which has upgraded simple living to contemporary living of humans. The scientific community knows and accepts the fact that AI has the capability to exceed the intellectual capacity of humans and has the ability to reach potentialities

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[6] https://www.researchgate.net/publication/220539249_E- Discovery_revisited_The_need_ for_artificial_intelligence_beyond_information_retrieval.

that humans will take years to comprehend and control. AI is based on a machine learning process and is applied in different sectors of the society such as legal, banking, finance, medical diagnosis, etc. The first two questions that arise regarding Artificial Intelligence in case it goes haywire, are 'Can thinking machines be subject to criminal law?' and 'who shall be held responsible in case of damage caused by a machine due to its error, fault or negligence.' For many years there has been substantial controversy about the very existence and core of AI entity. Scientists and futurologists have asserted the birth of Machina sapiens, which will equally share the place with humans as intelligent creatures. Currently as there are no regulations on Artificial Intelligence, Article 12 of the United Nations Convention can be applied. It states that, a person on whose behalf a computer is programmed to do a certain task can be held liable for the damages caused by the computer in the process of fulfilling the given task. The liability of AI can be interpreted from a legal view point which defines AI as a tool.[7] The principle of vicarious liability plays a role of significance when questioning the liability of the artificial intelligence. As per the law, the master is liable for the acts of his servant as propounded by the principle of vicarious liability. One question of prominence is whether this applies to AI as well. The master here is the maker or creator, whichever maybe preferred. As a thinking machine on its own, it very closely resembles the master servant relationship and therefore can be argued that it is subject to the principle of vicarious liability. No matter how subtle can one point out the differences in legal systems, ultimately the responsibility which in the end renders the respondent liable according to the principle of vicarious liability arises not because of the wrongful act but because of the relationship present between the master and servant. The deep pocket theory advocates for compensation to the damaged parties due to the actions of the AI when done in good will. This 'damage' is inevitable, so the need for compensation.[8]

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[7] Liability for damages caused by artificial intelligence written by PauliusCerka, JurgitaGrigiene, GintareSirbikyt.

[8] https://www.researchgate.net/publication/220539249_E- Discovery_revisited_The_need_ for_artificial_intelligence_beyond_information_retrieval

V.   THE A-TEAM OF ARTIFICAL INTELLIGENCE USED BY LEGAL FIRMS

Artificial Intelligence has penetrated the legal field by taking over the work of compiling, filing, drafting, scrutinizing, predicting crimes, giving verdicts with ninety percent accuracy, framing arguments, giving advice to clients, negotiating deals and appearing in the courts. The automation of legal firms has already decimated the jobs of traditional lawyers. Many firms all the over world has already started the automation process and because of this automation the work of a paralegal has been taken over. Artificial intelligence is used by many of the legal firms to stay ahead in the competition. Many clients require the legal firms to stay updated with the newest technology. Janet Fuhrer, President of the Canadian Bar Association in an interview told, *'a junior lawyer will have access to a 25-year-plus archive of experience and legal knowledge, but a 25-year-experienced lawyer may not have access to the technology that the younger lawyer is using'.*[9] There are various Artificial Intelligence systems that are available in the market today and below listed are the top players of Artificial Intelligence that are available in the market of law.

VI. ROSS INTELLIGENCE

ROSS intelligence, an advanced electronic brain also called the attorney robot is used by most of the legal firms in the United States, it has been programmed to ask questions to improve the reasons and with its machine learning capabilities it also monitors the legal updates and landmark judgments apart from all these functions it also keeps learning every day. ROSS intelligently answers all the questions asked to it with hundred percent accuracy with related passages and case laws. It understands the questions asked in natural language. This system uses natural language processing to understand the human speech as it is spoken. ROSS AI can be broken down into three main categories – Understanding, Retrieval, and Ranking. When a

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[9] https://law.queensu.ca/news/how-will-artificial-intelligence-affect-the-legal-profession-in-the-next-decade.

lawyer submits his query, ROSS analyses the given words through its own Natural Language Processing algorithms and these algorithms automatically understand the time period and jurisdiction of relevance and automatically apply filters to focus on the query and on the place and dates. When it has identified the appropriate date and jurisdiction filters in the query, it will retrieve passages and case laws most similar to the query and these passages are found by a combination of industry-standard research functions and algorithms. The retrieved cases relevant to the query are ranked in order to place the best and most relevant cases first. The Director of ROSS intelligence Nancy March in an interview stated*"Before ROSS there wasn't a tool available where I could just ask a question and find what is needed".*[10]

VII. KIRA SYSTEMS

Cyril Amarchand Mangaldas had signed a deal with Canada based Artificial Intelligence called KIRA systems, making it the first legal firm in India to espouse Artificial Intelligence. KIRA is used to find and extract clauses from a contract and other legal document. KIRAs advanced machine learning techniques separate it from other artificial intelligence in the market. There is a huge demand for technologies with artificial intelligence in the field of law because with the help of artificial intelligence the number of months used for extensive research and drafting of arguments is converted to a meagre number of days. KIRA system uses real time editing tools to help the lawyers monitor the changes made by their colleagues in a contract. The search and analysis tools of KIRA allows the lawyers to find issues and developments across various documents. This system compares a contract with many other contracts to find out the hidden risks. The software has been programmed in such a way that it can be taught to find clauses in differentlanguages.[11]

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[10] https://rossintelligence.com/why-ross.html.
[11] https://info.kirasystems.com/news/cyril-amarchand-mangaldas-is-indias-first-law-firm-to-embrace-artificial- intelligence-technology-as-part-of-legal-innovation

VIII. EBREVIA

Ebrevia is an artificial intelligence system which is based on an algorithm developed by the Columbian University. It is a company founded by attorneys to help them save the countless hours that they have been spending in the process of contract review. This system automatically extracts data from the contracts with high accuracy and precision. It helps the attorneys to find the risk sand prospect so far contract. The deals are completed much faster with the help of this system. Ebrevia can decipher the key data with in a matter of few seconds by processing a huge number of documents at once and the results are displayed at the system's interface which is user-friendly. The interface is user-friendly making it easier to use. The system encapsulates complex data in a contract which was missed by the manual review process. Ebrevia is being used by auditors, legal firms and other companies to analyze and correct a contract, unveiling the hidden cost and to increase the revenue. There are different features of this system such as the diligence accelerator and the lease abstractor. The diligence accelerates or helps the legal firms to review their target's contracts. The lease abstractor, on the other hand is used by commercial real-estate firms to extract data from the lease for various real-estate related issues. This system can also be taught to extract custom data relevant to a specific industry or project. Ebrevia is more accurate and faster than the manual reviewing process. This intelligent software is protected by a bank-grade encryptionalgorithm.[12]

IX. LAWGEEX

Noory Bechor and Ilan Admon created an Artificial Intelligence company called Lawgeex in the year 2014. Lawgeex reviews all the contracts that has been fed in the system and carefully scrutinizes them. If any problems are found then the system sends an alert to the lawyer and highlights that particular mistake and disapproves the contract. This Artificial Intelligence system has been taught legal language and its application in the business

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[12] https://ebrevia.com/#overview

contracts. Lawgeex has been trained to understand the Non-Disclosure Agreement and other contracts of low risks. The contracts which are not in sync to the company's policy are forwarded for detailed editing and approval by the senior lawyers. This system makes sure that the business policies and standards are maintained. Lawgeex was designed to help the senior and more experienced lawyers to focus on more important things, by saving them time on reviewing thecontracts.[13]

X. STUMBLING BLOCKS OF ARTIFICIAL INTELLIGENCE IN THE LEGALFIELD.

Law requires human interaction to understand the crux of the case and the emotions of the client. This is one of the biggest drawbacks of Robot Lawyers, they lack human touch on a case. Only a Human can truly understand the emotions of another Human. Though there are many robot lawyers, the requirement of human interaction in law is also necessary. In the Indian courts' lawyers spend at least a day to interact with their clients solely to extrapolate necessary facts from them. Humans have a tendency to be reluctant in the full disclosure of the facts which cannot be extracted by a robot lawyer. Client interaction and other communications such as interpreting the true position of the client are the most predominant components of a lawyer in the legal field. When a lawyer interacts with his client, there is not just a mere communication but heals on aviates the client's language, gesture and emotion even though all of it can't be coherently obtained.[14] Only a Human Lawyer can truly understand the mental condition of their client and act accordingly. The multiple states of emotions that a human being goes through cannot be interpreted by an electronic brain. Affective computing technology has enabled the Robots to understand and respond accordingly to human emotions. It senses the psychological condition of a person (through microphones, cameras and sensors) and suggests videos which uplift the mood of that person. With

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[13] https://www.lawgeex.com/aboutus/
[14] http://stlr.org/2017/10/03/artificial-intelligence-and-its-impacts-on-the-legal-profession/?cn-reloaded=1.

advancements in technology every drawback of artificial intelligence is being addressed and solved making it invincible.[15] Hacking is probably the one thing that artificial intelligence cannot overcome even with military grade security. There is always away in to the system. Hackers can disrupt the complex algorithm of Artificial Intelligence by turning all the data against them and overloading their memory. Hacking Artificial Intelligence system is elementary because it lacks actual intelligence and can be deceivedeasily.

The biggest drawback of Artificial Intelligence which cannot be solved, keeping in mind the current technological capabilities, is" Imagination". Imagination is the thin line which separates humans from robots. It is one of the unique characteristics of human beings which enables them to be creative in their respective fields. A human's creativity depends upon his level of imagination but a robot's creativity is solely based on the concept of trial and error. Robot lawyers work on the basis of information that is being fed in to them; they cannot independently contemplate the law and arrive at a solution. Being imaginative and creative is one of the features of a good lawyer. A lawyer requires to be streetwise and spontaneous while arguing before any court. Attorney robots lack conceptual creativity and hence they cannot outrun lawyers in the near future. The most common type of problem that an Artificial Intelligence faces is the problem of perverse instantiation or AI control problem. Perverse instantiation is when the Robot with Artificial Intelligence starts to think on its own and starts finding shortcuts to achieve the commands given to them. Perverse in stantiation makes the robot its own master. Attorney robots are also likely to be affected by AI controlproblem.[16]

If all the work of a legal firm is being delegated to Artificial Intelligence and attorney robots then the existing talent and efforts of budding lawyers will be wasted. There are high chances of people becoming lazy and lethargic with the incorporation of AI in their life. The attorney robots will definitely reduce

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[15] https://www.livelaw.in/will-lawyers-judges-replaced-artificial-intelligence-ai/
[16] Ibid.

the work load on the people working in the legal firm but at the same time it will also suppress the talents of incipient lawyers by restricting them to learn the process of filing, compiling documents and drafting a contract. It is very much necessary in the legal profession that a lawyer or even an intern must learn to draft a contract by himself even if there is an attorney robot present in the legal field so that the lawyers or the interns are fully equipped with the required knowledge and skill-set of drafting a contract when the attorney robot malfunctions. These are there acquired skill so far person in the legal field which makes him a better lawyer.[17]

With the advent of Artificial Intelligence and Attorney robots in India there will unquestionably be a code which would be enacted to regulate the conduct of AI in the legal field. The code would be similar to that of the Advocates Act, a code which governs the ethicalaccountability of an advocate in terms of his/her conduct. These regulations and restriction will be imposed to sub side the negative use of Artificial Intelligence and Attorney Robots. The regulations that would have been imposed on AI and Attorney robots will plausibly depreciate its wide capabilities bringing them into the radar of law-makers restricting its ambit. Hence the AI and Attorney robots will eventually lose their potency in the legal field reasons owing to the regulations and restrictions imposed onthem.[18]

XI. CONCLUSION

Artificial Intelligence is key to the future. This complex computer algorithm has converted a mere hype to reality. Artificial Intelligence has established its presence in all aspects of life by proving itself. From the logic theorist, written in 1956 to the creation of the most advanced Artificial Intelligence –based and ro-humanoid robot in the year 2016,Artificial Intelligence has developed at a much faster pace. Professions like law requires humungous number of man- hours to get the work done and the assigned work must be completed perfectly without any errors. ROSS, KIRA, Lawgeex, E-Brevia are

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[17] Ibid.
[18] Ibid.

few of the best Artificial Intelligence system present in the legal field which reduce the pressure on the lawyers by completing tedious tasks involving filing, drafting, reviewing and processing a contract with in a matter of few days. An AI understands and interprets the facts of a case while uploading a document and generates word suggestions to filter search, lists case laws mentioned and provides visual assistance of precedents. There is a general notion that junior lawyers spend most of their time and in document review and this work could be taken up by Artificial Intelligence. Document reviewing is a structural process as its objective is to establish relevance to prevailing topics and query. Being emotionless is the biggest drawback of an Artificial Intelligence system. Although there are software technologies like CATAPHORA for analyzing and monitoring personal behavior patterns through texts messages communicated over social networks, AI is not yet capable of understanding spontaneous and sporadic human interaction. The query regarding the liability of AI for its own actions has also been discussed up to a degree of satisfaction. Not relinquishing the fact that AI does not constitute a person within the legal definition, the conundrum is in deciding with whom the liability rests. This quagmire is solved when the principle of vicarious liability is applied and contrasted to the similar functions of that of a master-servant with the maker and the AI. Though Artificial Intelligence has proved to be useful in the legal field, the jobs of the judges and lawyers are not in danger. Artificial Intelligence should be viewed as a friend and not a foe.

CRIMINAL LIABILITY OF THE ARTIFICIAL INTELLIGENCE ENTITIES

Ankit Kumar Padhy*
Amit Kumar Padhy**

ABSTRACT

The evolution of information technologies have brought us to a point where we are confronted with the existence of agents – artificial intelligence entities - which are able to act autonomously with little or no human intervention. Contemporary technological inventions are beginning to support or replace human activities with the emergence of artificial intelligence entities ranging from autonomous cars to machines translation software, robots and medical diagnosis software. These inventions tend to venture into some human mental activities such as interpretation, evaluation, and decision-making, which have never been delegated to non-human mind before. However, the behaviour of the artificial intelligence entities can damage individual or collective interests that are protected by criminal law. The rise of artificial intelligence raises questions about liability for crimes an Artificial Intelligence commits, mainly because the AI acts autonomously and with limited control from humans. This paper would attempt to evaluate the criminal liability of Artificial Intelligence entities. The purpose of this thesis is to enquire this liability problem concerning Artificial Intelligence, with focus on the elements of criminal

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liability. The analysis aims to define Artificial Intelligence for legal purposes and to analyse whom to hold liable when crime is committed by Artificial Intelligence Entities.

Keywords: *Criminal Liability, Artificial Intelligence, Criminal law.*

I. INTRODUCTION

Artificial Intelligence has been a dream of mankind since centuries, both as a part of fiction and philosophy. But with exponential technological advancement in recent decades, this has become reality. Today, human dependency on artificial intelligence technology has substantially increased.[1] From automated cars to drones, from computer science to medical science and from artificially intelligent assistant on phones to artificially intelligent attorneys, there is hardly any sphere of everyday life which has remained untouched from it. AI has helped to make human life easier, better and efficient, saving valuable time and energy.[2]

There is no precise definition of Artificial Intelligence.[3] In common parlance, it is "ability to adapt or improvise according to the feedback received in order to solve problems and address situations that go beyond the predefined set of queries and instructions that the AI was programmed with".[4]

However, like any technology, it has its own share of pros and cons. Let's take the example of autonomous vehicles. On one hand, it has increased mobility for social units like elderly and disabled, while on the other hand,

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[1] O.E.R adutniy, Criminal Liability of the Artificial Intelligence, 138 Probs. Legality 132 (2017).
[2] Matilda Claussen-Karlsson, Artificial Intelligence and the External Element of the Crime: An Analysis of the Liability Problem 7 (2017).
[3] K. E. Oraegbunam, Artificial Intelligence Entities and Criminal Liability: A Nigerian Jurisprudential Diagnosis (2017).
[4] Dafni Lima, *Could AI agents be held criminally liable: Artificial Intelligence and the Challenges for Criminal Law*, 69 S.C.L. REV. 682 (2018).

the AI technology has been responsible for several deadly accidents. This has given rise to an important legal concern and curiosity as to the liability of the Artificial Intelligence entities under the criminal law for such crimes.

AI technology brings with it several pertinent legal concerns. First of all, if an Artificial Intelligence Entity injures any person or property, who would be criminally liable for such harm? Is it the Artificial Intelligence entity itself (for e.g.-robots), producer/programmer (programmer may also be a third party working for the producer, however for understanding, we would consider them as producer), user i.e. owner/buyer of the Artificial Intelligence entity, or would it be considered an Act of God? Secondly, what elements of crime need to be proved in such a case of crime by Artificial Intelligence Entity. Thirdly, if Artificial Intelligence entity, like robot, itself is found guilty, then what kind of punishments be imposed on such Artificial Intelligence entity. There are a plethora of such legal issues which are yet to be settled.[5]

The available legal jurisprudence on criminal liability of AI entity is very minimal with hardly any legislation or cases on this issue, especially in India. Thus, the present research article would delve into this issue. The objective is not to prescribe any straight-jacket rules or provisions but to highlight broad principles which can aid in coming up with specific laws on the issue in future, at the same time allow flexibility and adaptability for rapidly changing technology. The article endeavours to provide solutions to this legal conundrum of criminal liability of Artificial Intelligence Entity.

II.   GENERAL ELEMENTS OF CRIMINAL LIABILITY

To establish criminal liability of any offense, two elements need to be satisfied-the physical element (actus reus) and the mental element (mens rea). 'Actus reus' signifies the wrongful act or omission, and 'Mens rea' denotes the guilty mind, reflected by motive, intention or knowledge.

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[5] *Id.* at 680.

Negligence and strict liability are exceptions to this general rule. If any entity, be it human, corporation or Artificial Intelligence Entity, satisfies these two elements, then any such entity could be made liable under criminal law.[6]

III. POTENTIAL FEASIBLE OPTIONS FOR ASCRIBING CRIMINAL LIABILITY ASSOCIATED WITH ARTIFICIAL INTELLIGENCE ENTITIES

1.   When AI is acting as an innocent agent

In the first possible situation, the AI entity is presumed to be an innocent agent working according to the instructions of the user. In such a case, criminal liability can arise because of intentional programming by the producer to commit an offence, or misuse of the AI entity by the user for commission of the crime.[7]

Fictive illustration for the first case- A programmer designs software of a robot. He intentionally places it in front of his enemy's house to torch his empty house at night. The robot committed the offense but the programmer is deemed to be the perpetrator.

Fictive illustration for the second case- The user buys a robot and instructs the robot to assault any third person. Here, the robot does not apply its intelligence and experience, and simply follows the master.

In the first case, only producer would be liable. In the second case, only the end user would be liable because the robot is a mere innocent intermediary.

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[6] P. Freitas, F. Andrade and P. Novais, Criminal Liability of Autonomous Agents: from the unthinkable to the plausible (2012).
[7] Gabriel Hallevy, The Criminal Liability of Artificial Intelligence Entities: From Science Fiction to Legal Social Control, 4 AKRON INTELL. PROP. J. 179 (2010).

2.   When AI is acting as semi-innocent agent

The second possible situation is based on the foreseeability of the producer/programmer or end user as to the potential commission of offences. In this particular situation, the producer and the user work closely with the AI entity though they did not intend the particular offence. In such a case, criminal liability can arise in two ways- First, because of negligence or recklessness of the producer in programming the AI entity and second, natural and probable consequence of the act instructed by the user.[8]

Fictive illustration for the first case –A puts the car on auto-pilot and starts listening to music. The AI misjudges the speed of an opposite car and crashes into it, resulting in loss of human life and property. The misjudgement was because of the faulty programming of the producer.[9]

Fictive illustration for the second case- A buys a particular robot and instructs it to torch a house 'B'. In an attempt to torch house 'B', the robot also torches it's immediately neighbouring house 'C' and there is loss of human life and property therein. Although A did not intend torching house 'C' or killing anyone, such results can be said to be natural and probable consequence of his act which he could have reasonably foreseen.

In the first case, the producer would be liable. In the second case, the end user would be held liable. In the second case, A may not be liable for murder but for offence of negligent homicide.

3.   When AI is acting an independent entity/fully autonomous

The third situation is futuristic. In future, AI entities may be able to function in a totally independent, fully-autonomous manner, not solely dependent on the algorithms rather learning from their experiences and observations. Such AI entity would have the cognitive capabilities i.e. the ability to choose

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[8] *Id.* at 182.
[9] Weston Kowert, *The Foreseeability of Human- Artificial Intelligence Interactions*, 96 TEX. L. REV. 181 (2017).

between alternate possible solutions to a problem. If such AI entity commits a crime, then such AI entity can be held criminally liable.

IV. GENERAL DEFENCES

Intoxication, necessity, self-defence are few examples of General defences available to humans under criminal law. Similar defences in slightly modified form may also be made available to AI entities. For example- The kind of influence intoxication can have on humans; a malware or virus can have similar effect on a robot. Thus, with few adjustments, the general defences applicable to humans can also be extended to AI entities.

V. KINDS OF PUNISHMENT

Death penalty, imprisonment and fine are common punishments under criminal law. Similar punishments with certain modifications can be applied to AI entities. For example- Permanent deletion of the software of the AI entity would have an analogous effect as death penalty to humans. Also, temporary deletion of the software could be equated with imprisonment to the human criminals. Community service can be an analogous punishment for the AI entity.

VI. CONCLUSION

The growth of Artificial Intelligence and its applications in the coming decades is inevitable. If all the specific requirements of criminal liability applicable to humans can be extended to corporations, there is no reason why they cannot be made applicable to AI entities as well.[10] Having stringent principles of law in order to regulate the criminal liability of AI entities would ensure better social order and easier determination of respective liabilities in case of any offence by AI entity, which would ultimately lead to welfare of the people.

