# A Scientific Judicial Perspective can solve many hurdles of practical application of AI 'expert system' for judicial decision making.

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## ABSTRACT

*'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 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.

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## 1. 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 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.

## 2. 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

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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).

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 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]

Below is a slightly modified informative list of currently available legal AI applications given by Dabass & Dabass[12];

| Sl. | Purpose | Description of Application | Software/Firm |
|---|---|---|---|
| 1. | Due Diligence | These are AI systems that help legal professional to background review, review of multiple legal documents, risk assessment, on behalf of clients to perform due diligence. | Kira Systems, Leverton, eBrevia, Ross Intelligence, JP Morgan, Thought River, Law Geex, Judicata, Legal Robot, Casetext's CARA. |

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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 xTalk to Model the Alien Tort Claims Act and Torture Victim Protection Act*, 11 RICHMOND JOURNAL OF LAW & TECHNOLOGY (2004).

[7] Andrzej 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 (Peter H. Sydenham & Richard Thorn eds., 2005).

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

[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.

[12] Jyoti Dabass & Bhupender Singh Dabass, *Scope of Artificial Intelligence in Law*, 2018060474 PREPRINTS (WWW.PREPRINTS.ORG) (2018).

| 2. | Prediction Technology | AI system that predicts the outcome of a litigation. | Everlaw, DISCO, Catalyst, Exterrro, Brainspace discovery, Intraspexion, Premonition. |
|---|---|---|---|
| 3. | Legal Analytics | AI driven data analysis system that helps to find relevant case laws, statutes etc for better insight and litigation strategy. | Lex Machina, Ravel Law |
| 4. | Document Automation | AI driven system used for creation of various kinds of legal documents, such as agreements, contracts, wills, etc with minimal human intervention. | The report, perfect NDA |
| 5. | Intellectual Property | AI tools to guide laywers to analyze large IP portfolios and to draw insights from the context. | Trademark Now, ANAQUA Studio, Smart Shell |
| 6. | Management Systems | AI driven management tools that helps in billing, court diary management, task reminder etc. | Bright flag, Smokeball |

## 3. 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 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 recognised but also applauded in judicial system.[13] There is at least some valid argument blaming the judges for the 'uncertainty',[14] 'vagueness' and 'lack of precise standards'.[15] 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.[16] 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,[17] 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.[18] Singular correctness of judicial decision is questionable.[19] 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 decision of an individual judge.[20] I strongly disagree with the argument advanced by Anthony D'Amato, that no single legal

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

[14] Id. at.

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

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

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

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

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

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

theory or any combination of legal theory dictates or constraint judicial decision.[21] 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"[22] 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'.[23] 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.[24] This cognitive process sometimes results into skewing of facts and premises to support a chosen decision.[25] A continuous attempt has been made to theorize and to explain the process of judicial decision making, such as '*process theory*',[26] '*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.[27] However, no single model of judicial decision making, so far, can claim standalone success.

## 4. 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

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[21] Anthony D'Amato, *Can Any Legal Theory Constrain Any Judicial Decision?*, 43 MIAMI LAW REVIEW (1989).
[22] Oxford University Press, *English Oxford Living Dictionaries*, https://en.oxforddictionaries.com/definition/theory.
[23] Anthony R. Blackshield, *Five Types of Judicial Decision*, 12 OSGOODE HALL LAW JOURNAL (1974).
[24] 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).
[25] Dan Simon, *A Third View of the Black Box: Cognitive Coherence in Legal Decision Making*, 71 UNIVERSITY OF CHICAGO LAW REVIEW (2004).
[26] Carl Baar, *Using Process Theory to Explain Judicial Decision Making*, 1 CANADIAN JOURNAL OF LAW AND SOCIETY (1986).
[27] Simon, RUTGERS LAW JOURNAL, (1998).

as Machine Learning (ML)[28], Natural Language Processing (NLP)[29], Blockchain[30], Neural Network[31], 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.[32] 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',[33] where the possibility of building a machine was discussed back in 1956.[34] 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,[35] medical diagnosis, researching archaeology,[36] 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

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[28] "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, MARK HOWARD, MACHINE LEARNING AN INTRODUCTION FOR BEGINNERS, USER GUIDE TO BUILD INTELLIGENT SYSTEM (Amazon Digital Services LLC. 1st ed. 2018).

