RESEARCH PAPER ON ARTIFICIAL INTELLIGENCE AND CRIMINAL JUSTICE SYSTEM

Shiwani[1]

Dr. Namah Datta[2]

UILS CHANDIGARH UNIVERSITY

ABSTRACT

This research work focuses on how criminal processes have changed as a result of the advancement of digital technologies in the global arena, where artificial intelligence has a vital role to play. Researcher show that the United States uses a range of digital technologies in court cases, and that legal start-ups that specialise in artificial intelligence (AI) are able to predict the details of a future court ruling with a high degree of certainty. (AI) in the Indian scenario in 2015 Maharashtra police started using AI technologies in crime control by acquiring the "predictive policing software". As a part of the scheme, the department has also procured Universal Forensic Extraction Devices (UFED) of leading global brands used in digital forensics and investigation. Such devices can retrieve data, even deleted data, from mobile phones, social networking sites, hard disks, and various other devices. They can also recall audio-visual data from drone and CCTV cameras.

It is evident that the majority of Member States of the European Union (EU) have already incorporated cutting-edge technology into their legal systems and legal support. However, a more thorough examination of how artificial intelligence complies with the principles of the European Convention on Human Rights is necessary in order to use it in court (ECHR). The European Ethical Charter on the Use of Artificial Intelligence, which specifies five essential standards for the use of AI in legal proceedings, may be helpful in relation to the aforementioned. The most current advancements and uses of AI in the realm of criminal justice are the main topics of this research.

Keywords: artificial Intelligence, criminal justice system, leadership, digital technologies

[1] Research Scholar, Chandigarh University, Mohali, Punjab, 140413
  shivanirawal414@gmail.com
[2] Associate Professors, Chandigarh University, Mohali, Punjab, 140413
Namah.e10445@gmail.com

I.   INTRODUCTION

In recent years, the science of criminal procedure law has been actively addressing the concerns surrounding the use of artificial intelligence (AI). Artificial intelligence (AI) is a concept that is not covered by the law; rather, it is defined in terms of scientific theories, practises, and approaches that all seek to replicate human cognitive abilities through computers. A number of Russian authors present artificial intelligence in the form of a machine that is capable of "acting, determining its actions, and evaluating their consequences without full control on the part of a human" in accordance with the information processing outcomes from the external environment.[3]

Some authors suggest imagining computer software that mimics the human brain and has an integrated learning mechanism as artificial intelligence. To put it another way, experts from Russian science and practise concur that artificial intelligence is necessary for machines to take the place of people in solving complex problems, which will undoubtedly enhance the quality of criminal proceedings and make them more transparent, impartial, and fair. This is done in acknowledgement of artificial intelligence's growing significance in contemporary law.

Research literature typically emphasises the need for a theoretical grasp of the artificial intelligence phenomenon. Artificial intelligence is usually regarded to be a body of theories and techniques used to create devices that can mimic intelligence. It is suggested to make a distinction between strong, moderate, and weak artificial intelligence. Strong artificial intelligence will allow for the simulation of the entire world as well as the autonomous resolution of complex problems. Due to algorithmic processing, weak artificial intelligence will improve the performance of present information systems, but moderate artificial intelligence will enable outstanding performance in a certain field of study.[4]

According to some authors, is what AI is described as. The term "AI" is applied to computer systems that mimic the cognitive processes that people associate with other human minds in other scholarly publications. This first relates to the training and problem-solving aspects.[5]

II.   ARTIFICIAL INTELLIGENCE

AI is a branch of computer science that is developing quickly. John McCarthy, who is known as the founder of artificial intelligence, coined the phrase "the science and engineering of constructing intelligent machines" in the middle of the 1950s (see sidebar, "A Brief History of Artificial Intelligence"). Conceptually speaking, artificial intelligence (AI) refers to a machine's capacity to independently observe, react to, and carry out tasks that ordinarily call for human intelligence and decision-making processes, but without direct human involvement.

One facet of human intelligence is the ability to learn through experience. Machine learning, which simulates this power and enables hardware and software to learn from experience, uses artificial intelligence (AI). From

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[3] Grishin D, Naumov V (2015) Koncepciya zakona o robototekhnike. https://vc.ru/flood/20724-law-robots. Accessed on 04 January 2023.