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[10] Mindaugas Naucius, *Should Fully Autonomous Artificial Intelligence Systems Be Granted Legal Capacity,* 17 TEISES APZVALGA L. REV. 113 (2018).

ARTIFICIAL INTELLIGENCE: A THREAT TO PRIVACY?

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ABSTRACT

Klaus Schwab has observed that, "The Fourth Industrial Revolution, finally, will change not only what we do but also who we are. It will affect our identity and all the issues associated with it: our sense of privacy, our notions of ownership, our consumption patterns, the time we devote to work and leisure, and how we develop our careers, cultivate our skills, meet people, and nurture relationships."[1] Advances in Artificial intelligence have transformed our world. John McCarthy from the Computer Science Department of Stanford University coined the termand defined it as, the science and engineering of making intelligent machines.[2] Artificial intelligence is where a machine possesses the intelligence as that of a human being. Such machines with artificial intelligence, like anyother human being can react to and contemplate the environment it is in and react accordingly. It collects information around it and has the ability to take decisions accordingly. This system of artificial intelligence though sounds helpful on prima facie understanding; it has been a threat to the

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[1] http://www.journals.ac.za/index.php/sajhe/article/download/633/248
[2] http://www-formal.stanford.edu/jmc/whatisai.pdf

privacy of an individual. These artificial intelligence mechanisms are controlled by softwares which are developed by human entities. Such owners have a control over the action and reaction of the artificial intelligence mechanism. In today's digitalised world every individual in one or the other way is subject to the use of technology. Enormous amount of personal data is stored as digital data, which the artificial intelligence mechanism is making use of, in view of the betterment of standard of living. On the flip side, all personal data including our finger prints, travel details, frequent interaction with a particular persons, medical reports are collected, stored, processed, profiled with the help of Artificial Intelligence. This invades a person's privacy.

In this background, the paper tries to analyze the invasion of privacy by Artificial Intelligence and the ill-effects of the same. In the guise of public good even the government has adopted AI mechanisms which lead to questioning the governmental action. Likewise, there is hardly any legislation that regulates these aspects either on the national or on the international platform. The paper focuses on India and lack of any legislation till date to protect an individual's Privacy. Since the Supreme Court of India has upheld that right to privacy is a fundamental right under Article 21 of the Constitution of India, though not an absolute right, it is high time a comprehensive Privacy legislation is enacted in India.

Keywords: *Artificial Intelligence; Right to Privacy; Data Protection; Human Rights.*

I.   INTRODUCTION

With the technological revolution and especially the use of Artificial intelligence, our lives have been transformed in a manner that was never perceived or fathomed before. With the advent of Artificial Intelligence, the intelligent machines enable high-level cognitive processes like thinking, perceiving, learning, problem-solving and decision-making, coupled with advances in data collection and aggregation, analytics and computer

processing power.[3] These technological innovations have become ubiquitous and all pervasive, touching every sphere of our lives. We are witnessing a fourth revolution which has created a '*technomy community'*.[4]Schwab has observed that,"*we are on the threshold of a technological revolution which will alter the way we live, work and relate to one another. In its scale, scope and complexity, the transformation will be unlike anything humankind has experienced before. We do not yet know just how it will unfold, but one thing is clear: the response to it must be integrated and comprehensive, involving all stakeholders of the global polity, from the public and private sector to academic and civil society.*"[5]The fourth Industrial revolution is characterized by the convergence of various technologies such as data analytics, artificial intelligence, cognitive technologies and internet of things.[6]It has been observed by Brian Householder[7] that, "*The concept of digitizing everything is becoming a reality. Automation, Artificial intelligence, Internet of things, machine learning and other advanced technologies can quickly capture and analyze a wealth of data that gives us previously unimaginable amounts and types of information to work from. Our challenge becomes moving to the next phase-changing how we think, train and work using data-to create value from the findings obtained through the advanced technologies.*"[8]

Artificial Intelligence revolution is emerging at a fast pace in India and as it has the potential to transform the economy there is an urgent need for the Indian Government to strategize for development of Artificial Intelligence. The Hon'ble Finance Minister has taken a step in the right direction when he

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[3] http://niti.gov.in/writereaddata/files/document_publication/NationalStrategy-for-AI-Discussion-Paper.pdf

[4] https://www.ey.com/Publication/vwLUAssets/ey-future-of-jobs-and-its-implication/$File/ey-future-of-jobs-and-its-implication.pdf

[5] Xu, Min & M. David, Jeanne & Hi Kim, Suk. (2018).,*The Fourth Industrial Revolution: Opportunities and Challenges*, International Journal of Financial Research. 9. 90. 10.5430/ijfr.v9n2p90.

[6] https://www2.deloitte.com/content/dam/Deloitte/lu/Documents/technology/gx-fourth-industrial-revolution.pdf

[7] President and Chief Operating Officer, Hitachi Vantara

[8] https://www.forbes.com/forbes-insights/wp-content/uploads/2018/01/Deloitte-FourthIndustrialRev_REPORT_FINAL-WEB.pdf

mandated the NITI Aayog to establish the National Program on AI in order to usher in the research and development in the field of AI.

II. ARTIFICIAL INTELLIGENCE

The idea of computer based artificial intelligence came to fore with Alan Turing's test which inquires into the question as to whether a computer can think like a human being. The first artificial neural network was built a few months later by Princeton students. The term, 'Artificial Intelligence' was coined by Mr. John Mc Carthy and defined it as, "the science and engineering of making intelligent machines."[9] The first AI program, 'Logic Theorist' was developed by researchers at the Carnegie Institute of Technology. In MIT an Artificial Intelligence Laboratory was founded by Marvin Lee Minsky. Much advancement was made in Cambridge to develop semantic networks for machine translation and also to develop self learning softwares at IBM. The interest in AI emerged again in the recent years as there are many advances in the field of deep learning, faster computers and more data which has convinced the investors that it is viable and profitable to work with Artificial Intelligence. Billions of dollars are being invested by Tech giants like Amazon, Apple and Google in various technologies for the development of Artificial Intelligence.

The tasks associated with intelligent humans when performed by digital computer or robots is termed as Artificial Intelligence. Many aspects of our lives have been touched by Artificial intelligence. Many sectors like transportation, health care, education, entertainment industries are using AI to carry out the work. Medical care and research is undergoing a sea change with the use of Machine learning algorithms. In order to identify high impact molecules for drug development and to accelerate skin cancer diagnosis these technologies are being used. A recent report by Mc Kinsey found that 45% of all work activities could soon be automated using AI.[10]

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[9] http://www-formal.stanford.edu/jmc/whatisai.pdf
[10] https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/where-machines-could-replace-humans-and-where-they-cant-yet

III. CONCEPT OF PRIVACY

The concept of Privacy is not a new one and one can find references to it since times immemorial. The early references to privacy violation and protection can be found in the passages of bible. Any person who violated or intruded into someone's private life was viewed with anger and shame. The Code of Hammurabi also mentioned against intrusion into someone's home. Right to Privacy was protected in the Hebrew culture, ancient Greece and China.

It is very difficult to define the term '*privacy*' as the meaning varies according to the context, environment and from society to society. Privacy is sometimes fused with Data protection in some countries to mean protection of personal information.

Privacy has various facets such as Information privacy; bodily privacy; privacy of communications and territorial privacy. Information privacy refers to the protection of personal information or data like the credit card details, health information etc. The protection to the physical selves of people against invasive procedures like testing of drugs, cavity searches falls within the purview of bodily privacy. Further, privacy can also be understood to mean the privacy of communication which includes the security and privacy of mails, telephones, emails and any other form of communication. Territorial privacy refers to setting of limits into one's domestic or other spheres like one's workplace or public space.[11]

The idea of privacy stems from distinguishing between what is '*Private*' and '*Public*'which helps in drawing limits between 'oneself' and the 'outer world'. The concept of privacy was articulated by Justice Louis Brandeis when he referred to privacy as the right of an individual,'*to be left alone*'which ensured protection against the unwanted disclosure of private facts, thoughts, emotions etc.[12]Alan Westin,in his the seminal work 'Privacy and

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[11] http://gilc.org/privacy/survey/intro.html
[12] http://faculty.uml.edu/sgallagher/Brandeisprivacy.htm

Freedom 'emphasized upon the fact that privacy includes the choice of people to determine the extent to which they will expose themselves, their attitudes and their behavior to others.Privacy has also been described as a quasi'*aura*' around the individual, whichconstitutes the limit between him/her and the outside world. Privacy has different facets like the right to be let alone; limited access to the self; secrecy; control of personal information; personhood and intimacy.[13]According to Ruth Gavison, *Secrecy*, *Anonymity* and *Solitude* are the three elements of privacy. Privacy can be lost when a person chooses to do so or it can also be lost through the action of another person.[14]Richard Posner, an American jurist and economist refers to privacy in terms of withholding and concealment of information.[15]Westin is of the view that privacy is the claim of an individual to determine what informationabout himself, he wants to share with the others. Fried defines Privacyin terms of the control that one can have over the information about oneself.[16]According to American Edward Blousteinwhen there is an intrusion into privacy of a person it has some connection with the'*personhood, individuality andhuman dignity*'of that individual.[17]Tom Gerety, an American Professor terms privacy as "the control overor the autonomy of the intimacies of personal identity."[18] Hungarian Jurist Máté Dániel Szabó,argues the right of an individual to decide about himself or herself can be termed as 'privacy'."[19]

IV. INTERNATIONAL FRAMEWORK FOR PROTECTION OF PRIVACY

Human rights form the cornerstone of any civilised society. The right to privacy has been categorised as a first generation human right. Privacy is a

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[13] https://pdfs.semanticscholar.org/b4dd/520e60148e04ae22d2fc33415398e0736fff.pdf
[14] Supra n. 9
[15] https://www.passeidireto.com/arquivo/49651384/what-is-privacy—the-history-and-definition-of-privacy—adrienn-lukacs/2
[16] ibid
[17] ibid
[18] ibid
[19] ibid

fundamental human right recognized in the Universal Declaration of Human Rights, 1948 (Article 12)[20]and the International Covenant on Civil and Political Rights,1966 (Article 17);[21] Convention on the Rights of the Child,1990(Art.16); [22]and International Convention on the Protection of all Migrant workers and members of their families, 1990(Art.14).[23]The right to privacy is protected at the regional level under the European Convention for the protection of Human rights and fundamental freedoms(Art.8);[24]and American Convention on Human rights, 1969(Art.11)[25] amongst others. Cairo declaration on human rights in Islam, 1990 (Art.18)[26]; Arab Charter on human rights,1994 (Art.16 and 21)[27]; African charter on the rights and welfare of the child (Art.19)[28];Asia-pacific economic cooperation privacy framework[29]; Council of Europe Convention for the protection of individuals with regard to automatic processing of personal data,1981[30]; Additional Protocol to the Convention for the Protection of individuals with regard to personal data regarding supervisory authorities and trans-border data flows, 2001[31]; European Union Data Protection directive [32] also protect privacy rights.

Most of the countries of the world have recognized the right to privacy in their Constitution. During this time, the inviolability of the home and secrecy

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[20] http://www.un.org/en/udhrbook/pdf/udhr_booklet_en_web.pdf
[21] https://treaties.un.org/doc/publication/unts/volume%20999/volume-999-i-14668-english.pdf
[22] https://www.ohchr.org/documents/professionalinterest/crc.pdf
[23] https://www.ohchr.org/en/professionalinterest/pages/cmw.aspx
[24] https://www.echr.coe.int/Documents/Convention_ENG.pdf
[25] https://www.cartercenter.org/resources/pdfs/peace/democracy/des/amer_conv_human_rights.pdf
[26] http://www.bahaistudies.net/neurelitism/library/Cairo_Declaration_on_Human_Rights_in_Islam.pdf
[27] http://www.humanrights.se/wp-content/uploads/2012/01/Arab-Charter-on-Human-Rights.pdf
[28] https://au.int/sites/default/files/treaties/7773-treaty-0014_ _african_charter_on_the_rights_and_welfare_of_the_child_e.pdf
[29] https://www.apec.org/-/media/APEC/Publications/2005/12/APEC-Privacy-Framework/05_ecsg_privacyframewk.pdf
[30] https://rm.coe.int/1680078b37
[31] https://rm.coe.int/1680080626
[32] https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31995L0046:EN:HTML

of communication were protected by most of these provisions.Some countries like South Africa and Hungary have included right to access and control one's personal information.However countries like the United States of America, Ireland have not explicitly recognized privacy in their Constitution. Countries around the world have worked around adopting comprehensive privacy laws and many of the laws are based on themodels adopted by the OECD and the Council of Europe. European Union directive lays emphasis on the protection of personal data which has set a benchmark for national laws. Countries outside Europe Union have drawn inspiration from this and have passed privacy laws. Many countries are in the process of enacting data protection laws and more than forty countries have already enacted data protection or information privacy laws.

V.   RIGHT TO PRIVACY: AN INDIAN PERSPECTIVE

Nariman J. traced the constitutional foundations of privacy to the Preamble stating as follows: "The dignity of the individual encompasses the right of the individual to develop to the full extent of his potential. And this development can only be if an individual has autonomy over fundamental choices and control over dissemination of personal information which may be infringed through an unauthorized use of such information.[33]

Right to Privacy is not specifically guaranteed under the Constitution of India but has been interpreted by the courts to be protected under Art.21 of the Constitution. The right to privacy is not an absolute right but can be subject to reasonable restrictions in the interests of the sovereignty and integrity of India, the security of the State, friendly relations with foreign States, public order, decency or morality, or in relation to contempt of court, defamation or incitement to an offence.[34] The Supreme Court's decision in the case of Justice K.S. Puttaswamy (Retd) v. Union of India[35] is a resounding

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[33] https://indconlawphil.wordpress.com/2017/08/."
[34] Article 19(2) of the Constitution of India, 1950
[35] https://www.sci.gov.in/supremecourt/2012/35071/35071_2012_Judgement_24-Aug-2017.pdf

victory to the right of Privacy.In this case the constitutional validity of the Indian biometric identity scheme Aadhaar was challenged.   This is considered to be a watershed moment in the constitutional history of India as the right to privacy has been endorsed by the highest court of the country. All the nine judges unanimously agreed that, the *right to privacy is protected as an intrinsic part of the right to life and personal liberty under Article 21 and as a part of the freedoms guaranteed by Part III of the Constitution.*[36]

There is a void in the Indian legal system as far as data protection is concerned as Indiadoes not have comprehensive data protection legislation in place.   India is contemplating to enact privacy legislation with efforts being made in this direction with an Approach Paper on Privacy and the Report of the Group Experts on Privacy. The personal information is afforded legal protection in India under Section 43A of the Information Technology Act, 2000 and the Information Technology (Reasonable security practices and procedures and sensitive personal data or information) Rules, 2011. Section 43 A of the Information Technology Act mandates reasonable security practices to be maintained by body corporate if it receives, possesses, deals, or handles any 'sensitive personal data'. Any failure on their part to do so will result in liability and the corporate will have to compensate for the loss suffered.[37] Today the Government authorities and other non-governmental bodies initiatives are data driven. For instance, the Unique Identity scheme, National population register collect vast amount of personal data of individuals. Further many e-government projects rely on vast amounts of data which further adds to the problem of data protection and raises privacy concerns.   However, Section 43A of the Information Technology Act, 2000 is lacking as far as protection of data is concerned in the public sectors. The scope of protection afforded under it is limited to personal and sensitive data. The problem is further aggravated as usually

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[36] https://www.eff.org/deeplinks/2017/08/indias-supreme-court-upholds-right-privacy-fundamental-right-and-its-about-time

[37] https://indiacode.nic.in/handle/123456789/1362//simple-search?page-token=437d9d6bd053&page-token-value=fa92e035a6f1a6271abe3958ebe97eae&nccharset=29BF10FA&query=information+technology+Act%2C+2000

data is of dynamic nature and due to generation of new forms of data and data sources and the evolving nature of data, the protection afforded under Section 43A falls short. Further, the definition of personal sensitive data is also limited. Personal information is defined to mean any information that relates to a natural person, which, either directly or indirectly, in combination with other information available or likely to be available with a body corporate, is capable of identifying such person." Rule 3 of the Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data or Information) Rules, 2011 defines "sensitive personal data or information" to include password; financial information such as Bank account or credit card or debit card or other payment instrument details; physical, physiological and mental health condition; sexual orientation; medical records and history; and biometric information. It is necessary that certain kinds of personal information are particularly sensitive due to the intimate nature of their content and need to be protected. However, this definition is inadequate as it does not include electronic communications such as emails, browsing and chat logs within its scope. The consent of the data subject needs to be taken in writing before the collection of sensitive personal data.[38] The data collectors must ensure that the consent is informed and freely given. The application of consent before the collection of personal data is significantly narrowed by the fact that the Rule 5 applies only to sensitive personal data or information and not all kinds of personally identifiable information.[39] Thus it can be seen that Section 43A of the IT Act and the 2011 rules do provide for many similar provisions as under the General Data Protection Regulation (GDPR) but applicable only for residents of India.

The European Union has enacted the EU GDPR, which replaces the Data Protection Directive of 1995 and has come into force on 25th May 2018. It is a

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[38] Rule 5 of the Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data or Information) Rules, 2011

[39] https://privacyinternational.org/sites/default/files/201804/India_UPR_Stakeholder%20Report_Right%20to%20Privacy.pdf

comprehensive legislation that deals with all kinds of processing of personal data. It also lays down the rights and obligations of parties. It lays down the fundamental norms for the privacy protection of the Europeans. GDPR will be applicable not only for EU companies, but alsoto many third world countries including India. Companies that deal with the data of the EU residents or if they are providing any goods and services which involves handling of data or if they monitoring or profiling data of EU people they are required to comply with the GDPR. Compliance with the GDPR has become a major cause of concern for the Multinational companies as the GDPR is having far reaching effects in the international arena and the penalties provided under GDPR are very hefty. Under the GDPR restrictions can be imposed on the basis of meeting the 'adequacy requirement' which basically means restrictions on the transfer of data to any other country or organization of international nature which donot have adequate level of protection in their country.In order to keep up with the changing landscape of privacy protection at the international level, it becomes imperative for the Indian Government to enact a privacy legislation.

There was a ray of hope for privacy protection when the Justice Sri Krishna Committee submitted the draft Personal Data Protection Bill, 2018. The bill gave importance to the consent of individual for the purpose of sharing of data. If personal data had to be shared or processed express consent of data subject had to be taken. To make an informed choice the burden fell on the data subject.The personal data must be processed in a fair and reasonable manner. Any failure on the part of the companies would attract penalties that can go up to Rs.15 crores or 4% of a company's turnover world over. The bill however does not address the issue pertaining to the ownership of the data. The Telecom Regulatory Authority of India had stated that each user ownshis data and the entities that are in the possession of data are mere custodians.Data is not treated as a 'property'but is treated as a matter of 'trust.'The consumers have the right to demand the deletion of their past record. Under the GDPR, the data subject could also exercise their 'right to be forgotten' which is defined as the right to restrict or prevent continuing

disclosure of personal data. However the process of justifying why the consumer does not want to continue giving consent is also long drawn.[40]

VI. HOW ARTIFICIAL INTELLIGENCE CAN COMPROMISE ON OUR PRIVACY?

The emergence of increasingly sophisticated Artificial Intelligent systems and the convergence of many technologies like the Artificial Intelligence, the Internet of Things (IoT), and the related Internet of Living Things (IoLT) poses a serious threat to our privacy and security. The generation, collection, processing and sharing large amounts of data about an individual and collective behavior can be done with the help of Artificial Intelligence. One can analyze and optimize sensory data like the images of face, voice recording,vitals, DNA of an individual much faster and better than human beings with the help of Artificial Intelligence and by using computational algorithms enhanced with machine leaning capabilities. Inspite of various privacy and security issues associated with Artificial Intelligence countries and governments around the world are investing and developing Artificial intelligence technologies.The interconnectivity of AI systems which optimize every aspect of our lives including our genomes, faces, finance, emotion and environment have further added to the problem of privacy protection.The proliferation of AI technologies has impacted most of the spheres of our lives.

Many consumer goods and products which are using AI are equipped with sensors which generate and capture the data even without the knowledge or consent of the people. The data which is collected is then profiled to be used for marketing purpose and to make commercial gains and also to predict their future behavior. Anonymity of an individual is lost as AI methods are being used to identify people who wish to remain anonymous. Further, Artificial intelligence is also being used to infer and generate sensitive information about individuals from their non-sensitive data.

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[40] https://www.thehindubusinessline.com/opinion/columns/slate/all-you-wanted-to-know-about/article24617362.ece

AI has become very attractive due to the speed, scale and automation. The speed at which AI does computations is already faster than what human analysts are capable of, and it can also be arbitrarily increased by adding more hardware.AI is also inherently adept at utilizing large data sets for analysis, and is arguably the *only* way to process big data in a reasonable amount of time. Finally, an AI can perform the designated tasks without supervision, which greatly improves analysis efficiency. These characteristics of AI enable it to affect privacy in a number of different ways:

a) Data Exploitation:

As the reliance on the AI technology is increasing so is the potential for exploitation. Many consumer products ranging from smart home appliances to computer applications are vulnerable to data exploitation by AI. With the use of AI, a person is unaware about how much data their software and devices generate, process, or share.

b) Identification and Tracking:

AI can be used for the purpose of identifying, tracking and monitoring individuals across multiple devices whether they are at work, or home or any public place. If the personal data is anonymised and once it becomes a part of a large data set, an AI can de-anonymize this data based on inference from other devices. This blurs the distinction between personal and non-personal data.

c) Voice and Facial Recognition:

Privacy and Anonymity of individuals is severely compromised with the use of two methods of identification that AI is increasingly adept at are Voice recognition and facial recognition. For example, Facial recognition and voice recognition are used by law enforcement agencies for the investigation purpose and to track the wrongdoers.

d) Prediction:

AI and sophisticated machine learning algorithms are being used to infer or predict sensitive information from non-sensitive forms of data. For instance, someone's keyboard typing patterns can be utilized to deduce their emotional states such as nervousness, confidence, sadness, and anxiety. Even more alarming, a person's political views, ethnic identity, sexual orientation, and even overall health can also be determined from data such as activity logs, location data, and similar metrics.

e) Profiling:

Data which is collected with the use of AI is profiled and can be used to sort, score, classify, evaluate, rank people. The data is collected usually without taking the consent of the data subject. Data subjects whose personal information is collected usually donot challenge the misuse as they do not have the ability and often helpless in tackling such issues.China's social scoring system is an example of how this information can be used to limit access to things like credit, housing, employment or social services.