[29] "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.

[30] "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).

[31] "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.

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

[33] 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'.

[34] 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/.

[35] 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/.

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

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.[37] What will happen in a full AI zone, whether it will create a utopian or dystopian world is not known at present,[38] for that we have to depend on an educated guess, but resistance to AI is presumably costly.[39] 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.[40]

## 5. 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.[41] 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."[42]

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[37] Juan Carlos Augusto, Past, present and future of ambient intelligence and smart environments (Springer 2009).
[38] Spyros Makridakis, *The forthcoming Artificial Intelligence (AI) revolution: Its impact on society and firms*, 90 FUTURES (2017).
[39] Talty. 2018.
[40] Dirk Helbing, et al., *Will democracy survive big data and artificial intelligence?*, *in* TOWARDS DIGITAL ENLIGHTENMENT (2019).
[41] Ian Langford, *Fair Trial: The History of an Idea*, 8 JOURNAL OF HUMAN RIGHTS (2009).
[42] Selvi and Ors. V. State of Karnataka, (2010) 7 SCC 263.

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.[43] 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 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 narcoanalysis, 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.[44] 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

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[43] Justice K.S. Puttaswamy V. Union of India, (2017) 10 SCC 1.
[44] Faizal N Muhammad, *Scientific Enquiry: A Popperian Account*, 4 THE RESEARCHERS' INTERNATIONAL RESEARCH JOURNAL (2018).

it, the science of judicial decision making. Any approach to theorize the science of judicial decision making should be inter-disciplinary.

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.

$P_1$:      If (confession)

         AND

         If (involuntary)

         THEN

         It is self-incrimination

$P_2$:      If (it is self-incrimiation)

         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*'[45]. Future legal field will be dealing with a simulated world in digital form.[46] This advancement of science and technology is inseparable from society itself. Th 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

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[45] '*Digital footprint*' or '*digital shadow*' refers to one's unique set of traceable digital activities, actions, contributions and communications that are manifested on the internet or on digital devices - WIKIPEDIA

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

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, any time, 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.[47] 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 maximise automation, new types of legal rights have emerged; such as 'right to be forgotten',[48] 'right to explanation',[49] etc. There is also concern over algorithmic profiling for resource allocation, which sometime result into discriminatory practice.[50]

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 blackbox algorithms.

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[47] 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.

[48] "The right to be forgotten is a concept that has been discussed and put into practice both in the European Union (EU) and, since 2006, in Argentina. The issue has arisen from desires of individuals to determine the development of their life in an autonomous way, without being perpetually or periodically stigmatized as a consequence of a specific action performed in the past." - Wikipedia

[49] "In the regulation of algorithms, particularly artificial intelligence and its subfield of machine learning, a right to explanation (or right to *an* explanation) is a right to be given an explanation for an output of the algorithm. Such rights primarily refer to individual rights to be given an explanation for decisions that significantly affect an individual, particularly legally or financially. For example, a person who applies for a loan and is denied may ask for an explanation, which could be 'Credit bureau X reports that you declared bankruptcy last year; this is the main factor in considering you too likely to default, and thus we will not give you the loan you applied for'." - Wikipedia

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

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.[51] 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'.[52]

Tribe's[53] two arguments, against use of probability, 'complexity of mathematical arguments beyond the common man's understanding' and 'societal', does not fetch much confidence.[54] The human brain is also a computer of a different kind that follows input-output system.[55] Neural Network in AI system mimics the working of the human brain at conceptual level. Subjects of 21st century 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' 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."[56]

While discussing the issue of AI assisted decision making in public sector, Marion Oswald[57] 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

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

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

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

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

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

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

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

Supreme Court of India, Justice Jasti 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."[58]

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.[59] Tania Sourdin[60] 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.[61] AI assisted judicial decision making has potential to solve the most notorious problem of Indian judiciary, the delay; proper implementation of AI may ensure a sustainable judicial system.[62]

## 6. Conclusion:

Judiciary must be prepared to meet up the need of the future and to deal with future problems.[63] 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.[64] 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,[65] 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

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[58] 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/.

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

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

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

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

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

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

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

perspective can solve many hurdles of practical application of AI ''expert system'' for judicial decision making.

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