[4] Barr A, Feigenbaum EA, The Handbook of artificial intelligence. Vol. 1 (1981).

[5] Russell SJ, Norvig P, Artificial Intelligence: A Modern Approach. (Upper Saddle River, New Jersey, 2009).

the perspective of criminal justice, pattern recognition is essential. Humans are good at seeing patterns, and with practise, we can learn to tell apart a variety of things, people, complex human emotions, facts, and circumstances on a regular basis. This human ability is what artificial intelligence (AI) in computer hardware and software attempts to mimic. Self-learning algorithms, for example, use data sets to learn how to recognise people from their photographs, perform difficult computational and robotics jobs, understand online buying trends, recognise medical disorders from difficult radiological scans, and anticipate the future.

III.   APPLICATIONS OF AI FOR CRIMINAL JUSTICE AND PUBLIC SAFETY

Numerous methods of using AI as a tool for public safety are being investigated. In both the public and private sectors, facial recognition is one particular AI application that is widely used. For instance, intelligence analysts frequently use face photos to determine a person's identify and whereabouts. It takes a lot of time and effort to thoroughly review the enormous amount of potentially important photographs and videos, and there is a chance that human error will occur because of exhaustion and other circumstances. Machines, unlike people, never get tired.[6]

In order to maintain safe and effective commuter traffic over a variety of locations and weather, lighting, and traffic conditions, the U.S. Department of Transportation is also researching, developing, and testing automatic traffic accident detection based on video in an effort to increase public safety. The application of AI algorithms in medicine to analyse radiological images may have significant ramifications for the fields of criminal justice and medical forensics for determining the cause and manner of death.[7] AI algorithms have also been explored in various disciplines in forensic science, including DNA analysis."

AI is also rapidly emerging as a key fraud detection technology. Internet corporations like PayPal prevent fraud attempts by regularly training their fraud detection algorithms with large amounts of data to identify and forecast abnormal patterns and pick up on new patterns.[8]

IV.   NIJ'S ARTIFICIAL INTELLIGENCE RESEARCH PORTFOLIO

The four areas of public safety video and image analysis, DNA analysis, gunshot detection, and crime forecasting make up the majority of the AI research that NIJ funds.

i.   Public safety video and image analysis

Video and image analysis is used by the criminal justice and law enforcement sectors to collect information about individuals, places, and behaviours to support criminal investigations. However, video and image information processing requires a significant investment in subject matter expertise and is extremely labor-intensive. Video and image analysis is also prone to human mistake because of the vast volume of information, the speed at which technology like smartphones and operating systems are evolving, and the lack of qualified personnel with the knowledge to manage such information.

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[6] The Intelligence Advanced Research Projects Activity, "Janus," Washington, DC: Office of the Director of National Intelligence, *Available at:* https://www.iarpa.gov/index.php/ research-programs/janus. Last accessed on 04 January 2023
[7] Rachel Z. Arndt, "Artificial Intelligence Takes on Medical Imaging," *Transportation Hub* (July 8, 2017).
[8] Eric Knorr, "How PayPal Beats the Bad Guys With Machine Learning," *Ahead of the Curve, InfoWorld* (April 13, 2015).

AI-based technologies enable us to remedy such human flaws and perform jobs at an expert level. Traditional software algorithms are limited to certain parameters, such as eye colour, eye shape, and distance between the eyes, for facial identification and pattern analysis. Beyond what humans may imagine, AI video and image algorithms learn difficult tasks while also independently creating and establishing their own complex facial recognition features and parameters. These algorithms may be able to identify firearms and other things, recognise faces, match objects to people, and identify complex events like accidents and crimes (in progress or after the fact). In response to the demands of the criminal justice and law enforcement sectors, NIJ has made investments in a variety of areas to improve the speed, quality, and specificity of data collection, imaging, and analysis as well as the quality of contextual information.