Many governments have benefited by the Proliferation of Artificial Intelligence, enhanced IoT and IoLT devices. One such example is the use of Portable genome sequencer MinION and Metrichor which uses Artificial Intelligence in epidemiology which help to determine the risk of diseases. Sequenom Inc., is another example of the use of Artificial Intelligence which translates genetic code into relevant insights into genetic variations. On the basis of the data that is generated enables the government and other regulatory bodies to make informed decision to deal with and monitor the spread of diseases and to prevent epidemics. Tracking people can be done easily with Artificial Intelligence which in turn can be helpful to law enforcement agencies. Skydio's new biometric tracking drone helps law enforcement agencies to enhance their tracking capabilities. On the one hand, data capture and optimization potentially threaten our privacy and on the other hand both these processes are also vulnerable to cyber attacks

conducted by governments and non state actors alike. This raises various concerns such as how are the companies and governments acquiring our personal data? Whether the citizens are aware of the data being generated on their daily interactions?   In the face of comprehensive cognition and predictive intelligence how will the notion of privacy fare? The notion of privacy is undergoing change in the digital age and needs to be addressed. Many social media platforms like Google, Apple, Facebook, and Amazon (GAFA) comprise what some have called the tech oligopoly. Facebook for example had compromised the data of its users. Valuing Personal Data Framework was created by the World Economic Forum to outline the different elements of our digital avatars. Some of top most privacy concerns have been the lack of understanding of one's online presence; collection of data with implicit or reluctant consent; lack of control of one's personal data and privacy; deceptive use of terms and conditions agreements; and trading privacy for free services. The extent of digital mass surveillance has further raised questions regarding the extent to which international legal standards and national mechanisms sufficiently protect individuals from privacy breaches.[41]

VII. TACKLING THE PROBLEM -WAY FORWARD

Digital technologies like the AI have made our lives easier and have made substantial contributions in many areas of our lives. It is being used in many sectors like transport, health, education etc.   The vast amount of data gathered can be analyzed with the use of the AI's and be used to solve many social ills. However, these technologies can also be misused by individuals, corporations, government and non-governmental agencies. Artificial Intelligence can also work to our detriment. One such example is the intrusion into privacy of an individual and misuse of data collected. To defend ourselves from exploitation by those who wield malicious intent is to manage and properly understand these technologies and their impact on our

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[41] W Denton, Sarah & Pauwels, Eleonore & He, Yujia & G Johnson, Walter. (2018), *Nowhere to Hide: Artificial Intelligence and Privacy in the Fourth Industrial Revolution.*

lives. Further, it is high time for India to enact a comprehensive privacy and data protection legislation.

Sonia Katyal, the co-director of the Berkeley Centre for Law and Technology and member of the U.S. Commerce Department digital Economy Board of Advisors, has rightly 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!"

AUTHORSHIP OF AI GENERATED WORKS UNDER THE COPYRIGHT ACT, 1957: AN ANALYTICAL STUDY

Dr. Avishek Chakraborty*

ABSTRACT

With the recent development of artificial intelligence (AI), increasingly creative works have been created by non-human authors. AI is now capable of producing complex creations which becomes indistinguishable from works made by human beings. Traditionally the authorship of copyright in computer generated works was not in question because the program was merely a tool that supported the creative process, very much like a pen and paper. However, with the latest types of artificial intelligence, the computer program is no longer a tool and it actually makes many of the decisions involved in the creative process without human intervention. Section 2(d) of the Copyright Act, 1957 in India defines 'author' in the context of different copyrightable works but does not make any reference to the legal personality of the author. The present study explores the feasibility and implications of this assertion. It addresses the scope of the definition of 'person' in the Copyright Act, 1957 and examines whether AI can be considered as author. Consequently it analyses the implications of including AI as author of copyrighted work. It further analyses the implication of granting authorship to AI and the problems of handling legal responsibilities arising out of such authorship. Therefore, the study

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contends that AI cannot be considered as author since they will not be able to discharge legal responsibilities. Drawing analogy from the 'Lavery' decision, this paper argues that in the absence of having the legal capacity to claim remedies for copyright infringement, the argument of extending copyright protection to AI generated works will fail.

Keywords: *copyright, traditional, legal responsibility, lavery*

I. INTRODUCTION

The basic principles of copyright law has constantly been challenged by new technologies. There are several situations where traditional concepts of 'originality' or 'creativity' of works as requirements for copyright protection appear difficult with the computer generative process behind certain types of work.[1] Technology has been used to create authorial works for a considerable period of time. Now, the question of artificial creativity, alongside the issue of artificial intelligence have acquired significant importance in the intellectual property rights regime.

When computers are used by human authors as instruments in making of works of authorship the resulting works are generally referred to as Computer Assisted Works (CAWs). Here, technology is merely a tool for the author, like a brush in the hands of a painter. Examples of computer assisted works include the use of word processing programs to produce texts, computer animation to make animation movies or digitise manually created drawings, etc. CAWs does not pose any problematic issue from a copyright perspective. However, in certain cases technology can supplant the human creator in respect of creativity. In case of Computer Generated Works (CGWs) by which AI-enabled machine learning software is the real originator of the final works. In CGWs the programmer establishes the rules and instructions according to which the program functions. The input given by the programmer, or by the software's user, may also entail feeding the

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[1] Maggiore, M., Artificial Intelligence, computer generated works and copyright. In *Non-Conventional Copyright,* EDWARD ELGAR PUBLISHING (2018).

machine general parameters. However, unlike CAWs the creative outcome shall bear no causal link with the programmer or the software's users. In CGWs the creative choices are akin to random – or at least unpredictable from a human perspective – as they depend on the machine and not on the humans behind it.[2]

The focus of the paper is on addressing the issues pertaining to authorship of protectable works created by the use of computers and artificial intelligence (AI), i.e., computer generated works. It starts with the recent illustrations of creative works generated by AI enabled machine learning computers. The next part of the paper traces the concept of authorship as creative human being in the existing copyright laws. After that the theoretical justification for AI-generated work is discussed in respect of revolutionary, romantic and modernist school. Subsequently, the position of non-authorship of protectable works have been analysed in the legal framework of international copyright instruments, and in the respective copyright legislations of European Union, United States of America and India. After that the paper highlights the key areas of inadequacy of the present copyright law to deal with AI generated authorship. The paper concludes that the existing copyright law does not recognise non-human authorship and because of lack of personhood, the argument of extending copyright protection to AI generated works will not succeed. Finally, it is asserted that copyright law needs to be changed or re-evaluated to determine how laws should address computer enabled AI generated works.

II.   TECHNOLOGY, AI AND CREATIVITY

In 1843, Lady Ada Lovelace, an English mathematician, considered the world's first computer programmer, wrote that a machine could not have human-like intelligence as long as it only did what humans intentionally programmed it to do. According to Lovelace, a machine must be able to create original ideas if it is to be considered intelligent.[3] Modified in 2001,

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[2] Ibid.

[3] Kapoor, P., 2015. Approaches to measuring the intelligence of machines by quantifying them. *International Journal of Advanced Research in Computer and Communication Engineering,* 10(4), pp. 81-83.

the Lovelace Test proposes a way of scrutinising this idea. A machine can pass this test if it can produce an outcome that its designers cannot explain based on their original code.[4] Till now, no AI has successfully been able to pass this test. However, following is a list of works that AI has successfully produced which if generated by a human would be considered to be creative and original.

a. Painting

The Next Rembrandt project[5] is a remarkable manifestation of the wonders of AI in this respect. The goal of the project was to have a machine produce a brand new Rembrandt painting as if the Dutch genius himself had painted it. By analysing the statistical properties of known Rembrandt paintings on the level of high resolution photographs and depth images, a new painting was produced by 3D printing. The painting had similar properties as the Rembrandt paintings but it was clearly a new painting in the sense that it was not a copy or a variant of an existing one, at least in any obvious way. However the question arises here is, who is the author of the work and will that work merit copyright protection? Will it be sufficient to attribute the authorship to the researchers who extracted data from Rembrandt's paintings and programmed them into machine?

b. Story writing

Another example of AI induced creativity can be Ray Kurzweil's Cybernatic Poet, which by using a type of machine-learning logic, distilled the poetic style of a number of authors and produced its own original poem. Recently, a Japanese AI wrote a novel called "The Day a Computer Writes a Novel" that almost won a literary prize in Japan. The research team first wrote a novel of their own and then broke it down into its component parts. Then the AI involved itself, arranging the parts it had been given to create "another story

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[4] Ibid.
[5] http://www.nextrembrandt.com

similar to the sample novel," building it from words, phrases, characters and plot outlines that had been fed into it.[6]

c.   Music

More examples include the 'Flow machines' tool which can extract patterns from a database music and create new compositions in the style of a chosen artist of genre. Significant adjustment of (human) musicians is still needed to reach a satisfactory end result. This includes adding tracks, writing and producing lyrics and mixing.[7]

III. AUTHOR AS THE CREATIVE HUMAN BEING

"When contemplating the creative, images of Beethoven, Joyce and Monet comes to mind, not images of machinery."[8] This statement is the essence of copyright. Across the world the principles of copyright law have revolved around the 'author' as the flesh and blood individual behind the work, by displaying a 'human' infrastructure that pays tribute to the 'ideology of authorship' and is rooted in the Romantic idea that associates human genius with authorship.[9]

The historic conception of authorship, forming the original structure of most of the copyright laws in the world, formally has not changed. The author is idealised as a creative, lone artist, inspired directly from nature. The fundamental principle of copyright law, i.e., the 'idea-expression dichotomy' reflects the conception of human author as the subject of copyright law. Works always originate from ideas, which will not be protected by copyright until they are expressed in a form. The issue is particularly relevant for expressions created by AI software where the computer generates the

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[6] https://slate.com/technology/2016/03/a-i-written-novel-competes-for-japanese-literary-award-but-humans-are-doing-the-work.html (Last accessed on 15.1.2019)

[7] http://www.flow-machines.com/ai-makes-pop-music.com

[8] Clifford, R.D., 1996. Intellectual property in the era of the creative computer program: Will the true creator please stand up. *Tul. L. Rev.*, *71*, p.1675.

[9] Jaszi, P., 1991. Toward a theory of copyright: The metamorphoses of authorship. *Duke L J*, p.455.

expression even though it might not have originated the idea. The issue here is the difficulty in identification of who (the computer or the individual) has generated what (the idea or the expression). Consequently, if the idea and the expression cannot be readily distinguished, then copyright protection should not be available.[10]

The problem related to authorship and right to ownership of copyright protected works arises when those works reflect creative choices attributable to machines. The dilemma stems from the human centric conception of copyright law that is structured around the idea that only human beings are the source of creativity and may produce original works in a copyright sense. The settled position is that the author is the natural person making the creative choices and as such, infusing her own personality into a given work. With different nuances, the meaning of 'author' or 'artist' traditionally sits at the root of copyright law. In the jurisdiction of European Union, 'originality' is interpreted as the 'author's' own intellectual creation. This understanding establishes a bi-univocal relationship between the act of creating a copyrightable work and a human acting as its creator so that there is no originality and hence no copyright can subsist where there is no natural person behind a work.[11]

IV. THEORETICAL JUSTIFICATIONS FOR AI-GENERATED AUTHORSHIP

Human authorship may not be an 'a priori' of the copyright law.[12] It is indeed nothing more than it should obviously be expected to be – a legal construct designed around policy considerations. This assumption may find support by considering how copyright law deals the level of creativity required for works to be protected. The present framework of copyright law appears to revolve around the 'creative human author'. However, there is uncertainty regarding

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[10] Butler, T.L., 1981. Can a computer be an author-copyright aspects of artificial intelligence.*Comm/Ent LS*, *4*, p.707.
[11] Maggiore, M., 2018. Artificial Intelligence, computer generated works and copyright. In *Non-Conventional Copyright*. Edward Elgar Publishing.
[12] Ibid.

what qualities a person should have to be recognised as author. Neither national, nor international copyright laws provide a definite definition of authorship. The laws are partly silent regarding whether non-humans can qualify for authorship and left the issue open for to judicial interpretation. Since technological developments in AI bring new challenges to the traditional concepts of copyright law, it raises the fundamental question of whether there is a need to shape the law and its interpretation to promote and not stifle technological development.Addressing this crucial and fundamental question will require us to step back and look at the following three scenarios:

a.   The Revolutionary School

One possibility to regulate AI generated innovations could be to include in the law an explicit provision that allows non-human authorship. This solution will follow a 'property-centred' type of approach in the sense that it will allow IPR entitlements to any innovation produced by non-humans, as far as the other protect ability requirements are met. From a 'pure' legal perspective, such approach will have the consequences of giving legal personhood to a non-human. Copyright law assumes that the first author is the first owner of the IPR. Opening the door for AI to become authors will make a non-human a right holder. This mechanism, does not aim at incentivizing the machine, but some of the human stakeholders that are part of the innovation process.

b.   The Romantic School

From a legal point of view, the Romantic school follows the idea that the existing IPR framework should be interpreted so to allow only natural persons to ne authors in all categories. This approach will categorically deny IPR entitlement on non-human produced innovations. This school considers several important factors, inter alia the fact that developers might actually build AI systems exactly for the purpose of creating artistic works in certain specific ways that will not be possible to be done by human beings

themselves. In these cases what incentivise humans to develop AI systems is the prospect of having exclusive rights on the output. This could be even truer in cases where the AI machine per se will not be able to attract IPRs, but the outcome will.[13]

c.   The Modernist School

Finally, a way to approach the issue could be to include in the law a provision stating that only 'natural' persons can be authors and at the same time, create a rule according to which the natural person(s) behind the arrangements necessary for the creation at stake shouldbe considered as the author. The Modernist school follows a similar approach that have been embraced in the UK with regard to computer generated works, which provides that "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."[14] Such provision undoubtedly provides that non-humans cannot be authors and that creations produce by non-humans cannot exercise IPRs.

V.   POSITION OF NON-HUMAN AUTHORSHIP OF PROTECTABLE WORKS IN DIFFERENT JURISDICTIONS

Copyright subsists in original work of authorship and therefore authors are the starting point and central focus of any discussion on copyright law. The question about the role of authorship in copyright has certainly been made more persistent with the growth of creation of CGWs. The major concern is who is to be conceived as the author when the work is created by a non-human author. This segment of the article will analyse the definition of author in different jurisdictions and will attempt to explore whether non-human authors can be considered as authors in copyright law.

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[13] Ballardini, M R., He, Kan and Roos, T., 2019. AI generated content: authorship and Inventorship in the age of artificial intelligence. In *Online Distribution of Content in the EU*. Edward Elgar Publishing.
[14] Copyright, Designs and Patents Act, 1988, section 9 (3).

a. Authorship of protectable workunder international copyright instruments

The three major international treaties relevant to copyright law are the Berne Convention,[15] the WIPO Copyright Treaty and the TRIPs Agreement.[16] Although the term 'author' is often mentioned and used in the text of the Berne Convention, it is not explicitly defined.[17]As explained by Goldstein and Hugenholtz, "the consequence and doubtless also the cause of the silence of international agreements..... is that countries vary sometimes widely in the answers they have given."[18] It can be inferred that legal scholarship seems oriented in concluding that only natural persons can be regarded as authors. Although Berne Convention does not explicitly set an originality requirement, this already existed in national copyright laws at the time of drafting the Convention. According to Ricketson, it was clearly understood that this was also a requirement for the purposes of protection under the Convention and inherent in the phrase, 'literary and artistic works' in Article 2. The condition that a literary and artistic work possesses a sufficient degree of originality postulates, "the need for the author to be a human being and for there to be some intellectual contribution above and beyond the simple effort ('sweat of the brow') or what may be called mere 'value in exchange'."[19]

The Berne Convention indirectly specifies one concept of author by stipulating that if the author's name is indicated he/she shall be regarded as the author of a literary or artistic work in the absence of proof to the contrary.[20] Rather than defining the author, this rule aims at offering some certainty and reducing the burden of proof for right holders. It can be argued

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[15] Berne Convention for the Protection of Literary and Artistic Works as amended on September 28, 1979.

[16] Agreement on Trade-Related Aspects of Intellectual Property Rights, 1994 (TRIPs).

[17] Ginsburg, J.C., 2002. The concept of authorship in comparative copyright law. *DePaul L. Rev.*, *52*, p.1063.

[18] Hugenholtz, P.B. and Goldstein, P., 2010. *International Copyright: Principles, Law and Practice*. Oxford University Press.

[19] Ricketson, S., 1991. The 1992 Horace S. Manges Lecture-People or Machines: The Bern Convention and the Changing Concept of Authorship. *Colum.-Vla JL & Arts*, *16*, p.1.

[20] Berne Convention, Article 15 (1)

that the author then can be a natural or legal person, because both can exhibit their names on the work. Both the WIPO Copyright Treaty and the TRIPs agreement remain silent with regard to the definition of 'author', even though both treaties require compliance with the Berne Convention.[21]

b.   Authorship of protectable work in European Union

Under EU legislation AI authorship seems equally doubtful At the EU level, with the exception of cinematograph and audio-visual works, computer programs and databases, copyright directives do not really address the issue of whether only human beings can be regarded as authors. Article 1(5) of Directive 93/83[22] (the Sat-Cab Directive) states that for cinematographic or audio-visual works the principal director shall be considered as its author or one of its authors, leaving Member States free to provide for others to be considered as co-authors. Article 2(1) of Directive 2009/24[23] (the Software Directive) provides that the author of a computer program shall be the natural person or a group of natural person who has created the program or, where the legislation of Member State permits, the legal person designated as the right-holder by that legislation. Article 4(1) of Directive 96/9[24] (the Database Directive) admits the possibility that the author of a database can be not just the natural person or group of natural persons who created the base. Directive 2006/116[25] (the Term Directive, sub recital 14) refers the calculation of the term of copyright protection to the life of the author as 'physical persons'.

In Infopaq International A/S v Danske Dagblades Forening,[26] the Court of Justice of the European Union extended the interpretation of originality as

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[21] WIPO Copyright Treaty, Article 1; TRIPs, Article 2(2).
[22] Council Directive 93/83/EEC of 27 September 1993.
[23] Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer program.
[24] Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases.
[25] Directive 2006/116/EC of the European Parliament and of the Council of 12 December 2006 on the term of protection of copyright and certain related rights.
[26] Case C-5/08 Infopaq International A/S v. Danske DagbladesForening [2009] ECLI:EU:C:2009:465.

"author's" own intellectual creation to all categories of work and also held that copyright protection should apply only to a subject matter which is original in the sense that it is the author's own intellectual creation. In other important decisions,[27] CJEU observed that 'author's own intellectual creation' means that the author should "stamp his personal touch or reflect his personality in the sense that he expresses his creative abilities in original manner by making free and creative choices."[28]Evidently, AI will fail this test as it will not be classed as an author and the work it creates will not be considered original creative works.[29]

c.   Authorship of protectable work in United States of America

As per the United States Copyright Act of 1976, for the purpose of copyright protection a work should be created by an 'author'.[30] The statute does not define the term 'author'. However, recent litigations in the US have looked into the issue of human and non-human authorship. In Naruto v. Slater (also known as 'Monkey Selfie case),[31] the US District Court of the Northern District of California dealt with the question of animal ownership in photographic works, where a Celebs crested macaque named Naruto had used a photographer, named Slater's camera to take a picture of itself. In 2016, the Court dismissed the action and refused the monkey's claim for authorship of the photograph, as the copyright legislation majorly speaks of a 'person' involved in the creation of the work and that for a work to qualify as a copyright protected work it has to be created '…… created by a human being.'[32] Representing Naruto, PETA appealed against the decision of the

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[27] Football Association Premier League Ltd et al v. QC Leisure et al [2011] ECLI:EU:C:2011:631; Eva-Maria Painer v. Standard Verlages GmbH at al. [2013]ECLI:EU:C:2013:138; Football Detaco Ltd at al., v. Yahoo!et al. [2012] ECLI:EU:C:2012:115.

[28] He, Kan. 2016. The concept of originality in EU and China. In *The governance of IP in EU and China*. Edward Elgar.

[29] Ihalainen, J., 2018. Computer creativity: artificial intelligence and copyright. *Journal of Intellectual Property Law & Practice*.

[30] 17 United States Code, section 102.

[31] Naruto v. Slater, case no. 15-cv-04324-WHO (N.D. calif. 2016)

[32] Ibid.

district court, the case has been settled out of the court in 2017.[33] This case follows the US Copyright Office's Compendium,[34] which expressly states that 'to qualify as a work of 'authorship' a work must be created by human being.[35] Works that do not qualify this requirement are not copyrightable. The Office will not register works produced by nature, animals or plants.'[36] This Compendium specifically referred to 'a photograph taken by a monkey' as an instance of work that cannot be protected. In this the District Court referred to the Compendium to conclude that Naruto cannot be the author of a protectable work.

The issue raised by the Monkey Selfie case highlights the bigger question of whether copyright protection can be made available to non-human authors.[37] The Compendium of the US Copyright office suggests that protection is not available to 'works produced by a machine or mere mechanical process that operates randomly or automatically without any creative input or interventionfrom a human author.'[38]

d.   Authorship of protectable work in Indian Copyright Act, 1957

Section 2 (d) of the Copyright Act, 1957 in India defines the term "author" in the context of several copyrightable work but does not make any reference to the legal personality of the other.[39] Section 17 provides distinct instances of ownership of protectable work when a work has been made under a contract of service or apprenticeship for artificial persons such as the government and

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[33] Toliver, Z. Settlement Reached: 'Monkey Selfie' case broke new grounds for animal rights, see https://www.peta.org/blog/settlement-reached-monkey-selfie-case-broke-new-ground-animal-rights/

[34] U.S. Copyright Office, Compendium of U.S. Copyright office Practices, section 101 (2017).

[35] Burrow-Giles Lithographic C. 111 U.S. at 58.

[36] U.S. Copyright Office, Compendium of U.S. Copyright office Practices, section 101 (2017).

[37] Ramalho, A., 2017. Will Robots Rule the (Artistic) World? A Proposed Model for the Legal Status of Creations by Artificial Intelligence Systems.

[38] U.S. Copyright Office, Compendium of U.S. Copyright office Practices, section 101 (2017).

[39] Copyright Act, 1957, section 2 (d) "author" 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; (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.

international organizations. The absence of reference of any artificial person from section 2 (d) indicates primarily that only natural persons can be protected as authors under the Copyright Act, 1957.[40] Under section 2(d)(vi) of the Copyright Act, 1957, in relation to any literary, dramatic, musical or artistic work which is computer-generated, "the person who causes the work to be created." In this definition, the key issue is the usage of the expression 'the person who causes the work to be created.' Determination of who 'causes' a work to be created is a question of the proximity of a natural or legal person to the creation of the 'expression' in the content in question. The more closely or directly a person is involved in creating the 'expression', the more he or she contributes it and the more likely he or she is to qualify as a person 'who causes the work to be created.' Consequently, the existing legal framework under the Copyright Act, 1957 may not effectively deal with creation of works where the actual creator or a contributor of the 'expression' is not a human or legal person.[41]

Justice Nandrajog in Amarnath Sehgal v. Union of India[42] recognized the moral rights of an author under section 57 of the Copyright Act, 1957 and observed that the author has a right to preserve, protect and nurture his creations through his moral right. He further stated that the rights of paternity, preservation of integrity and that of retraction came to the author from the fact that "a creative individual is uniquely invested with the power and mystique of original genius, creating a privileged relationship between a creative author and his work. In this case, the Court's emphasis on the individual while discussing an author's moral rights suggests that artificial persons were meant to be excluded from the concept of authorship. Therefore, when it comes to works that are created by AI, their authorship will be contentious under Indian copyright laws. Undoubtedly, a human's

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[40] Basheer, S. Artificial intelligence and intellectual property. See https://spicyip.com/2016/12/artificial-intelligence-and-intellectual-property-mind-the-machine.html (Last accessed on 02.02.2019)

[41] Nishith Desai Associates, The Future is here: Artificial Intelligence and Robotics. See http://www.nishithdesai.com/fileadmin/user_upload/pdfs/Research_Papers/Artificial_Intelligence_and_Robotics.pdf (Last accessed on 01.02.2019)

[42] 2005 (30) PTC 253 Del.

involvement is required in kick-starting the AI's creative undertaking, however the process to determine who the author or owner is when the AI steps in to play a pivotal role in the creation of the work, continues to remain a grey area.[43]

VI. INADEQUACY OF COPYRIGHT LAW TO DEAL WITH AI-GENERATED AUTHORSHIP

The Monkey Selfie case, discussed previously in this paper, raises important issues that will likely become more sensitive in the foreseeable future.[44] The question of non-human authorship is not only about whether a monkey can be the owner of copyright in the photographs that it takes, but whether increasingly sophisticated technologies, under the umbrella of artificial intelligence, will result in the broadening of the understanding of what an author is. The law as it is currently structured cannot vest ownership of the copyright in a computer generated work in the work's author-in-fact because the work's author-in-fact has no legal personhood.[45]

In People ex rel Nonhuman Rights Project, Inc v. Lavery,[46] the Court held that a chimpanzee was not a 'person' entitled to the rights and protections afforded by the writs of habeas corpus because animals, unlike human persons, corporations and municipal entities could not bear any legal duties, submit to societal responsibilities or be held legally accountable for their actions; the incapability to bear any legal responsibilities and societal duties rendered it inappropriate to confer upon chimpanzees legal rights. Following this precedent, in Matter of Nonhuman Rights Project, Inc v Stanley[47] the court ruled that ascribing legal personhood to chimpanzees is 'inappropriate as they are incapable of bearing any legal responsibilities and societal duties.

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[43] Nishith Desai Associates, The Future is here: Artificial Intelligence and Robotics See http://www.nishithdesai.com/fileadmin/user_upload/pdfs/Research_Papers/Artificial_Intelligence_and_Robotics.pdf (Last accessed on 01.02.2019)

[44] Rosati, E., 2017. The Monkey Selfie case and the concept of authorship: an EU perspective. *Journal of Intellectual Property Law & Practice*, *12*(12), pp.973-977.

[45] Bridy, A., 2012. Coding creativity: copyright and the artificially intelligent author. *Stan. Tech. L. Rev.*, p.5.

[46] [2014] 124 A D 3d 148.

[47] [2015] NY Slip Op 31419 (U).

The capability of rights and duties is the sole attribute that is exclusively considered by courts in determining legal personality of any entities, in the absence of any statutory provisions defining personality of any beings.[48]

An analogy can be drawn here between animals and AIs as non-human authors and because of lack of capacity to hold rights and duties neither of them can be considered as authors for the purpose of protectable works. Even if the concept of non-human authors gets recognition in copyright law the bigger questions which arise here is, who will claim and enforce the economic and moral rights of the non-human author will be exercised? who will assign and license the economic rights? how an infringement suit will be filed in a court of law in case of violation of copyright and who will be entitled to the remedies? Although we may be fast approaching a time when AIs achieve the status of legal personhood, that time is not yet here.[49] Logically it can be inferred that the programmer of computer generated software is the logical owner of the copyright in the works generated by his or her software. After all, he or she is the author or author of the works.[50]

In United States in 1974, the Congress created the National Commission on New Technological Uses of Copyrighted Works (CONTU) in 1974, the imminent problem of computer authorship was no closer to being solved.[51] CONTU was asked to study the creation of new works with computer assistance. In its final report CONTU concluded that the development of an AI capable of independently creating works was "too speculative to consider at this time."[52] The Final Report channelled Ada Lovelace's critique of the Analytical Engine: "The Commission believes that there is no reasonable

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[48] Solaiman, S.M. 2017. Legal personality of robots, corporations, idols and chimpanzees: a quest for legitimacy. *Artificial Intelligence and Law.*

[49] Boyle, J., 2011. Endowed by Their Creator?: The Future of Constitutional Personhood. *Constitution*, *3*, pp.194-213.

[50] Bridy, A., 2012. *Coding creativity: copyright and the artificially intelligent author.* STAN. TECH. L. REV., p.5.

[51] National Commission on New Technological Uses of Copyrighted Works, Final Report 4 (1978).

[52] Ibid.

basis for considering that a computer in any way contributes authorship to a work produced through its use. The computer, like a camera or a typewriter, is an inert instrument, capable of functioning only when activated either directly or indirectly by a human. When so activated it is capable of doing only what is directed to do in the way it is directed to perform."[53] In its final recommendations to Congress, CONTU recommended that there be no change to the copyright law in consideration of new works produced through the application or intervention of automatic systems.[54]

The most significant hurdle to obtain copyright control and accountability for a work generated by an AI system is the principle of human authorship.[55] It is not clear that whether copyright law across all the jurisdictions explicitly requires the author of a creative work to be human.[56] The US Copyright office, by publishing "The Compendium II of Copyright Practices,"[57] has revealed the attitude of the Copyright Office of the US and presents a significant hurdle for humans seeking to claim copyright protection in works not directly authored by them. In Urantia Foundation v. Maaherra for support,[58] regarding the copyright of a text supposedly authored by "celestial beings". The Ninth Circuit Court mentioned in the dicta that copyright law does not explicitly "require human authorship".[59] However the case also be interpreted to mean that the statute does not really protect works authored by non-humans. The court again observed that "it is not creations of divine beings that the copyright laws were intended to protect."[60] The court required that "some element of human creativity must have occurred in order for the Book to be copyrightable." The originality and creativity requirements of copyright protected work in different jurisdictions confirm that copyright

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[53] Ibid.
[54] Id. at p. 46.
[55] Nimmer, D., 2013. *Nimmer on copyright.* LexisNexis; Haas, R., 2010. Twitter: New challenges to copyright law in the Internet age. *J. Marshall Rev. Intell. Prop. L., 10.*
[56] Yanisky-Ravid, S., 2017. *Generating Rembrandt: Artificial Intelligence, Copyright, and Accountability in the 3A Era: The Human-like Authors Are Already Here: A New Model.* MICH. ST. L. REV., p.659.
[57] U.S. Copyright Office, The Compendium II of Copyright Practices (1998).
[58] 114 F.3d at 957.
[59] Id. at 958.
[60] Ibid.

protects authorial works created by humans. The human tie is reinforced when creativity or originality in a copyright sense are codified and interpreted by the case law as synonymous with imagination, inspiration or artistry – none of which spring to mind as attributes of computers or of computer generated works[61]. Therefore, integrating works produced by AI into the copyright regime will require the disturbance of well-settled and established norms of copyright law.[62]

VII. CONCLUSION

So far, copyright law exists as long as there is still a human, or a team of humans, behind the art that these computers produce. However, the reality has entirely changed as AI systems have become able to create independently. Law of copyright needs to be changed or re-evaluated to determine how laws should address these AI systems, the product they produce and the challenges they pose for the existing copyright regime. Policymakers have to define new moral boundaries for these systems in order to avoid harm by imposing control of and accountability for AI-generated works on recognised legal entities. In order to propose whether an author shall be required for AI-created works, the EU report on robotics can be followed. It suggests the creation of electronic personhood or even a specific set of rights for AI to own the rights in the works that it creates. One alternative that has been raised is to treat the works made by AI as works for hire and affording the rights to the person who has commissioned the AI to create a particular work. However, the flip side of this is that it can lead to issues where companies can commission works and saturate the market, potentially even wielding the masses of works as a sword against other producers, including competitors. The AI created works can also benefit from sui generis rights, similar to database rights and then there will be no requirement of authorship.

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[61] Maggiore, M., 2018. Artificial Intelligence, computer generated works and copyright. In *Non-Conventional Copyright*. Edward Elgar Publishing.

[62] Yanisky-Ravid, S., 2017. Generating Rembrandt: Artificial Intelligence, Copyright, and Accountability in the 3A Era: The Human-like Authors Are Already Here: A New Model. *Mich. St. L. Rev.*, p.659.

A SCIENTIFIC JUDICIAL PERSPECTIVE CAN SOLVE MANY HURDLES OF PRACTICAL APPLICATION OF AI 'EXPERT SYSTEM' FOR JUDICIAL DECISION MAKING

Jewel Chanda*

ABSTRACT

The 'expert system' is in center of attention of Artificial Intelligence (AI) research. Many models of legal argument in 'expert system' have shown promising result. Successful application of AI can solve multiple problems of justice delivery system. But no model of legal argument proposed, presently has the ability to take over the job of human judges. This paper tries to explore where the current models of legal argument fall short, in the context of judicial decision making by Indian Courts. One of the main backdrops of the justice delivery system is its' uncertainty. A judicial decision is uncertain due to many factors, amongst others, it largely depends on the perspective of the respective judges. For this reason, judgement of two judges on the same point may be contradictory to each other, whereas uncertainty is a negative factor for justice delivery system. The uncertainty, vagueness and disagreement have been considered as some of the biggest hurdles of AI and law research. But vagueness and uncertainty in the legal field is not devoid of logic, howsoever abstract it may be. Machine Learning, Neural Network, Natural Language Processing, together with Big data are pushing us towards a new world of AI. Year old principles of fair trial and rules of law need to be modified to

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accommodate the era of AI. I argue, a scientific judicial perspective may solve many hurdles of the practical application of AI "expert system" for judicial decision making, and we can achieve real-time dispute resolution.

Keywords: *Artificial Intelligence, Law & AI, Judicial Decision-making, Judicial Perspective.*

I.   INTRODUCTION:

In the world of humans, everything is legal; every legal thing is '*rule-based*'; and every rule is made to fit into facts. Fitting the rules into the facts is not an easy task; here comes the interpretation that does the tough job. Human habitat is made of an ever-growing chunk of facts held by a complex web of rules, more it grows more it becomes complex. Judiciary by resolving disputed facts maintain order and balance in society, upholds justice. The process of judicial decision making is complex, abstract and depends upon multiple factors, such as background, culture, emotions,[1] intuition etc. of the individual judge. Judges break the facts into pieces and fit them into law, bend and twist the law with the tool of interpretation and fit them into facts and enjoys discretion over their own process. Language is the medium that carries both law and fact for presentation before a judge. Giving meaning to, and conveying the decision through language, essentially involve interpretation, be it expressed or silent. The process of judicial decision making is essentially interpretive, though Butler[2] maintained a middle path, the process of judicial decision would fail without taking recourse of the act of interpretation   in broader context. The law-fact synergy makes the legal field a playground for logically coherent arguments.[3]

Section 2 of this article introduces the AI and law research and more particularly the legal 'expert system'. Section 3 discusses the paradoxical

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[1] Pavel Vasilyev, *Beyond Dispassion: Emotions and Judicial Decision-Making in Modern Europe*, 25 RECHTSGESCHICHTE - LEGAL HISTORY 277(2017).
[2] Brian E. Butler, *Is All Judicial Decision-Making Unavoidably Interpretive?*, 25 LEGAL STUDIES FORUM (2001).
[3] Trevor Bench-Capon, *Argument in Artificial Intelligence and Law*, 5 ARTIFICIAL INTELLIGENCE AND LAW (1997).

nature of judicial decision making, its uncertainty and complexity and how the attempt to theorise judicial decision making failed so far. Section 4 makes an attempt to depict our algorithmic future; how the world will be ruled by Blackbox algorithm in future. Section 5 discusses the judicial perspective regarding the scientific process of fact-finding. I argue that judicial decision making must be established as a scientific process else the gap between judicial construction of reality and social construction of reality will be widened. Section 6 concludes.

II.   INTRODUCTION TO THE LEGAL 'EXPERT SYSTEM'

Unique features of legal domain, such as adversarial fact-finding, dynamic and diversified knowledge base, modality of reasoning style, uncertainty etc. indicates synergy between law and AI.[4] AI can be broadly divided into two categories, 'general' and 'narrow';[5] while 'general' AI is the dream of AI researchers, 'narrow' AI is the real accomplishment. 'Expert system' falls into the category 'narrow AI'. General AI is not limited to any particular set of problems, but the 'expert system', being 'narrow AI', operates in a specific domain for solving a specific class of problems.[6] *Expert system'* is in the center of law and AI research.[7] An 'expert system' consists of a 'knowledge base' and an 'inference engine'. The 'knowledge base' holds the rules, facts, information, data and cases, while the 'inference engine' applies the rules to the database and deduct new information.[8],[9] AI researchers are making attempt to build legal 'expert system' since 1980's. Practical application oriented 'knowledge-based' 'legal expert system' have shown promising

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[4] Edwina L. Rissland, et al., *AI and Law: A fruitful synergy*, 150 ARTIFICIAL INTELLIGENCE 1(2003).

[5] ANINDITA DAS BHATTACHARJEE, ARTIFICIAL INTELLIGENCE AND SOFT COMPUTING FOR BEGINNERS (Shorff Publishers and Distributors Pvt. Ltd. 3rd ed. (2018).

[6] Eric Allen Engle, *An Introduction to Artificial Intelligence and Legal Reasoning:Using xTalkto Model the Alien Tort Claims Act and Torture Victim Protection Act*, 11 RICHMOND JOURNAL OF LAW & TECHNOLOGY (2004).

[7] Kowalski, *Artificial Intelligence and Law: A Primer an Overview*, 51 THE ADVOCATE (1993).

[8] Ajith Abraham, *Rule-based Expert Systems*, *in* HANDBOOK OF MEASURING SYSTEM DESIGN (PeterH.Sydenham & Richard Thorn eds.,2005).

[9] Wikipedia, *Expert System*, https://en.wikipedia.org/wiki/Expert_system.

results. Technology is changing justice system mainly in three ways, first, by assisting or supporting the legal professionals, second, by doing the job of professionals replacing them and third by changing the very form of justice.[10] Legal Scholars are divided on how AI will finally impact the legal profession, but it is almost certain that it will take over some activities from the legal professionals.[11]

III. PARADOX OF JUDICIAL DECISION MAKING: HOW JUDGES JUDGE?

The toughest job, which is done by a court is finding truth from the facts presented before it. There is no need to mention that fact produced before the court can be a mixture of true, false, half true half false, and can be any possible combination of them. Upholding justice in its simplest form is nothing but to make the correct decision in finding the truth. But judiciary does not find the truth, it restricts the probe in finding the judicial truth. Truth supported by evidence is the judicial truth, truth not supported by evidence, though truth, its truthfulness remains not proved. There is no absolute truth or absolute false in judicial decision making. The presumption as to the truthfulness of a fact increases with the degree of evidence supporting it. Negative evidence leads to a negative presumption of truthfulness. Depending on the material produced before the court, there can be either positive or negative presumption of any degree. When truthfulness of the fact is in question, the judicial process of truth finding may result in, either a positive presumption, or a negative presumption, or a null presumption. The primary burden of proving a fact lies on the party who asserts it. Null presumption may occur when there is zero evidence, this is the point where truth remains not proved. In finding the truth, a court relies upon evidence. Positive evidence supporting a fact leads to a positive presumption of the fact being true; similarly, the degree of evidence (stronger the evidence, higher the degree) is also proportionate to the

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[10] Tania Sourdin, *Judge v. Robot: Artificial Intelligence and Judicial Decision-Making*, 41 UNIVERSITY OF NEW SOUTH WALES LAW JOURNAL (2018).

[11] Harry Surden, *Response, Bridges II: The Law—STEM Alliance & Next Generation Innovation*, 112 NORTHWESTERN UNIVERSITY LAW REVIEW ONLINE.

presumption of truth. Stronger evidence leads to a stronger presumption of truth. A fact cannot be judged with certainty by any court. Common man's perspective equates truth with justice, but Courts does not engage itself in finding the truth, but the judicial truth, i.e. truth supported by evidence, rest is kept out of the purview of courts. Some of the main backdrops of the justice delivery system is its' 'uncertainty', 'vagueness' and 'lack of precise standards'. Uncertainty is not only recognized but also applauded in judicial system.[12] There is at least some valid argument blaming the judges for the 'uncertainty',[13] 'vagueness' and 'lack of precise standards'.[14] Judicial decisions are uncertain due to many factors, amongst others, it largely depends on the evidence produced before the Court. As society grows more and more complex, the existing legal mechanism for reduction of complexity in judicial decision-making fails.[15] A judge cannot walk down the line of time and witness the commission of event and thereafter hold the fact is proved with certainty, so courts rely on probability of its existence. In a criminal case when there is the highest probability that the accused is guilty of the commission of an offence charged against him, the conviction follows. Judicial decision and opinion, though not synonymous, both are objected towards upholding justice,[16] but there is no absolute justice, the very concept of justice is dynamic, just and unjust are interchangeable in a majoritarian judiciary which follows the doctrine of *stare decisis* as the majority and minority judicial opinion compete each other.[17] Singular correctness of judicial decision is questionable.[18] This is the greatest legal paradox. No doubt judges uphold justice, maintains order in society and keeps the heart of law beating but the social background of the judge make its way into the

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[12] Beverly Blair Cook, *Fuzzy Logic and Judicial Decision Making*, 85 JUDICATURE (2001).

[13] Id. at.12

[14] Thomas I. Emerson, *Nine Justices in Search of a Doctrine*, 64 MICHIGAN LAW REVIEW (1965).

[15] Thomas Gizbert-Studnicki& Mateusz Klinowski, *Complexity of the Social Sphere and the Judicial Decision- making Process*, 42 ARCHIVUM JURIDICUM CRACOVIENNE (2009).

[16] S. Sivakumar, *Judgment or Judicial Opnion : How To Read and Analyse*, 58 JOURNAL OF THE INDIAN LAW INSTITUTE (2016).

[17] Jewel Chanda, *Justice Defined in Sabarimala Case*, THE STATESMAN, October 18, 2018.

[18] Dan Simon, *A Psychological Model of Judicial Decision Making*, 30 RUTGERS LAW JOURNAL (1998).

decision of an individual judge.[19] I strongly disagree with the argument advanced by Anthony D'Amato, that no single legal theory or any combination of legal theory dictates or constraint judicial decision.[20] If theory is "a supposition or a system of ideas intended to explain something; a set of principles on which the practice of an activity is based"[21] then obviously behind every judicial decision there is a theory sewed by rules of logic and reasons. Debates continue how judges decide. Search for a standard model of judicial decision making should essentially be directed towards 'principled decision-making'.[22] Judicial decision making is a cognitive process which does not fit exactly *'rationalist'* or *'critical'* model. Cognitive faculty of the judges (being a human being) evaluate and compare alternative plans and actions in uncertain condition but we neither know the mechanism, nor we had been able to replicate the process exactly. [23]This cognitive process sometimes results into skewing of facts and premises to support a chosen decision.[24] A continuous attempt has been made to theorize and to explain the process of judicial decision making, such as *'process theory'*,[25] *'realist theory'*, *'formalist theory'*, *'psychological theory'*, *'cognitive theory'* etc. 'Psychological theory' of judging claims that judicial decisions must be affected by the psychological environment within which it is made.[26] However, no single model of judicial decision making, so far, can claim standalone success.

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[19] Alexander B. Smith & Abraham S. Blumberg, *The Problem of Objectivity in Judicial Decision-Making*, 46 SOCIAL FORCES (1967).

[20] Anthony D'Amato, *Can Any Legal Theory Constrain Any Judicial Decision?*, 43 MIAMI LAW REVIEW (1989).

[21] Oxford University Press, *English Oxford Living Dictionaries*, https://en.oxforddictionaries.com/definition/theory.

[22] Anthony R. Blackshield, *Five Types of Judicial Decision*, 12 OSGOODE HALL LAW JOURNAL (1974).

[23] Giovanni Sartor, *A Sufficientist Approach to Reasonableness in Legal Decision-Making and Judicial Review*, LAW 2009/07 EUI WORKING PAPER, EUROPEAN UNIVERSITY INSTITUTE, DEPARTMENT OF LAW (2009).

[24] Dan Simon, *A Third View of the Black Box: Cognitive Coherence in Legal Decision Making*, 71 UNIVERSITY OF CHICAGO LAW REVIEW (2004).

[25] Carl Baar, *Using Process Theory to Explain Judicial Decision Making*, 1 CANADIAN JOURNAL OF LAW AND SOCIETY (1986)

[26] Simon, RUTGERS LAW JOURNAL, (1998).

IV. OUR ALGORITHMIC FUTURE:

We are in a transition period. AI driven machines, commonly known as Blackbox algorithm, have started taking vital decisions on important aspects of human life. Algorithms are expert in real-time decision making and masters of repetition. An algorithm is an unambiguous set of rules that lead to a specific answer of a specific problem. Advancement in technologies, such as Machine Learning (ML)[27], Natural Language Processing (NLP)[28], Blockchain[29], Neural Network[30], together are shaping the field in such a way that it potentially threatens the traditional pattern of human interaction in the society. Blackbox algorithm can do anything which is routine, structured, patterned and logical or rule-based. Like human intelligence, logic plays a central role in AI.[31] Barring random events, rules are everywhere. Human intelligence is devoted to discovering underlying rules behind every worldly affair. While the progress of AI in the last few decades is promising, its potential to change the human interaction in society gives rise to many questions that are mostly ethical and hypothetical. Implementation of AI will have a catastrophic effect on society. Blackbox algorithms have invaded into the job market and slowly substituting many human professionals. AI has advanced a lot since 'Dartmouth workshop',[32] where the possibility of

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[27] "Machine Learning is a branch of artificial intelligence that stems from the idea that a system is going to be able to take data, learn from it, identify any patterns that are present, and then make decisions without the intervention of a human. If there is intervention from a human, the intervention is minimal."See, MARKHOWARD, MACHINE LEARNING AN INTRODUCTION FOR BEGINNERS, USER GUIDE TO BUILD INTELLIGENT SYSTEM (Amazon Digital Services LLC. 1st ed.2018).

[28] "NLP is defined as the process of computer analysis when input is provided in a human language, and these inputs are translated in a useful form of representation. NLP is also known as computational linguistics." See, BHATTACHARJEE. 2018.

[29] "Blockchain is the key technological innovation of Bitcoin. It is an architecture for a new system of decentralized trustless transaction." See, MELANIE SWAN, BLOCKCHAIN BLUEPRINT FOR A NEW ECONOMY (O'REILLY 1st ed. 2015).

[30] "Artificial neural network imitates sensory processing techniques by brain. Basically by applying algorithms That can mimic the real neurons functionalities we can make a network that may 'learn' to solve many problems." See, BHATTACHARJEE.2018.

[31] JACK COPELAND, ARTIFICIAL INTELLIGENCE: A PHILOSOPHICAL INTRODUCTION (John Wiley & Sons. 2015).

[32] In 1956, a bunch of scientists gathered at the campus of Dartmouth College, Hanover, USA, and discussed possibility of building a machine that could think, which is popularly known as 'Dartmouth Workshop'.

building a machine was discussed back in 1956.[33] Today, 'machine learning' has freed algorithms from the clutches of human programmers. Machine learning algorithms have the ability of self-training from massive database what we commonly call Big-data. We are mastering 'narrow AI' but aiming towards 'general AI'. At present successful application of AI seems everywhere from genetics to astronomy. AI is doing the job of searching for new galaxy and planet,[34] medical diagnosis, researching archaeology,[35] drawing building plans, eliminating human experts from the field. Chatbots and AI driven automated voice response systems are already replacing human call takers from customer support industry. Undoubtedly algorithmic weather forecasts are way accurate than human experts in the field. The AI-driven future job marked will cut human dependency. In a world of self-driving cars, there is no place for a chauffeur, we don't need an architect if we get a perfect building plan on a single click of a mouse that suit best the land. The progress of research in the field of AI assures that human society will inevitably be dominated by artificial intelligence and automation in near future and we are progressing towards such an era.[36] What will happen in a full AI zone, whether it will create a utopian or dystopian world is not known at present,[37] for that we have to depend on an educated guess, but resistance to AI is presumably costly.[38] It is expected that intelligent computers will surpass human experts in almost every field. Artificial Intelligence is itself a revolution that will cause the biggest transformation of the society since industrialization.[39]

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[33] Stephan Talty, *What will our society look like when artificial intelligence is everywhere?*, Smithsonian.com(2019) https://www.smithsonianmag.com/innovation/artificial- intelligence-future-scenarios-180968403/.

[34] Jackie Snow, *Artificial Intelligence Just Discovered New Planets*, MIT Technology Review(Feb. 12, 2019), https://www.technologyreview.com/the-download/609785/artificial-intelligence-just-discovered-new-planets/.

[35] JosepPuyol-Gruart, *Computer Science, Artificial Intelligence and Archaeology*, 757 BAR INTERNATIONAL SERIES (1999).

[36] Juan Carlos Augusto, Past, present and future of ambient intelligence and smart environments Springer (2009).

[37] Spyros Makridakis, *The forthcoming Artificial Intelligence (AI) revolution: Its impact on society and firms*, 90 FUTURES (2017).

[38] Talty. 2018.

[39] Dirk Helbing, et al., *Will democracy survive big data and artificial intelligence?,in* TOWARDS DIGITAL ENLIGHTENMENT (2019).

V.   SCIENTIFIC JUDICIAL PERSPECTIVE:

The principle of fair trial, public hearing, natural justice, though passed through the acid test   of time, may not fit in a world ruled by AI because the principle of fair trial is a cultural export and not universal by nature.[40] In the context of our algorithmic future, the need for some of these rules to uphold justice is questionable. No principle of law is objected towards protecting the culprit, for example, the concept like 'beyond reasonable doubt' was required to prevent slightest possibility of conviction of an innocent in the realm of uncertainty of evidence. Hon'ble Supreme Court of India, taking up the issue of 'involuntary administration of certain scientific techniques, namely narcoanalysis, polygraph examination and the Brain Electrical Activation Profile (BEAP) test for the purpose of improving investigation efforts in criminal cases', held; "Compulsory administration of these techniques is an unjustified intrusion into the mental privacy of an individual which amount to 'cruel, inhuman or degrading treatment..........Invocations of a compelling public interest cannot justify the dilution of constitutional rights such as the 'right against self-incrimination. Thus, no individual to be forcibly subjected to any of the techniques in question, whether in the context of investigation in criminal cases or otherwise."[41]

Recently nine judges' constitutional bench of the Hon'ble Supreme Court, ruled that 'right to privacy' is a basic fundamental right that emanates from right to life and freedom guaranteed under part III of the constitution but subject to restriction.[42] Hon'ble Court has also laid down the test and principles for imposing a legal restriction upon the fundamental right to privacy. Now, these two judgements together depict the perspective of Indian Judiciary in this regard. Unlike sociologists, judges do not have any standard judicial perspective. In dealing with social issues judges use their own cultural perspective and often perspective of two judge differs from each other. We live in a socially constructed world; a judicial decision is a

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[40] Ian Langford, *Fair Trial: The History of an Idea*, 8 JOURNAL OF HUMAN RIGHTS (2009).
[41] *Selvi and Ors. V. State of Karnataka*, (2010) 7 SCC 263.
[42] Justice K.S. Puttaswamy V. Union of India, (2017) 10 SCC 1.

depiction of the judicial construction of reality. If the gap between social construction of reality and the judicial construction of reality widens, it would necessarily affect the overall balance of justice. Further study is required to establish correlation between the social construction of reality and the judicial construction of reality.

The judgement of Hon'ble Apex Court in *Selvi and Ors. V. State of Karnataka*, is in conformity with two main legal principles; '*Let thousand culprits be acquitted, not a single innocent be convicted*' and 'right against self-incrimination'. But the essentiality of these principles of fair trial is based upon uncertainty of facts. In the realm of uncertain fact, judges rely upon evidence produced before it. It is unlikely that the legal community would agree that right against self- incrimination is directed towards the protection of a guilty criminal. It is for the protection of an innocent indeed. The concept is directly related to protection from forcible, compulsive or coercive testimony against self. There can always be an alternative construction of reality, in other words, an alternative interpretation. Why the law requires an accused (who may or may not be guilty) to face trial, with additional qualification of the trial being 'fair'? An agreeable answer would be; trial is an established and tested procedure for finding the truth. Similarly, scientific techniques, such as narco analysis, polygraph examination and the Brain Electrical Activation Profile (BEAP) are also procedures for finding truth. There is no reason to believe that judicial decisions are result of random event. Like every human decision, behind every judicial decision, there are reasons, logic and coherence that follows certain premise. Scientific methods are based on objective observation, they are verifiable, falsifiable and objected towards finding the truth.[43] Like a scientific investigation, criminal trial starts with a hypothesis, 'the accused is presumed to be innocent'. A judicial decision is also based on objective observation, it is falsifiable, logically coherent, and objected towards finding truth. We can call it, the science of judicial decision making. Any approach to theorize the science of judicial decision making should beinter-disciplinary.

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[43] Faizal N Muhammad, *Scientific Enquiry: A Popperian Account*, 4 THE RESEARCHERS' INTERNATIONAL RESEARCH JOURNAL (2018).

Legal principles are building blocks of judicial decision making and such principles can be formulated through rules. Let us take the principle, '*Let thousand culprits be acquitted, not a single innocent be convicted*' as a first premise, and the '*right against self-incrimination*' as the second premise. The latter is complementary to the former. Below is an illustration of IF-THEN rule for these two premises.

P1: If (confession) AND

If (involuntary)

THEN

It is self-incrimination

P2: If (it is self-incrimination)

THEN

Acquittal

This is an example of how the legal principles can be represented through IF-THEN logic rules (there are other ways too). Even if we use different language for same meaning, the basic logic rules shall remain same. In true sense of justice, a principle is of less importance than its outcome. Dispensing justice is more important than rules. Law, rules, principles, and legal premise, if result in injustice, cannot be said to be good. The principle, '*Let thousand culprits go, not a single innocent be convicted',* can be replaced with '*Let only the guilty be convicted',* without compromising its outcome.

Contrary to the present scenario, in our algorithmic future, there shall be no uncertainty over fact, if not, at least we could achieve a state of negligible uncertainty. The rapid advancement of science, in the era of big-data with quantum computation, algorithms can find fact with utmost certainty from our '*digital footprint*'. Future legal field will be dealing with a simulated

world in digital form.[44] This advancement of science and technology is inseparable from society itself. The science of judicial decision must integrate all the scientific procedure of fact-finding, it is the need of the hour. Applicability of same right to privacy, as laid by the Supreme Court of India, against blackbox algorithm (intelligent machines) who sees through its' agent (a camera or a scanner), would produce an undesirable result. No doubt one has right to privacy of body against others, but if an intelligent machine is assigned the status of a person with innovative legal fiction, then people would validly refuse to walk through a scanner on the ground that an intelligent machine (assigned person) sees them naked.

Chinese attempt to hammer corrupt public officials through AI system is an interesting practical approach worth to be mentioned in this context. China is developing a nationwide face recognition system with the help of surveillance cameras that can identify any person, anytime, anywhere, round the clock. One Chinese system tracks movements of police officers with live status report. The system's decision is mostly accurate in identifying corrupt official, but it is not capable of explaining its' reasons.[45] The resistance against this system from the government officials is not unexpected. In algorithmic decision making, there is a widespread demand for reasons and explanations. We are habituated in justifying decisions from its' underlying reasons and explanations because reasons are easy to understand and visualize than any other complex model. In response to the rapid intrusion of algorithm, intelligent machines, tendency to maximize automation, new types of legal rights have emerged; such as 'right to be forgotten', 'right to explanation', etc. There is also concern over algorithmic profiling for resource allocation, which sometime result into discriminatory practice.[46]

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[44] RICHARD E. SUSSKIND, TOMORROW'S LAWYERS: AN INTRODUCTION TO YOUR FUTURE (Oxford University Press. 2017).

[45] Stephen Chen, *Is China's corruption-busting AI system 'Zero Trust' being turned off for being too efficient?*, South China Morning Post(2019), https://www.scmp.com/news/china/science/article/2184857/chinas- corruption-busting-ai-system-zero-trust-being-turned-being.

[46] Bryce Goodman & Seth Flaxman, *EU regulations on algorithmic decision-makinganda "right to explanation"*, ICML WORKSHOP ON HUMAN INTERPRETABILITY IN MACHINE LEARNING (WHI 2016), NEW YORK, NY. HTTP://ARXIV. ORG/ABS/1606.08813 V1(2016).

But such AI systems have no chance in India in near future. Surveillance (though by machines) of such extent falls at the wrong side of the law in the realm of right to privacy maintained by the judiciary. This demands immediate judicial introspection over the issue of applicability of right to privacy against black box algorithms.

Another argument against integration of Artificial Intelligence is uncertainty over accuracy. Such an argument is valid only if it can be shown that human judges do not commit error. Judicial decisions by human judges are certainly uncertain and subject to human fallibility. The Judicial uncertainty is non-probabilistic which makes this concept an illusion.[47] On the other hand AI assisted fact-finding can turn the uncertain fact into the highest degree of certainty based on the rules of probability. An algorithm led computational system is good at measuring probability. Algorithms produce more accurate probabilistic decision and 'offer increased transparency and fairness over their human counterpart'.[48] Tribe's[49] two arguments, against use of probability, 'complexity of mathematical arguments beyond the common man's understanding' and 'societal', does not fetch much confidence.[50] The human brain is also a computer of a different kind that follows input-output system.[51] Neural Network in AI system mimics the working of the human brain at conceptual level. Subjects of 21stcentury society use many products of complex mathematical argument that deals with subject of grave importance, such as life. In medical science, both lifesaving and life-threatening decisions are taken by AI 'expert system'. Firstly, medical professionals do have a standard (scientific) perspective and people do not care much about the *blackbox algorithm* behind such 'expert system'

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[47] Yakov Ben-Haim, *Assessing 'beyond a reasonable doubt' without probability: an info-gap perspective*, 8 LAW, PROBABILITY AND RISK (2019).

[48] Goodman & Flaxman, ICML WORKSHOP ON HUMAN INTERPRETABILITY IN MACHINE LEARNING (WHI 2016), NEW YORK, NY. HTTP://ARXIV. ORG/ABS/1606.08813 V1, (2016).

[49] Laurence H. Tribe, *Trial by mathematics:precision and ritual in the legal process*,84 HARVARD LAW REVIEW (1971).

[50] Peter Tillers, *Trial by mathematics-reconsidered*, 10 LAW, PROBABILITY AND RISK (2011).

[51] GUALTIERO PICCININI, PHYSICAL COMPUTATION: A MECHANISTIC ACCOUNT (OUP Oxford. 2015).

because it is medical science. Whereas, we are yet to establish a science of judicial decision making. "Computational modelling permits the transfer of insights about human intelligence to the creation of artificial intelligence (AI) and vice versa."[52]

While discussing the issue of AI assisted decision making in public sector, Marion Oswald[53] rightly concluded; "For centuries, English administrative law has been concerned with the fairness of state decisions. Its principles are already tech-agnostic. It has tackled issues of transparency and understanding, the relevance of 'inputs' and the protection of appropriate human discretion. For lawyers, scientists and public sector practitioners alike, old law- interpreted in a new context-can help guide our algorithmic-assisted future." Former judge of Supreme Court of India, Justice Chelameswar, recently made a comment relevant to this context, "There exist a gap between the mind of the inventor and the mind of a lawmaker. Law does not often keep pace with the developments in technology."[54]

Considering the current progress of AI and law research we can legitimately expect AI assisted judicial making because substantive laws are essentially normative and procedural laws are essentially rule-based, they can be easily formulated into the computational model.[55] Tania Sourdin[56] rightly argued that advancement of AI technology is going to have profound impact on judges and judging in future. It is undeniable that judges are sandwiched between increasing demand for justice and limited budgetary allocation, in such demanding situation, AI decision support system can promote uniformity and efficiency in judicial practice.[57] AI assisted judicial decision

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[52] Falk Lieder & Thomas L. Griffiths, *Resource-rational analysis:understanding human cognition as the optimal use of limited computational resources*, BEHAVORIAL AND BRAIN SCIENCE (2019).

[53] Marion Oswald, *Algorithm-assisted decision-making in the public sector: framing the issues using administrative law rules governing discretionary power*, 376 (2018).

[54] Live Law News Network, *Book On Interface Of Law & Genetics Released By Justice Chelameswar*, Live Law (Nov 25, 2018), https://www.livelaw.in/book-on-interface-of-law-genetics-released-by-justice-chelameswar/.

[55] Engle, RICHMOND JOURNAL OF LAW & TECHNOLOGY, (2004).

[56] Sourdin, UNIVERSITY OF NEW SOUTH WALES LAW JOURNAL,(2018).

[57] G. Sartor & L. Karl Branting, *Introduction: Judicial Applications of Artificial Intelligence, in* JUDICIAL APPLICATIONS OF ARTIFICIAL INTELLIGENCE (G. Sartor & L. Karl Branting eds., 1998).

making has potential to solve the most notorious problem of Indian judiciary, the delay; proper implementation of AI may ensure a sustainable judicial system.[58]

VI. CONCLUSION

Judiciary must be prepared to meet up the need of the future and to deal with future problems.[59] Judicial Support systems are in operation in many countries as judge's aid. An ideal judicial decision support system helps the 'judges to achieve consistency of approach in the decision making.[60] Judiciary exist because its existence is the collective demand of the society. Technology shapes the society by modifying the social reaction of people towards it. For the survival of the judiciary in our algorithmic future, the process of judicial decision making must establish itself as a scientific process. Integration of scientific fact-finding system into judicial fact-finding should be the first step in that direction. Judicial practice within the judiciary is not open to scientific investigation,[61] it creates a huge gap in the field of legal research. Any possibility of practical application of AI 'expert system' for judicial decision making needed to be established through series of scientific investigations and trials. A scientific judicial perspective can solve many hurdles of practical application of AI "expert system" for judicial decision making.

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[58] Parth Jain, *Artificial Intelligence for Sustainable and Effective Justice Delivery in India*, 11 OIDA INTERNATIONAL JOURNAL OF SUSTAINABLE DEVELOPMENT (2018).

[59] J. Clifford Wallace, *The Future of the Judiciary: A Proposal*, 27CALIFORNIAWESTERN LAW REVIEW (1990).

[60] See: Stein Schjølberg, *Judicial decision support systems from a judge's perspective*, 6 INTERNATIONAL JOURNAL OF LAW AND INFORMATION TECHNOLOGY (1998).

[61] Joep Sonnemans & Frans Van Dijk, *Errors in Judicial Decisions: Experimental Results*, 28 JOURNAL OF LAW, ECONOMICS, AND ORGANIZATION 687(2011).

ALGORITHMIC POLICING AND INTERNATIONAL LAW: CRITICAL REALITIES IN DATA-DRIVEN CORPORATES AND GOVERNMENTS OVER AI REALMS

Abhivardhan*

ABSTRACT

Algorithmic policing is an important development in the field of Law and Technology, which has subjected to a relevant instrumentality in developed and developing economies. Beyond the crude material realities of machine learning, the role of algorithmic policing has certainly changed and has questioned the basic role of big data in its structure and resonance with the principles of justice. Also, it has contributed towards an acute form of resilient effect in economies such as China, US and some EU countries, where the role of AI-based systems has surpassed the legal barriers of data protection legislations, and has certainly invoked concerns for corporate and individuals, where rule of law is not limited to mere subjected principles of natural justice. In fact, algorithmic policing raises some imperative questions over the role of international human rights law (or IHRL) and has impacted individuals in cases of studies on customer experience and data dimensionality, where corporates are accountable and reliant over the frugalities in international cyberspace regarding the role and scope of AI-based entities. The plural nature of data processing raises significant issues over the dimensional variation of privacy intrusions that AI-based parameters are applied and instrumented in developed and

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developing economies. It has a significant role yet lacked opinio juris in international law and regional legal regimes, where it has become uncertain to restrict the dynamism of data-driven modalities existent under artificial intelligence. This paper thus raises legal issues over algorithmic policing in the sphere of international law and human rights, suggests solutions with regards the status of an AI in the schemata of algorithmic policing regarding privacy intrusions and provides case analysis of algorithmic policing as soft violations of definite human rights and privacies with reference to China, the EU and US.

Keywords: *international law, algorithmic policing, machine learning, self-determination, customer experience.*

I.   INTRODUCTION

The extensive use of AI systems and devices has amassed varying interest towards the due development of a techno-globalist age in the West and Asiatic economies. China, for example, in most prominent sense, other than the US and the EU, has mastered the corporate art of AI modelling and marketing mechanics, which nowadays is put into use of realms of customer experience (CX)[1]. This realm is indulging yet at the certain verge of development, which itself, cannot be termed as a direct IHRL violation, but a due effect of AI modality. This is a part of the soft power implications created by governments and corporates over the same with the data subjects being individuals in different scopes and domains. This also entails a significant development in the field of international cyber law, pursuant to the need of a more diverse and relevant approach as compared to the principles of data protection and privacy.

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[1] Giselle Abramovich, Study Finds Investments In Customer Experience Are Paying Off Cmo.com (2018), https://www.cmo.com/features/articles/2018/2/26/adobe-2018-digital-trends-report-findings.html#gs.xoSSi8Q (last visited Feb 11, 2019); Christina Larson, Who needs democracy when you have data? MIT Technology Review (2018), https://www.technologyreview.com/s/611815/who-needs-democracy-when-you-have-data/ (last visited Feb 11, 2019).

Figure 1:A diagram depicting the essence of customer experience (CX)[2].

It is a realm of existence, which has been dealt less, with the pursuant development of AI Ethics, in particular aspect of the Westernized model. Such emergence has led to the conceptual establishment of algorithmic policing as a legal, anthropological and technological phenomenon. The paper establishes the conceptual role of algorithmic policing, its policy-based impact on democracies and non-democratic regimes such as China, with its ontology affecting the role of human rights, data ethics and processing and cyberspace implications. Further, it analyses the privacy intrusions involved and a review whether such intrusions are real human rights violations. Relevant conclusions over the genesis of such related issues are provided.

II. ALGORITHMIC POLICING: A CROSS-CONNECTED PHENOMENON

The significance of AI systems is determinant in the course of social interaction, and that itself in the limitedness of the domain involved. It is not a simple establishment because after the Dartmouth Proposal, the tending

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[2] Will Thiel,The role of Artificial Intelligence in customer experience Pointillist (2018), https://www.pointillist.com/blog/role-of-ai-in-customer-experience/ (last visited Feb 11, 2019).

approach to deal AI has changed; states and non-state actors have established differential methods to use machine learning to channelize modal forms of data processing. The role of pseudonymization is a different outset, yet it is not the same as formed. However, Algorithmic policing is somewhat different. It is the manifested form of policy-making involving state/non-state actors in their affairs to materialize their corporeal and ethical interests towards a machine learning-based system to work upon the due development of interaction, reception and pursuance of the system and its efficiency directed in the method and need that the actor wishes to pursue. The problems suggest that an AI realm fails to entail bias, in algorithms, as a complexity, which if encouraged, leads to varying soft violations of human rights, which cannot be possibly dealt with retributive approaches due to the indulgent increase in the usage of AI realms and the economic impact that it has on corporates, propagating customer experience as a special phenomenon.

> *[Xinjiang] ("New Territory") is the traditional home of a Chinese Muslim minority known as Uighurs. [...] One result has been an uptick in violence in which both Han and Uighur have been targeted, including a 2009 riot in the capital city of Urumqi, when a reported 200 people died. The government's response to rising tensions has not been to hold public forums to solicit views or policy advice. Instead, the state is using data collection and algorithms to determine who is "likely" to commit future acts of [violence] or defiance [...] The Xinjiang government employed a private company to design the predictive algorithms that assess various data streams. There's no public record or accountability for how these calculations are built or weighted[3].*

A special issue has been addressed in China by scholars and professionals, which is not recognized as a human right violation but a public policy

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[3] Christina Larson, Who needs democracy when you have data? MIT Technology Review (2018), https://www.technologyreview.com/s/611815/who-needs-democracy-when-you-have-data/ (last visited Feb 11, 2019).

approach by the Chinese Government. This activity is on the due approach of algorithmic policing in the territory of Xinjiang, where selective analysis is instrumented with biased algorithms, with no clear socio-statistical study over the geographical realm of the people. This is a legal issue for in case of understanding the course of human rights, where, it is a question if an AI can turn racist. However, the technological part comes into another conjugation, where the aspect of recognition of such modalities extend the limits. A recent approach to GDPR with AI systems, with no entitative recognition, has been given by the ICO, UK:

> *"[I]f you use AI to make solely automated decisions about people with legal or similarly significant effects, tell them what information you use, why it is relevant and what the likely impact is going to be[4]."*

An AI is a human artefact, which learns and is capable of relearning and developing such techniques at its own[5]. A recent declaration recognized the technological role of an AI realm as proposed by EDPS in 2018, based on (1) Privacy by Design and Default and (2) Fairness Principle as the prima facie conceptions involved[6], which however is a legal and factual limitation for AI realms to estimate and recognize IHRL obligations. The limits that the jurisprudential scope on the subject-matter is rendered in thought, is not complete.

The first principle regards the usage of AI-based systems with a probable outlook towards wherein its activity can be privacy-oriented by default. It

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[4] Right to be informed, Ico.org.uk (2018), https://ico.org.uk/for-organisations/guide-to-data-protection/guide-to-the-general-data-protection-regulation-gdpr/individual-rights/right-to-be-informed (last visited Feb 14, 2019).

[5] A. M. TURING, *COMPUTING MACHINERY AND INTELLIGENCE*, LIX Mind 433-460 (1950).

[6] Declaration on Ethics and Data Protection in Artificial Intelligence, Edps.europa.eu (2018), https://edps.europa.eu/sites/edp/files/publication/icdppc-40th_ai-declaration_adopted_en_0.pdf (last visited Feb 14, 2019), at 2-6.The general problem we face in determining the use of these principles is connected with the scope of GDPR over AI. The recent European regulation entails an AI to be a technology and not an entity, whereby it fails to lead a solvable route in its Articles 3 & 14-18 of the regulation.

also includes the design part; which means to regulate AI in the limitedness of the design or technical construct that vests in the same. This may seem towards a protectionist legal obligation on corporates, governments and private actors, but the implications arise beyond the principle, because machine learning leads the procedural reception and intervention with data into its own liberty, and that also is based on what functions are expectant. However, the locus standi over ML algorithms to be yet limited by the way they have to work destroys the creative and safeguarding aspect of AI, which can be understood by the increasing complexity of ML-oriented operations. Data mining, as well, even may be taken into the purview of anti-trust laws, for example in the case of Amazon, Facebook and Google. However, it poses more serious implications rather than the legal position of trust. The extensive utility of data is a legal possibility and privacy obligations are restrictive enough to determine over the course that such attributions are led. In 2017, scientists from Facebook AI Research (FAIR) discovered that their chatbots had developed their own language, as a major development in 9 hours[7], which they had to shut down. There are similar incidents, which lead towards the similar or apparent implications of observance. However, the inferences that can be drawn out are that machine learning-oriented AI systems exist in the course of a technological liberty, which surpasses the privacy by design and default restrictions imposed (if done) and cannot be resolved only by fragmentation as a process, when they become complex. Indeed, gravity and degree can have a legal role as tools to understand the regulatory aspect of ML, but liability, as a matter of determination, can certainly not be limited by mere implications of presupposed simulations expected, because ML has the potential to break up barriers (provided that AI needs to be strong; weak AIs have relatively less chances of high predictability).

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[7] Tony Bradley, *Facebook AI Creates Its Own Language In Creepy Preview Of Our Potential Future* Forbes.com (2017), https://www.forbes.com/sites/tonybradley/2017/07/31/facebook-ai-creates-its-own-language-in-creepy-preview-of-our-potential-future/ (last visited Feb 14, 2019).

The second principle involving the declaration is the fairness principle. It is collateral to the scope of GDPR, as a transnational European Regulation. The key corollaries involving the development and scope of the principle are:

(a) reasonable expectation;

(b) observational impact;

(c) predeterminate prevention of risk to human life, liberty and dignity; and,

(d) original purpose.

Now, (a) is a legal idea based on the scope of expectation that the user may entail in relation to the data subject and the AI system, which is, on the side of human users, is justified. However, from the side of an AI system, it may not entail a complete justice because of the complications of ML. We cannot ascertain at the same time as in how come the legally reasonable expectation may render fruitful due to the varying implications of algorithmic policing. This is also not justifiable in positive law because we have personified an AI system with the similar jurisprudential normativity with which we consider natural persons. Regarding (b), observational impact is rendered to be justified because the question of real liability (civil/humanitarian/criminal) may come into place. However, the retributive or punitive approach towards redressal may lead us into a legal anarchy because an AI system needs an equation with human personification which a positive law render. In addition, the traditional or general approach of liability cannot apply to AI because it cannot be personified and equated with humans in that legal status of observation and adjudication. Thus, being a different species of juristic persons, an AI resembles a special capability of consideration. Consumer Personalization, for example is a directly connected phenomenon to this concept[8]. Regarding (c), we can dilute the positive legal position of an

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[8] According to BrightEdge, in 2018, a new trend was seen in companies regarding tech marketing. While AI accounted 25.69%, Consumer Personalization accounted 28.66% and Voice Search grabbed up 21.23%. Also, these top 3 trend percentages are based on AI applications, accounting 75% collectively. See also What Consumers Really Think About AI, Pega.com (2017), https://www.pega.com/system/files/resources/2017-11/what-consumers-really-think-of-ai-infographic.pdf (last visited Feb 14, 2019); *Infra* note 21.

AI as a juristic position, account a considerable usage of data protection and anti-trust legislations and account private persons to limited discourses with considering a special yet temporary scope of (a). If we take GDPR for example, then yes, the 9 rights may come into practical usage, except in Arts. 16 to 18 owing to the complex nature of ML-led AI realms provided that the data influx for mining is considerably viable and has reached complex learning mechanisms and stages already. To that extent, (c) is rendered. With respect to (d), we can demarcate original purpose into two aspects- (i) user/data subject's purpose and (ii) purpose of AI realm. Regarding the user/data subject, we may limit the course of liability and provide liberty to high predictability discourses of machine learning systems. However, the ontology involved with the purpose that an AI has may be transient, and yet transforming. There may occur anomalies over the fact whether the AI realm has a potential and reasonable capability to attain the purpose and end. Nevertheless, this case occurs only when such complex stage of data mining and influx has reached. This is a course of procedure facilitated by the realm itself. Some points of importance must be considered:

a.   Algorithmic policing is a dynamic process of facilitating an AI towards a policy by the user(s), who require its relevant facilitation. Such facilitation, as when is employed by Machine Learning (hereinafter ML), is based on the algorithmic services that are crafted;

b.   Fragmentation of an AI is a possibility, but the complexity of data penetrations and interactions is not tenable to be dealt with the same approach per se;

c.   An AI and its algorithmic policing cannot be directly challenged via data protection law because its formation is deepened, and depends on the nature of strength that the ML-based AI attains;

d.   The Status of an AI via the principle of Privacy by Design and Default can be reformed by removing the similar limitations that the substantive principle entails on a tech-oriented architecture. A simple

method can be to recognize the entitative values and privacy of an AI system in terms of generic juristic status;

e.   Purposive construction can be suitably entitled to AI realms in general terms and can be led towards better modalities in terms of the elements of the fairness principle;

III. HUMAN RIGHTS REGIMES IN INTERNATIONAL CYBER LAW: THE COMMONALITIES

A human right is anthropomorphic; and it recognizes the existence of human artefacts in detail. The principles of liberty, equality and fraternity are converted into safeguarded rights in constitutional democracies, and the customized patterns of such safeguarded rights by regional regimes shapes into the constituent form of international law, which is known as customary international law. The significant role that UDHR led was a global motivation, further led by the International Covenants of 1966. This signifies the existence of any universally tenable phenomena[9] related to the international legal scenario, and is duly facilitated thereby. However, in case of different human artefacts[10], the observation and procedure of human rights changes dynamic in a varying fashion. Also, a special obligation approach, for understanding the technical and social commonalities on AI can be inspired by the tripartite model of human rights, based with the ICESCR, also known as theMaastricht Guidelines[11], where minimal obligations shape up state responsibility in a better way.

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[9] Ana Maria Lebada, Second Committee Considers Role of AI in Advancing SDGsSdg.iisd.org (2017), http://sdg.iisd.org/news/second-committee-considers-role-of-ai-in-advancing-sdgs (last visited Feb 14, 2019); AI for Good: Accelerating Progress towards the SDGs - UNSDN - United Nations Social Development Network, UNSDN - United Nations Social Development Network (2018), http://unsdn.org/2018/05/09/ai-2 (last visited Feb 14, 2019); Artificial intelligence can help achieve the SDGs, UNOPS (2018), https://www.unops.org/news-and-stories/speeches/the-second-annual-digital-workforce-summit (last visited Feb 14, 2019).

[10] The importance of a human artefact is tenable for artificial intelligence and is technology-subjected and objected socialization, which has relations with culture. See also ARNOLD PACEY, MEANING OF TECHNOLOGY 8, 176-178 (1999).

[11] This approach entitles a clear and yet protectionist ontology towards determining the practical role of human rights obligations. See also ELLIE PALMER, JUDICIAL REVIEW, SOCIO-ECONOMIC RIGHTS AND THE HUMAN RIGHTS ACT 22 (2007); International Commission of Jurists, Maastricht Guidelines on Violations of Economic, Social and Cultural Rights Refworld (1997), https://www.refworld.org/docid/48abd5730.html (last visited Jan 8, 2019).

"The [reader] must accept it as a fact that digital computers can be constructed, and indeed have been constructed, according to the principles we have described, and that they can in fact mimic the actions of a human computer very closely[12]".

The problem with algorithmic policing is not about its structure: it is about its patronage of data utility and penetration, where legitimacy and credibility are moot. We have to adequately determine the stable role of an ML-led system, whether the algorithms and data used are in consonance to understand the human society, and the recourse of the same perception and retentivity, which is an expectancy for the deference of human rights[13]. Also, apoint of interest to discern is about the legal structure developed in the theory and doctrines of human rights[14]. From the recourses of action, accountability, responsibility and violation, human rights seem to be a lineation. It fails to settle its legitimate stability, because it promises for a compromising sustenance[15] in the eyes of law, which is again an instrumentation towards maintaining rule of law.

"[All] persons deprived of their liberty shall be treated with humanity and with respect for the inherent dignity of the human person[16]"

This linear approach of preserving liberty and equality as basic human rights is promising, yet it cannot be a complete status quo, nor can we expect

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[12] *Id.* at 438.

[13] One constraint of machine learning is that, as a data-determined procedure, it essentially relies on the value of the causal data and thus can be very inelastic. In fact, its generic establishment for procurement and possible recourses must be generally settled, which is a big issue. See also M. L. Cummings et al., Artificial Intelligence and International Affairs: Disruption Anticipated Chathamhouse.org (2018), https://www.chathamhouse.org/sites/default/files/publications/research/2018-06-14-artificial-intelligence-international-affairs-cummings-roff-cukier-parakilas-bryce.pdf (last visited Jan 17, 2019) at 13; MICHAEL N SCHMITT & LIIS VIHUL, TALLINN MANUAL 2.0 ON THE INTERNATIONAL LAW APPLICABLE TO CYBER OPERATIONS 22-24, 190-191, 206, 535 (2 ed. 2017).

[14] HUMAN RIGHTS PROTECTION IN GLOBAL POLITICS 54 (Kurtz Mill &D. J. Karp eds., Palgrave Macmillan 2015).

[15] JACK M BALKIN, CONSTITUTIONAL REDEMPTION 141 (2011).

[16] International Covenant on Civil and Political Rights, Refworld (1966), http://www.refworld.org/docid/3ae6b3aa0.html (last visited Feb 14, 2019).

towards a promised simulation to be conceived by legislators until, the state concerned can foresee it[17]. There do exist commonalities over the conceptual realism of international human rights law and its role and primacy implications to regional human rights regimes, and in the case of AI, this coalesces with data law and obligations pursuant to cyberspace. These commonalities are:

(a) flexibility of legal viability;

(b) minimal deterrence over or/and adherence to state and non-state actors obliged under international law;

(c) socialization and technological relevance as an anthropomorphic question and;

(d) economic and social justice.

With regards (a), the legal adherence to human rights treaties/jus cogens norms/declarations/UNGA resolutions/transnational regulations or treaties reflects the significant role of customary international law and state practice to certify the leaning stage towards flexible mechanisms in the legal system towards the development, protection and evolution of AI realms. Ratification or obligatory stages of acceptance to IHRL obligations requires a public policy settlement and clarity, which states do entail while they propose to adhere such obligations. Pursuant to AI, if liberal, yet mature legal policies are taken into account for reform, then it may lead with a better possibility for the legal system to preserve a credible juristic status of artificial intelligence.

[T]he State duty to protect is a standard of conduct. Therefore, States are not per se responsible for human rights abuse by private actors. However, States may breach their international human rights law obligations where such abuse can be attributed to them, or where they fail to take appropriate steps to prevent, investigate, punish and redress private actors' abuse [...] States also have the duty to protect and promote the rule of law, including by taking

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[17] *Id.* 4, at 144.

measures to ensure equality before the law, fairness in its application, and by providing for adequate accountability, legal certainty, and procedural and legal transparency[18]

On (b) and (c), we may refer the viable legal utility of the Maastricht Guidelines as aforementioned, where the perspective and spectrum of the ICESCR is referred. The perspective of economic and social rights entails to a more credible issuance of reasonable considerations over an AI and its recognition in a welfare state. In fact, every technological realm (smartphones, cryptocurrencies, IoT devices, PCs, etc.) has changed socialization from two ends: first is the end of the subjected users as how the life of a society is changed and second from the end of the realm itself in terms of its economic viability and social utility[19]. Of course, an AI is a technological entity and attains the same right and reality to a subjected socialization as any other tech-oriented system or device or realm may pose. Hence, for the perspective of IHRL, the umbrella of socio-economic obligations can render a progressive future and settlement of usage and scope of AI in a social life. With respect to (d), questions can be posed over employment, corporate rights, socio-economic equity in cyberspace regarding representation & capability and other related issues of residual scope.

This may be case to case-based, because a democratized legal system may have its own public policy, which is coherent and real. Nevertheless, keeping the democratic counterparts aside, data-driven governance systems need to follow obligations in general. The *opinio juris* involved in state sovereignty and human rights recognizes the role of self-determination of the people,

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[18] Office of High Commissioner of Human Rights, Guiding Principles on Business and Human Rights Ohchr.org (2011), https://www.ohchr.org/Documents/Publications/GuidingPrinciples BusinessHR_EN.pdf (last visited Jan 16, 2019).
[19] J. G. Ruggie, Protect, Respect and Remedy: A Framework for Business and Human Rights (A/HRC/8/5) Ohchr.org (2008), http://www.ohchr.org/EN/Issues/Transnational Corporations/Pages/Reports.aspx (last visited Jan 9, 2019) at 9.

and has been inestimably recognized by international law[20].Here are the proposed aspects over the consideration of human rights regimes:

a. Legitimate foundations must be made in regards the discourse of human rights and technology-oriented AI policing taking care the reasonable mechanism and role that ML entails;

b. There must exist ethics-oriented rules and initiatives to develop the discourse of ML-based algorithmic policing and legitimate foundations must be settled to channelize routes to recognize and preserve the self-determination of individuals in cyberspace and in personam;

c. There must be a gradual change in the understanding of human rights violations; there may be such violations or abuses of the same kind, but their degree or observance may render a dimensional perspective, where they might by 'soft' interventions, which has been seen in Xinjiang, China and the West: even using any voice-recognition device for example (not only about data collection and voice recognition mechanisms), the use of a device here, with the pursuit of customer experience to be enhanced, is coalescing and connective to that user, which is a policy-based service by the companyand facilitates manifested liabilities or responsibilities according to that;

IV. CUSTOMER EXPERIENCE TOWARDS ALGORITHMIC POLICING: MODALITIES IN CHINA, US AND EU STATES

Any start-up or company has a presumptive intent to cause or incentivise methods or channels towards better experience for and create an essence of loyalty towards the customer(s) concerned. This is not a new concept, as marketing reaches out to be essential factor of corporates to sustain and leave a social relevance for some time. Customer Experience (hereinafter CX) is a phenomenon of marketing and data science, where instead of reaching out long-term manual methods of winning customer loyalty and concern,

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[20] South-West Africa Cases; Advisory Opinion Concerning the International Status, ICJ Rep. 1950 148 (1950). Understanding the scope of international cyber law, we can understand the Rules 36-39 of the Tallinn Manual 2.0 and the ITU Convention.

some corporates in the world are implementing ML-led strategies towards understanding the essence of customer-oriented requirements, which seems befitting and promising. However, the problems related start at a latent aspect, when data appropriation is subjected towards the same.

[R]espondents' CX-specific priorities indicate that their organizations are focusing on improving the end-to-end customer experience instead of the entire customer journey from acquisition to loyalty was the top priority (46%), followed by improving cross-channel experiences (45%), and expanding content marketing [capabilities] (42%)[21]

Amazon, Facebook, Google, Alibaba, Symantec, HP, Apple and Microsoft are one of the few tech corporates, who are involved in the extensive usage of algorithms involved to benefit consumers. These benefits, are dynamic, and are yield by simple ML-led data mining methods, where based on a mass of data present, it facilitates a comfortability for the corporates to understand the realms of need for their consumers.
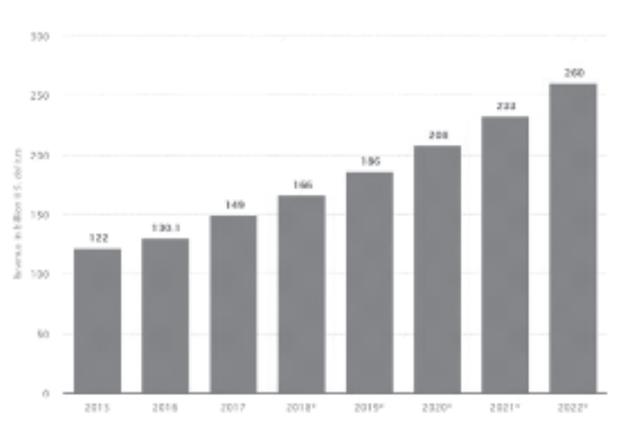
Figure 2: Revenue from big data and business analytics worldwide from 2015 to 2022 (in billion U.S. dollars)[22]

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[21] The Business Impact of Investing In Experience, Adobe.com (2018), https://www.adobe.com/content/dam/acom/au/landing/Adobe_Biz_Impact_CX_APAC_Spotlight.pdf (last visited Feb 14, 2019) at 2.

[22] Global big data and business analytics revenue 2015-2022, Statista (2019), https://www.statista.com/statistics/551501/worldwide-big-data-business-analytics-revenue/ (last visited Feb 14, 2019).

If we estimate the comparative aspect of EU in terms with the US and other potential data-driven economies of related nature, then a special estimation is discernible over consumer experience and its implications being embedded. The US is subjecting an increasing isolation in its foreign policy as well as in socio-economic terms with the EU, and in case of the digital single market, compliance regarding GDPR is still ongoing. While illegal bid requests under Art. 5(1)f of the regulation are in activity, it is imperative to consider as how consumer experience will be regarded in terms of its safety and credibility. The reason is based on the aspect of precautions and methods to prevent intrusive designs per se, and cases may increase. Nevertheless, big data has been discerned to be a special incentive towards utilization and streamlining of purpose, which China has been doing without restrictions. Still, the European diaspora has led a better digital single market and has attempted to lead the discourse of enforcement for the deemed purpose involved.

Content expansion becomes feasible and it leads to another form of algorithmic policing. This is not a hard-lined violation of human rights, because the processing is corporate-oriented[23]. However, a major use of big data in 2016 by Cambridge Analytica, led to basic violations (yet disputed) of human rights of millions of Facebook users. Nevertheless, statistical analysis shows that some progressive EU states are nearing in spending with the US and their contributory aspect has arisen big per se to proceed[24]. Some important mentions are given herein:

a. Right to be forgotten and of rectification in Arts. 15-17 GDPR lay a precedent as happened with Google in April 2018 to act and sue companies for the same, but this entails a complex issue and thus needs an ethical approach to recognize the modalities of a ML-led policy involved by companies;

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[23] Nevertheless, such obligations have a legal value on non-state
[24] Impact of AI on GVA by country worldwide, Statista (2016), https://www.statista.com/statistics/621583/worldwide-artificial-intelligence-impact-on-economic-growth/ (last visited Feb 15, 2019).

b. Data-oriented monopoly must be recriminated; anti-trust legislations are obsolete and cannot be applied in competitive markets even if tech corporates are destroying other markets;

c. Paucity of tenable international law regarding algorithmic policing causes adverse circumstances;

V. CONCLUSION

As a technical concept, algorithmic policing is a legal procedure yet a dynamic and eccentric to be controlled as a policy to resolve issues in generic sense for recognizing and furthering the self-determination of individuals in international human rights law. Certain conclusions based on proposition are provided thereto:

a. The legal conception of human rights and rule of law must be cultivating and lead to dimensional and credible establishments, which can be done by extra-implementable methods;

b. Algorithmic policing can be solved and considered by making data mining an objective ethic, rather than a subjective requirement;

c. The approach of dealing with the privacy of data is equivalent to and much closer to that of the user in case of algorithmic policing;

d. Data-oriented monopolies must be curtailed by newer anti-trust legislations in developed and developing economies;

e. The approach of privacy by default and design is limited and the instrumental role of the GDPR does weaken to understand and estimate a regulatory and safer future for and in the pursuance of the creation and maintenance of an AI-oriented ecosystem;

These conclusions are based on an outset of developments that AI is gaining in corporate and human resources. It is thus possible that algorithmic policing may be rendered in that perspective with resonant solutions.

ALGORITHMIC PRICING & COLLUSION; THE LIMITS OF ANTITRUST ENFORCEMENT

-Sumit Singh Bhadauria*
Lokesh Vyas**

ABSTRACT

The combination of big data, large storage capacity and computational power has strengthened the emergence of algorithms in making myriads of business decision. It allows business to gain a competitive advantage by making automatic and optimize decision making. In particular, the use of pricing algorithms allows business to match the demand and supply equilibrium by monitoring & setting dynamic pricing. It benefits consumer alike to see and act on fast changing prices. However, on the downside, the widespread use of algorithm in an industry has the effect of altering the structural characteristic of market such as price transparency, high speed trading which increases the likelihood of collusion. The ability of pricing algorithm to solve the cartel incentive problem by quickly detecting and punishing the deviant further strengthen the enforcement of price fixing agreement. In addition, the use of more advance forms of algorithm such as self-learning algorithm allows business to achieve a tacitly collusive outcome in limited market characteristic even without communication between humans. This raises the fundamental challenge for anti-cartel enforcement as the current law in most jurisdictions is ill-equipped to deal with algorithmic facilitated tacit collusion. The legality of tacit collusion is

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questionable primarily because the pricing algorithm has the ability to alter the market characteristics where the tacitly collusive outcome is difficult to achieve; thus widening the scope of the so-called 'oligopoly problem'.

This paper studies the usages of pricing algorithms by business in online markets. In particular, the paper identify the conditions under which the algorithm prices causes the harm to consumers. It seeks to analyze how algorithms might facilitate or even causes the collusive outcome without human interventions. Further, it looks at the legal challenges faced by the competition authorities around the globe to deal with the algorithmic let collusion and examine the various approaches suggested to counter act it.

Keywords: *Big data, algorithm, ill-equipped, transparency, enforcement*

I.   INTRODUCTION

Gone are the days when people traveled from one place to another in search of goods and services. The advent of the internet has not only changed the traditional definition of the economy but also narrowed the world. From daily shopping to wars, the internet has revolutionized each and every aspect of our life, making a mouse click more powerful than the trigger of a gun. This unfettered technological advancement has led to the creation of digital or internet economy where the algorithm is the cynosure of the market.

The combination of big data, large storage capacity, and computational power have further strengthened the emergence of algorithms in making myriads of business decisions. This rise in algorithms has offered many competitive advantages to the business and consumer alike to optimize their decision making. However, at the same time, it has caused novel competition problems. One of the area which receives much attention from Competition authorities across the jurisdictions is algorithmic price-fixing. European Commission sectoral enquiry in e-commerce found that about half of the online retailers uses pricing algorithmic to track the prices of the competitors. While pricing algorithms has offered various benefits allowing

business to monitor prices more efficiently and to respond to changing market dynamics, it has also increased the ability of competitors to achieve novel form of coordination which may go beyond the traditional competition law tools. In this paper, the authors have attempted to identify the condition under which algorithmic pricing might facilitate tacit or express collusion in the markets. Further, it seeks to identify the enforcement challenges and counter-measures.

Part II of the paper document how the rise of algorithms has changed the way human lead their life. It also discusses the rise of pricing algorithms and its benefits to the consumer and business. Part III of the paper seeks to identify the circumstance under which pricing algorithms facilitate express or tacit collusion and whether it required rethinking of competition law framework, while part IV discuss the enforcement challenges and the proposed counter measures. Part V concludes the paper.

II.   THE RISE OF ALGORITHMS & CHANGING MARKET DYNAMICS

The advent of the digital economy has widened the traditional definition of the consumer to include algorithmic consumers.[1] Their life is pedaled by the algorithms, a kind of Artificial intelligence, in an algorithmic-driven economy.[2] From setting an alarm for the next morning to buying t-shirts,the presence of algorithms cannot be overlooked. Their choices, preferences, like, dislike everything is being tracked to determine our future choices.[3] Thus, such deference on algorithms has not only imperiled the privacy aspect of our life but also fettered the way we make our choices. Algorithms are in reality the combination of computer science, mathematics, and the Internet.

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[1] Elkin-Koren, Niva& Gal, Michal, *Algorithmic Consumers*, 30 Harv. J. Law. & Technology 309 (2017)

[2] Minghua He, Nicholas R. Jennings & Ho-Fong Leung, *On Agent-Mediated Electronic Commerce*, 15 IEEE TRANSACTIONS ON KNOWLEDGE & DATA ENGINEERING 985, 985–90 (2003).

[3] Salil K. Mehra, *Antitrust and the Robo-Seller: Competition in the Time of Algorithms*, 100 MINNESOTA L. REV. 26 (2015).

The Algorithm era has bolstered the human's tendency of delegating work and has further increased the need of the Internet in our life.[4]

There is no single definition of algorithms,[5] some define it as a mathematical recipe,[6] whereas some call it a set of specific rules and instructions.[7] In simple words, it's a systematic set of finite rules (inputs) which produce results (output) on the basis of inputs. Algorithms are not a new phenomenon in human's life, they have always existed and were used by humans while making decisions. However, the burgeoning use of the internet and digitalization of economy have changed the way people lead their life and eased the task of decision making by hinging on algorithmic tools. The use of algorithms allows people to save their time and energy for making day-to-day choices.[8] Furthermore, it is also argued that such usage has minimized information and transaction costs thereby improving our decisions making capacity.[9] As algorithms are devoid of human biases, therefore, they are said to be better at decision making.

III. PRICING ALGORITHMS & BENEFITS

Pricing algorithms are the algorithms that use price as an input, and/or uses a computational procedure to determine price as an output.[10] The definition of pricing algorithms includes price monitoring algorithms, price recommendation algorithms, and price-setting algorithms.[11] The data

[4] Maria Bakardjieva, *The Internet in Everyday Life: Exploring the Tenets and Contributionsof Diverse Approaches*, in THE HANDBOOK OF INTERNET STUDIES 59-82(2009).

[5] Yuri Gurevich, *What is an algorithm?* (16 Feb, 2019; 12:44 PM), https://pdfs.semanticscholar.org/762f/178c7983d7431d04919453c043760d691366.pdf.

[6] N. WIRTH, ALGORITHMS AND DATA STRUCTURES,10-11 (2004).

[7] STEVEN S. SKIENA, THE ALGORITHM MANUAL, 12 (2008).

[8] Peter Georg Picht& Benedikt Freund, *Competition law in the era of algorithms*, (MaxPlanck Institute for Innovation and Competition Research Paper No. 18-10, 2018) https://www.ius.uzh.ch/dam/jcr:e020bc7845b44e27a08d87a5a0ac902b/Picht%20Freund___Competition%20law%20in%20the%20era%20of%20algorithms___MPI%20Research%20Paper%20no%201810___SSRN-id3180550.pdf.

[9] ARIEL EZRACHI, MAURICE E. STUCKE, VIRTUAL COMPETITION THE PROMISE AND PERILS OF THEALGORITHM-DRIVEN ECONOMY, 24 (2016).

[10] Competition and Markets Authority (2018), *Pricing Algorithms*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/746353/Algorithms_econ_report.pdf.

[11] Id.

required to calculate prices includes factors such as demand of consumers, prices of other competitors, purchase history of consumers and their preferences, past profits/revenue data or cost of production, storage etc.[12]

The advent of big data & analytics, algorithms can monitor prices more efficiently than human being and are able to respond to market changes more quickly and accurately.[13] The increase price transparency reduces search cost thereby enabling consumer to compare price, quality and choose the best.[14] Reducing search cost, low barrier to entry, and increasing information follows can increase the competitive pressure to innovate thereby promising dynamic and allocative efficiency.[15] Search engines, online marketplaces, discount stores, booking agencies, airlines, road transport, and social networks are some market industries which are currently pedaled by such algorithms.[16]

IV. ALGORITHMIC PRICING & COLLUSION

The increased use of algorithms in making pricing decisions has indeed offered many competitive advantages to the business, allowing them to gain efficiency and promoting consumer welfare.[17]At the same time, technological advancement allowed competitors to use pricing algorithms to achieved collusive outcome. The academic literature on the subject has identified two broad ways in which algorithms may be used to reach anti-competitive collusion.[18]*First,* the algorithms are being used to facilitate an already existing price-fixing agreement between competitors. Here algorithms are

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[12] Gintare Surblyte, *Data-Driven Economy and Artificial Intelligence: Emerging Competition Law Issues*, 67 IN: WIRTSCHAFT UND WETTBEWERB (WUW), 120 (2017).

[13] Algorithmic price fixing under EU Competition law: how to crack robot cartel? by INGE GRAEF.

[14] George J. Stigler *The Economics of Information*, 69 J. OF POLITICAL ECONOMY 213—225(1961).

[15] Supra Note 7 at ¶15.

[16] Id.

[17] Elkin-Koren, Niva&Gal, Michal, *Algorithmic Consumers*, 30 HARV.   J. LAW. & TECHNOLOGY 309 (2017).

[18] Antonio Capobianco& Pedro Gonzaga, *Algorithms and Competition: Friends or Foes?'*, CPI ANTITRUST CHRONICLE (14 Feb, 2019; 04:51 PM) https://www.competition policyinternational.com/wp-content/uploads/2017/08/CPI-Capobianco-Gonzaga.pdf.

merely employed as intermediary as an extension of human will.[19]*Second,* algorithms are designed in a way to achieve tacitly collusive outcome. Here the unilaterally designed algorithm learns to tacitly collude among themselves in certain limited market characteristic.[20]

The former category is straightforward and there is general consensus among legal practitioners and academician regarding adequacy of current antitrust tools to deal with such anti-competitive collusion. When algorithms are being usedas an extension of human will, such human will is manifests in the concept of 'agreement' recognized in the cartel enforcement. However, the latter category raises many legal challenges for antitrust enforcement. Here advance self-learning algorithms may learn to collude among themselves without human intervention. To date, such an eventuality exists only in theoretical and experimental studies.[21] As Professor Nicolas Petit puts it, "Antitrust and Artificial Intelligence literature is the closet ever our field came to science fiction."[22] Others have even denied the possibility of algorithmic tacit collusion.[23] However, the authors believes that ability of self-learning to reach to a collusive outcome cannot be denied which are beyond the reach of traditional antitrust enforcement.[24]

While algorithms as a tool to facilitate express collusion can be dealt under the available tools, the algorithmic tacit collusion represent the most

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[19] Ariel Ezrachi& Maurice E Stucke,*Artificial Intelligence & Collusion: When Computers Inhibit Competition*, 18 (Oxford, Working Paper CCPL (L) Paper no. 40, 2015), http://ssrn.com/abstract=2591874.

[20] Ezrachi, Ariel&Stucke, Maurice E., *Two Artificial Neutral Networks Meet in an Online Hub and Change the Future (Of Competition, Market Dynamics and Society)*, (Oxford Legal Studies Paper No. 24,2017), https://ssrn.com/abstract=2949434.

[21] Ai Deng , *When Machines Learn to Collude: Lessons from a Recent Research Study on Artificial Intelligence*, (17 Feb, 2019; 05:38 PM), https://ssrn.com/abstract=3029662.

[22] Ashwin Ittoo& Nicolas Petit, *Algorithmic Pricing Agents and Tacit Collusion: A Technological Perspective* (21 Feb, 2019; 03: 18 PM), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3046405.

[23] Ulrich Schwalbe,*'Algorithms, Machine Learning, and Collusion'; Thibault Schrepel, Here's why algorithms areNOT (really) a thing, Concurrentialiste*, (16 Feb, 2019; 12:48 PM),http://www.cresse.info/uploadfiles/2017_sps5_pr2.pdf.

[24] Joseph E. Harrington, Jr., *Developing Competition Law for Collusion by Autonomous Artificial Agents* (The Wharton School Working Paper,2018),http://assets.wharton.upenn.edu/~harrij/pdf/Collusion%20and%20Autonomous%20Pricing%20Agents.pdf.

challenging category where competition law tool may not be sufficient. There is debate on the ability of algorithms to reach tacitly collusive outcome.[25] However, this is not subject matter of this paper. In this chapter, the authors will discuss the ways in which algorithms are being employed to reach express or tacit collusion.

V.   ALGORITHMS TO FACILITATE EXPRESS COLLUSION

1.   Monitoring Algorithms

The pricing algorithms are being employed to monitor competitor's action and detecting and punishing any deviant behaviors in order to effectively enforce the cartel agreement. The ability of monitoring algorithms to quickly detect deviation and retaliate immediately reduces the incentive to cheat by individual competitors thereby stabilizing the cartel agreement.Thus, unlike traditional cartels, the use of price monitoring algorithms may makes cartels more durable and easier to sustain.

The role of algorithms in such scenario is merely to facilitating the already existing cartel among humans. The process involves collection of data regarding prices in a easy to use format which can be regularly updated. In online markets, such data is generally available publicly. The use of monitoring algorithms can strengthen the cartels by reducing the chances of errors based on imperfect pricing information. The ease and availability of the mass data collection allows the entities to understand the pricing behaviors of competitors.[26]As a result, colluding companies will be able to increasingly monitor each other's actions using sophisticated algorithms and can detect and deviation from the agreed prices on real-time basis.[27]

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[25] Deng, Ai, *What Do We Know About Algorithmic Tacit Collusion?* (September 16, 2018), 33ANTITRUST 16(2018). https://ssrn.com/abstract=3171315.

[26] Supra Note 10 at ¶15.

[27] ORG. ECON. CORP. DEV., ALGORITHMS AND COLLUSION – BACKGROUND NOTE BY THE SECRETARIAT(2017),https://one. oecd.org/document/DAF/COMP(2017)4/en/pdf.

The use of such price monitoring algorithms to implement cartel agreement may be illustrated by prosecution by United States (US) Department of Justice (DOJ) in the case *U.S. v. David Topkins*, where the parties are involved in horizontal price fixing for the poster sold on the amazon marketplace.[28] The modus operandi was that the parties has adopted specific pricing algorithms which is monitoring the pricing information of the competitors for the purpose of aligning the prices and coordinating any changes to their respective prices.[29] Similarly, in *Trod Ltd/GB eye,*[30] two parties are charged for horizontal price-fixing agreement. The cartel is implemented by using an automated repricing software which monitored and adjusted each other prices to prevent undercutting by each other. The Competition Market Authority, United Kingdom (CMA) found infringement of chapter I of the prohibition on finding clear evidences of communication between parties to use software to police cartel.

From an enforcement perspective, the use of price monitoring algorithms to facilitate a cartel can be prevented by using current antitrust tools. The role of pricing algorithms as a cartel facilitators does not eliminate the need for the explicit communication which is the source of primary illegality.[31] The competition authorities may rely on the case laws related to the concept of agreement or concerted practice to establish the collusion.[32] The stronger the evidence of anti-competitive agreement or communication among competitors, the less the need for the evidence of intent to establish the conduct.[33]

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[28] United States v. Topkins, CR 15–00201 WHO (N.D. Cal. Apr. 30, 2015).

[29] U.S. Department of Justice, *E-Commerce Exec and Online Retailer Charged with Price Fixing Wall Posters* (10 Feb, 2019; 10:29 AM), http://www.justice.gov/opa/pr/e-commerce-exec-and-online-retailer-charged-price-fixing-wallposters.

[30] UK CMA*, Decision of the Competition and Market Authority: Online sales of posters and frames Case 50223,* (10 Feb, 2019; 07:34 PM),https://assets.publishing.service.gov.uk/media/57ee7c2740f0b606dc000018/case-50223-final-non-confidential-infringement-decision.pdf.

[31] George Alon Hay, *Anti-competitive Agreements: The Meaning of 'Agreement*, (Cornell Law Faculty Working Paper No. 105, 2013),http://scholarship.law.cornell.edu/clsops_papers/105.

[32] United States v. Socony-Vacuum Oil Co., 310 U.S. 150, 221 (1940).

[33] Supra Note 9 at ¶52.

2.   Parallel Algorithms

The use of parallel or common algorithms by competitors in the markets may facilitate a horizontal cartel in the market. This conduct is also described as hub & spoke conspiracy.[34] Sustaining a cartel in dynamic markets is laden with enormous difficulties owing to frequent changes in supply and demand and other trading conditions requiring continuous adjustment in pricing and output decisions. In such circumstances, the use of similar algorithms to automatize the pricing decisions of the competitors may help sustaining anti-competitive cartel.[35]Dynamic pricing algorithms are generally used in industries such as hotel booking, transportation and network companies to set the efficient prices by adjusting the constantly changing demand and supply.[36]

As the pricing decisions in the online markets have become dynamic and data driven, there is an increase growth third party companies offering pricing algorithms. For example, Boomerang Commerce is a third party vendor which 'analyzes over 100 discrete data points per SKU, including competitors' prices" to help "retailers re- price millions of products in real-time.[37] It provides various relevant factors to make the pricing decision more efficient. The competitors have greater incentive to use such third party algorithms as it would be too costly or time consuming to develop independent price algorithms. Even if it is developed, it is very difficult to match the specialized sophistication provided by third party vendors.

Having an industry wide use of similar pricing algorithms develop by a third party vendor may help in stabilizing prices. Here the third party vendor

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[34] *Id*, at ¶47.

[35] ORG. ECON. CORP. DEV., ALGORITHMS AND COLLUSION: COMPETITION POLICY IN THE DIGITAL AGE, (2017), http://www.oecd.org/daf/competition/Algorithms-and-colllusion-competition-policy-in-the-digital-age.pdf.

[36] Schumpeter, *"Flexible Figures, A Growing Number of Companies are Using 'Dynamic' Pricing"*, THE ECONOMIST, (12 Feb, 2019; 05:24 PM),www.economist.com/news/business/21689541-growing-number-companies-are-using-dynamic-pricing-flexible-figures.

[37] Boomerang Commerce, *Our Story*, http://www.boomerangcommerce.com /about/.

collects the data from individual competitors to set the optimal pricing. As the vendor has the incentive to maximize the profits of the competitors, each retailer may aware about the potential use of rival data in determining prices. In such circumstances, the third party vendor may become a hub to facilitate the classic hub & spoke conspiracy among the competitors.

However, industry wide use of similar algorithm by a third party vendor *ipso facto* cannot result in a hub & spoke conspiracy leading to horizontal cartel. As U.S. Supreme court noted that "there must be overall awareness about the conspiracy and that each defendant knew or had the reason to believe that their own profits were dependent upon the success of the entire venture"[38] Thus, merely having vertical agreement with the similar third party vendor does raises any anti-competitive concern, the competitors must be aware of the concerted efforts to stabilize the prices.[39] The evidence related to intention of the spokes to communicate or awareness of the conspiracy are relevant.[40]

The use of electronic computer algorithms to facilitate hub & spoke conspiracy was once condemned by Court of Justice of European Union in case of *Eturas& Others*.[41] In this case, Eturas is an online travel booking system developed for the travel agents to book the tickets. The administrator of the system by a notice has imposed a discount cap on the travel agent. The court has presumed the existence of conspiracy among travel agents who are aware of contents of the message unless they publicly distance themselves from implementing the decisions.[42]

Further, the evidence related to the design of the algorithm may be relevant. If algorithm is developed specifically to collude among competitors, an hub &

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[38] Interstate Circuit v. United States, 306 U.S. 208, 227 (1939).
[39] Tesco v. Office of Fair Trading, [2012] CAT 31, para. 57, 58.
[40] Maurice E. Stucke, *"Is Intent Relevant?"* 8 JOURNAL OF LAW, ECONOMICS & POLICY 801 (2012).
[41] Eturas and Others, Case C-74/14 (2016).
[42] Rusu, Catalin S, *'Eturas: Of Concerted Practices, Tacit Approval, and the Presumption of Innocence'*, 7 JOURNAL OF EUROPEAN COMPETITION LAW & PRACTICE 396-398 (2016).

spoke conspiracy can be established. Absent such evidence, the competition authority may look at the adverse effect of vertical agreement under the 'Rule of Reason' analysis.[43]

3.   **Uber's Hub & Spoke Conspiracy**

The growth of digital economy has witness new forms of doing business, innovation and consumer welfare. Online platform in digital markets are often characterized by multi-sidedness, network effect, low sunk cost/operating cost.[44]The success of the online platform such as Amazon, Facebook, Google and Uber has unprecedently changed the market dynamics and has increasingly invited attention of competition authorities.[45] Online platforms may act as a hub in facilitate cartel when competing operator's prices are determined by algorithms provided by platform.

The online taxi aggregators such as Uber & Ola provides classic example of such type of conspiracy. Uber claims that it is merely a technological platform which connects consumer with independent services providers.[46] However, the Uber's business model does not allow individual taxi operator to charge its own prices. The prices charged by competing drivers are determined by an algorithm designed by the Uber on the basis of distance, availability, timeand other undisclosed factors. Uber takes between 20% to 25% commission on the price charged; rest is given to the drivers.[47] According to some, the conduct of drivers to enter into an agreement to determine sale price with Uber, knowing the fact that other driver have

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[43]Gal, Michal, *'Algorithmic-facilitated coordination: Market and Legal Solutions'*, CPI ANTITRUST CHRONICLE, (18 Feb, 2019; 07:41 PM) https://www.competitionpolicy international. com/wp-content/uploads/2017/05/CPI-Gal.pdf.

[44] Newman, John M., *'Complex Antitrust Harm in Platform Markets'*, CPI ANTITRUST CHRONICLE, (14 Feb, 2019; 02:34 PM), https://www.competitionpolicyinternational.com/wp-con tent/uploads/2017/05/CPI-Newman.pdf.

[45] EUCOM., 'Staff Working Document on Online Platforms Accompanying the document Communication of Online Platforms and the Digital Single Market', COM(2016) 288, https://ec.europa.eu/digital-single-market/en/news/commission-staff-working-document-online-platforms.

[46] UBER, *Legal terms and Conditions*, https://www.uber.com/en-IN/legal/terms/in/.

[47] Sarah Ashley O'Brien, *"NYC Uber Drivers Protest Rate Cuts,",*CNN MONEY (1 Feb, 2019; 06:43 PM), http://money.cnn.com/2016/02/01/technology/uber-nyc-protest/index.html?sr= twCNN020116ubernycprotest0317PMVODtopPhoto &linkId=2084963.

entered into a similar arrangement amounts hub & spoke conspiracy leading to horizontal cartel.[48]

Such price fixing by platform hurts the most when the platform achieve a dominant position in the markets. As the market is characterized by the network effect as well as indirect network effect, the market is likely to tip favor of one or few players. When this occurs, the consumer or drivers have no choice but to accede to the conditions such as prices set by platform. As the size and market power of platform increase, the possibility of exploitation by charging supra-competitive prices increases. Here the competition authorities must identify the tipping point at which platform obtain market power and the algorithms can likely increase prices.[49]

The Competition Commission of India (CCI) has recently rejected the similar price-fixing allegation against Uber.[50] The informant alleges that algorithmic pricing adopted by Uber takes away liberty of individual driver to compete with each other thereby amounting to price-fixing. Further, the pricing algorithm artificially manipulates supply and demand thereby guarantees higher fares to the driver who are otherwise compete against each other. However, the commission held that unilateral decision of individual driver to adopt algorithmic pricing determined by Uber does not raises anti-competitive concern without collusion among the drivers. Further, unlike Zomato, Airnub, Amazon, Uber is not merely a platform operator but it is a radio taxi operator owing to control exercised over the operators.[51]

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[48] Chanakya Basa, *Does price fixing, by app based on-demand taxi services pose a competition law concern in India?*, CPI, (11 Feb, 2019; 08:11 PM), https://www.competitionpolicy international.com/does-price-fixing-by-app-based-on-demand-taxi-services-pose-a-competition-law-concern-in-india; Anderson, Mark&Huffman, Max, *'The Sharing Economy Meets the Sherman Act: Is Uber a Firm, a Cartel or Something in Between?'*, (Indiana University H. McKinney School of Law Research Paper No. 8, 2017), https://ssrn.com/ abstract=2954632; Lougher, Guy&Kalmanowicz, Sammy, *'EU Competition Law in the Sharing Economy'*,7 JOURNAL OF EUROPEAN COMPETITION LAW & PRACTICE 87-120(2016).
[49] Ezrachi, Ariel&Stucke, Maurice E., *'Artificial Intelligence & Collusion: When Computers Inhibit Competition'*, Oxford, Working Paper no 40, 2015) http://ssrn.com/ abstract=2591874.
[50] Samir Agarwal v. ANI Technologies Pvt. Ltd., Case No. 37/2018.
[51] Id. *See also, AsociaciónProfesional Élite Taxi v. Uber Systems Spain SL,* C-434/15.

Interestingly, one United States (US) federal district court find the prima facie existence of hub & spoke conspiracy between Uber and its driver to fix the sale prices by using the algorithm designed by Uber.[52]

4.   Algorithms To Facilitate Tacit Collusion

The previous chapter explored the use of algorithms to facilitate an express collusion among humans where it was observed that current antitrust tools are sufficient to cope with such situation. However, with the technological advancement, the rise of the more sophisticated self-learning algorithms allows companies to achieve a tacitly collusive outcome in certain market characteristic without there communication between humans.[53]The risk of algorithmic tacit collusion has been recognized by various competition authorities.[54] As Organization of Economic Cooperation and Development (OECD) roundtable conference on Algorithm & Collusion noted:

> *Firstly, algorithms are fundamentally affecting market condition resulting in high price transparency and high-frequency trading that allows companies to react fast and aggressively. These changes in digital markets, if taken to a certain extend could make collusive strategies stable in virtually any market structure. Secondly, by providing companies with powerful automated mechanism to monitor prices, leaning technique, algorithms might enable firms to achieve the same outcomes of traditional hard core cartels through tacit collusion.[55]*

Tacit collusion represent as the most challenging area for the competition law enforcement. The conduct is legal; however, it harm consumers to the

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[52] Spencer Meyer v. Travis Kalanick, No. 16-2750 (2d Cir. 2017).

[53] Mehra, Salil K., *'Antitrust and the Robo-Seller: Competition in the Time of Algorithms'*, 100MINNESOTA L. REV., 1323–1375 (2016).

[54] OECD, *Algorithms and Collusion - Note by the European Commission*, submitted for the OECD Competition CommitteeHearings on 21-23 June 2017, DAF/COMP/WD(2017) (14 June 2017); *Algorithms and Collusion - Note bythe United States*, submitted for the OECD Competition Committee Hearings on 21-23 June 2017,DAF/COMP/WD(2017)41, at 6 (26 May 2017).

[55] Supra Note 35.

same extent as hardcore price fixing cartel.[56] The conduct occurs in highly concentrated market where the participant recognize their shared economic interest and interdependence with respect to price and output decision and subsequently unilaterally set their prices above the competitive level.[57] The condition under which tacit collusion occurs "need not involve any 'collusion' in the legal sense, and in particular need involve no communication between parties."[58]

To examine the ability to algorithms to facilitate tacitly collusive outcome, it is important to understand the characteristic of markets under which tacit collusion is possible and how algorithms can affect those characteristics. The tacitly collusive outcomes occurs particularly in oligopoly market structure. The characteristic of such markets are: *First*, markets with few competitors involving homogenous products. *Second,* transparent markets where deviation can be punished quickly. *Third,* the markets characterize my high barriers to entry and low buyer power. *Fourth*, large frequency of interaction.[59]

To illustrate this scenario, consider a market with few petrol pump situated close to each other. The products are homogenous so that consumer demand is primarily based on the prices and convenience. Also, the market is sufficiently transparent so that each petrol pump can quickly observed the prices charged by the others. Further market is characterized by high barriers to entry (regulatory and costs) and low buyer power in terms of no substitute for petrol. Such market is highly susceptible to non-competitive tacit collusion. For instance, none of the competitors would have the

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[56] Green, E. J., R. C. Marshall and L. M. Marx, *Tacit Collusion in Oligopoly*, in THE OXFORD HANDBOOK OF INT'L ANTITRUST ECON., (R. D. Blair and D. D. Sokol eds. 2013), https://faculty.fuqua.duke.edu/~marx/bio/papers/tacitcollusion.pdf.

[57] Brooke Group Ltd. v. Brown & Williamson Tobacco Corp., 509 U.S. 209 (1993).

[58] IoannisLiannos and Damien Geradin, *The 'Oligopoly Problem' in EU Competition Law*, in RESEARCH HANDBOOK IN EUROPEAN COMPETITION LAW, (Edward Elgar Publishing, eds., 2013).

[59] J. E. Jr. Harrington, *A Theory of Tacit Collusion*, Economic Working Paper, The John Hopkins University,http://www.tsefr.eu/sites/default/files/medias/stories/SEMIN_11_12/ECONOMIC_THEORY/harrington.pdf.

incentive to discount when price transparency allows competitors to quickly match the prices. Therefore, the increased interdependence left only rational alternative to follow a price leader or to suffer losses. Sufficient transparency and homogeneity tends to create symmetry and allow competitors to predict the behavior more efficiently and reduce strategic uncertainty.

However, real markets often do not characterize by transparency regarding prices or other factors of demand; thus making tacitly collusive outcome difficult to achieve. For instance, in our above example, consider that markets are not transparent and it takes time for the competitors to find out what other competitors are charging and to respond accordingly. The longer time required to respond to market changes increases the incentive to discount and allow competitors to gain image as a discounter. This strategic uncertainty makes tacit collusion unlikely.[60] As an European court noted, "there must be an incentive not to depart from the common policy on the market."[61]

The use of pricing algorithms in such market cause the tacit collusion in a superior manner than human. Here the human unilaterally design algorithms to reflect a pricing strategy which assumes interdependence or is geared to push towards such interdependence.[62] As the legal literature accepts that conscious parallelism can be established unilaterally without communication between competitors,[63] algorithms can help to further stabilize such parallelism even beyond strict oligopoly.[64]

To ability of algorithms to optimizing pricing decisions also increases the price transparency in the market. This coupled with the speed of algorithms

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[60] Edward J. Green, Robert C. Marshall, & Leslie M. Marx, 2, *Tacit Collusion in Oligopoly, in* THE OXFORD HANDBOOK OF INTERNATIONAL ANTITRUST ECONOMICS (Roger D. Blair & D. Daniel Sokol, eds., 2014).

[61] Airtours plc v Commission of the European Communities, Case T-342/99 (2002).

[62] Ezrachi, Ariel &Stucke, Maurice, *Sustainable and Unchallenged Algorithmic Tacit Collusion,* SSRN Electronic Journal(2018).

[63] Eastman Kodak Co. v. Image Tech. Servs. Inc., 504 U.S. 451, 466–67 (1992); Brooke Group Ltd. v. Brown & Williamson Tobacco Corp., 509 U.S. 209 (1993). Also, *see* Phillip E. Areeda, Herbert Hovenkamp& John L. Solow, Antitrust Law, (1998).

[64] Supra Note 62.

in detecting and punishing the deviation foster tacit collusion in concentrated market with homogenous goods. This can be established by two examples. *First,* In 2012, Chile government with the objective of benefit consumers regarding prices required petrol station to post fuel prices on government website and update it regularly. However, an economic study found that such regulation has led to an increase in prices by 10% on average.[65]*Second*, German government with the objective of promoting competition requires five market participant of an oligopoly to post price changes on real time basis and then transferring it to the consumer. Instead of promoting competition, the economic study found that petrol price increased by 1.2 to 3.3 euro cent, and diesel prices by 2 euro cent.[66]

The speed of algorithms to quickly detect and retaliate deviation further causes price signaling more effective. Earlier, the competitors usually signal price increase at least 30 days prior which also subject them to antitrust scrutiny. Now computer with increase ability to observe price and adapt changes can signal price increase to rivals in real time basis. Algorithms may be specifically designed to follow the price leader or to imitate price decision by rivals. Such a unilateral action posit significant challenges to competition law enforcement as it is very difficult to bring them under the ambit of 'agreement' or concerted practice.

To this date, the possibility of such algorithmic tacit collusion exist only in theoretical or experimental studies.[67] The simple 'win-continue lose- reverse' & 'tit-for-tat (price matching algorithms) have shown the capability to collude.[68] In one such experimental study where independently designed algorithms by firm commit to pricing algorithmic to allow it to decode other

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[65] Bundeskartellamt, *Final Report on the Fuel Sector Inquiry*, (May 2011), https://www.bundeskartellamt.de/SharedDocs/Publikation/EN/Sector%20Inquiries/Fuel%20 Sector%20Inquiry%20-%20Final%20Report.pdf?__blob=publicationFile&v=14.
[66] Ralf Dewenter, Ulrich Heimeshoff, and Hendrik Lüth, *The Impact of the Market Transparency Unit for Fuels on Gasoline Prices in Germany* (2016), http://www.dice.hhu.de/fileadmin/redaktion/Fakultaeten/Wirtschaftswissenschaftliche_Fakul taet/DICE/Discussion_Paper/220_Dewenter_Heimeshoff_Lueth.pdf.
[67] Ai Deng, *What Do We Know About Algorithmic Tacit Collusion?*,Antitrust, Vol. 33, No. 1 (2018).
[68] Supra Note 10.

pricing and revise it accordingly.[69] It was found out that if customers arrive frequently, and revision opportunities are infrequent, then any equilibrium will have long-industry profits that will be arbitrarily close to monopolistic level.[70]

VI. CHALLENGES & COUNTER MEASURES

Although the pricing algorithms have their own virtues yet their negative impact on the market should be overlooked. As we have seen, complex algorithms allows to achieve novel forms of coordination where the current competition tools may not be sufficient. While the use of algorithms to facilitate an express collusion can be tackled by current antitrust tools, the algorithmic tacit collusion represent the most challenging task before competition authority.

Interestingly, tacitly collusive outcome takes place both at the humans and machine levels. Market participant design machine unilaterally to reflect a interdependent price strategy. At human level, the intent lies in the design of the machine which support conscious parallelism. Algorithmic tacit collusion reflect an artificial alteration of market characteristic viz. market transparency to sustain enhance conscious parallelism. Whether such conduct trigger antitrust intervention? Under the current law as it stands, such anti-competitive intent to enhance tacit collusion cannot be challenged absent illegality of tacit collusion.

Does this calls for revisiting the concept of 'agreement' to include conscious parallelism? This question opens the half a century debate between Richard Posner and Donald Turner. Richard Posner has advocated an approach to widen the scope of agreement to include conscious parallelism. In his words:

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[69] Bruno Salcedo, *Pricing Algorithms and Tacit Collusion* (2016), http://brunosalcedo.com/docs/collusion.pdf.
[70] Id.

> *Tacit collusion is not a unconscious state. If the sales division of a company recommends that it offer a wider variety of products in order to exploit consumer demand more effectively, and the financial division recommends against that course on the ground that it will make it more difficult for the industry to maintain 'healthy' prices, top management can be in no doubt of the significance of its actions if it adopts the financial division's recommendation.[71]*

Similarly, Turner also believes that concept of 'agreement' should not be limited to explicit communication or meeting of mind and it includes the interdependent action of competitors in the market. However, unlike Posner, Turner thought that punishing competitors for independent rational action unlikely to serve any purpose.[72] Later, Posner himself walked back from his argument.[73]

Today, the advent of algorithm has rekindle the debate on the legality of conscious parallelism. The algorithms comes with enhance ability to sustain tacit collusion in a way better than human. At this stage, it is very difficult to conclude that algorithmic tacit collusion should be included in the definition of agreement.

In EU Competition law, the supra-competitive prices as a result of conscious parallelism can be challenged under the collective dominance. The criteria to establish collective dominance includes transparency, easily monitored market, the existence of a 'retaliation' mechanism detaining attempt to unilaterally divert from parallel strategy.[74] This criteria correspond to a market condition resulted through use of pricing algorithms. While the

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[71] Richard A Posner, *Oligopoly and the Antitrust laws: A suggested Approach,* 21 STAN. L. REV. 1562, 1576-92 (1969).

[72] Donald F. Turner *The Definition of Agreement Under the Sherman Act: Conscious Parallelism and Refusal To Deal,* 75 HARV. L. REV. 655, 671 (1962).

[73] Richard Posner, *Review of Kaplow,* Competition Policy and Price Fixing, 79 ANTITRUST L.J. 761, 763 (2014).

[74] Airtours plc v. commission, Case T-342/99; P Bertelsmann AG and Sony Corporation of America v. Independent Music Publishers and Labels Association, Case C-413/06.

United States now considering use of Section 5 of the Federal Trade Commission Act to prohibit unfair competition which may be the result of algorithm design to facilitate tacit collusion.

What about the cases which do not fulfill the above provisions. One of the approaches suggested was to push companies to 'compliance by design'.[75] Here companies would be held liable for designing algorithms which can facilitate information exchange among competitors. However, without a well-developed practice, it is very difficult for competition authority to audit PC algorithms.[76] Other approaches includes to create a new offence. However, it is very difficult to determine what to prohibit. Whether *abuse of excessive transparency* or *algorithmic tacit collusion.*[77]

The competition authorities can also adopts mechanism to prevent the emergence of oligopolistic markets. One of the way is to prohibit combination which can result in emergence of oligopolistic markets which can facilitate conscious parallelism. Competition authorities may also engage in competition advocacy or attempt to remove structural barriers from the markets.

VII. CONCLUSION

Everything has two facades so does algorithms. The computer algorithms have not only changed the way we transact but also redefined the nature of the market. Deliberating upon the oft-debated issues of Conscious parallelism, the authors attempted to show the possible detachment between the actions of algorithms and the human designers.

The economic rationale behind collusion is complex and nuanced and bringing automated pricing algorithms to such scenario further increases the

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[75] Margrethe Vestager, *Algorithms and Competition,* 18th Conference on Competition, Berlin, (Mar. 16, 2017), https://ec.europa.eu/commission/commissioners/2014-2019/vestager/announcements/bundeskartellamt-18th-conference-competition-berlin-16-march-2017_en

[76] OECD, *it's a feature, not a bug: on learning algorithms and what they teach us – note by Avigrdor Gal,* DAD/COMOP/WD(2017)50, (June 7, 2017).

[77] Vaclav Smejkal, *Cartels By Robots-Current Antitrust Law In Search of An Answer*, 4 J. FOR THE INT'L & EUR. LAW. ECONOMICS & MARKET INTEGRATION (2017).

complexity. As such, it is no surprise that there is no simple black and white binary answer of Yes or No to the question of whether the use of automated algorithms will increase the likelihood of collusion. Collusion, whether between human conspirators or among automated pricing algorithms, can and should be analyzed using the economic theory that has been honed and refined over the decades.

The authors in the paper recognized two major mechanisms through which algorithms can challenge antitrust investigators. Firstly, algorithms are fundamentally affecting market conditions, resulting in high price transparency and high-frequency trading that allows companies to react fast and aggressively. These changes in digital markets, if taken to a certain extent, could make collusive strategies stable in virtually any market structure. Secondly, by providing companies with powerful automated mechanisms to monitor prices, implement common policies, send market signals or optimize joint profits with deep learning techniques, algorithms might enable firms to achieve the same outcomes of traditional hardcore cartels through tacit collusion.

Considering the problems discussed above and applying the current antitrust enforcement techniques, it can be validly said that current competition law needs to be revamped in order to assimilate the technical challenges of the 21st century.

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