In order to understand the potential benefits of AI in terms of speed, researchers at the University of Texas at Dallas, with funding from the NIJ and in partnership with the FBI and the National Institute of Standards and Technology, are evaluating facial identification by humans and examining strategies for effectively comparing AI algorithms and expert facial examiners. According to preliminary results, when the recognition period is restricted to 30 seconds, AI-based facial recognition algorithms developed in 2017 perform on par with human facial examiners. These findings have the potential to boost productivity by enhancing the accuracy of trained human face examiners by applying AI-based algorithms as a "second pair of eyes."

ii. DNA analysis

AI can benefit the legal system from a scientific and evidence-processing perspective. In the case of forensic DNA testing, which over the past few decades has had a remarkable impact on the criminal justice system, this is particularly true.

When committing a crime, contact with persons or items can convey biological material like blood, saliva, semen, and skin cells. The sensitivity of DNA analysis has increased along with DNA technology, enabling forensic professionals to find and use DNA evidence that was previously inoperable due to low levels, degradation, or other factors. For instance, laboratories are increasingly receiving decades-old DNA evidence from serious crimes like sexual assaults and cold instances of homicide for examination. Greater sensitivity allows for the detection of lower amounts of DNA, which opens the door to the potential of DNA detection.

Even at very low levels, from numerous donors. For crime laboratories, these and other innovations are creating new difficulties. For instance, when utilising very sensitive procedures on pieces of evidence, it may be feasible to find DNA from numerous perpetrators or from someone who was not at all engaged in the crime. This brings up the question of how to interpret DNA mixes and the necessity of disentangling and locating (or "deconvoluting") individual profiles in order to generate crucial investigation leads for law enforcement.

iii.   Gunshot detection

The discovery of pattern signatures in gunshot analysis is another use for AI algorithms. In one project, the National Institute of Justice funded Cadre Research Labs, LLC "based on the observation that the content and quality of gunshot recordings are influenced by firearm and ammunition type, the scene geometry, and the recording device used" to analyse audio files of gunshots from smartphones and other smart devices. The Cadre scientists are developing algorithms that could help law enforcement with investigations by identifying gunshots, distinguishing muzzle blasts from shock waves, determining shot-to-shot timings, counting the number of firearms present, allocating specific shots to firearms, and calculating probabilities of class and calibre.[9]

iv.   Crime forecasting

Large amounts of data are used in the intricate process of predictive analysis to forecast and develop future outcomes. Police, probation officers, and other professionals who work in the field of criminal justice are primarily responsible for this task and must develop their skills over many years.[10]

A tremendous quantity of legal precedent, social data, and media data can be used by AI to advise rulings, detect criminal enterprises, forecast and identify those who are at danger from criminal enterprises, and more. The University of Pittsburgh is investigating and developing computational methods for statutory interpretation that may expedite and enhance the accuracy of the work done by judges, attorneys, prosecutors, administrative staff, and other professionals. These researchers are receiving funding from the NIJ. Theoretically, a computer programme can automatically recognise specific language kinds that are significant for legislative interpretation. The goal is to develop an automatic interpretation proof-of-concept expert system for cybercrime.

V.   FUTURE OF ARTIFICIAL INTELLIGENCE IN CRIMINAL JUSTICE

New AI criminal justice applications could emerge every day, opening the door to potential future opportunities to support the criminal justice system and, ultimately, increase public safety.

Movement and pattern analysis, video analytics for integrated facial recognition, the detection of people in multiple locations using closed-circuit television or across multiple cameras, and object and activity detection may all be used to help solve crimes by identifying suspects and preventing them from happening. Due to the massive amounts of data being produced by technologies like cameras, video, and social media, AI may be able to identify crimes that would otherwise go undetected and contribute to increased public safety by looking into likely criminal actions. The public's confidence in the criminal justice system and law enforcement will

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[9] "Development of Computational Methods for the Audio Analysis of Gunshots at Cadre Research Labs, *LLC, NIJ* 2016."

[10] "Effects of Human Factors on the Accuracy of Fingerprint Analysis, National Institute of Justice, *Available at:* https://nij.gov/topics/forensics/evidence/ impression/Pages/human-factors.aspx., last accessed on 03 January 2023"

rise as a result. Crime laboratories around the country may benefit from AI in areas like complex DNA combination analysis.

Analysis of data patterns may be used to thwart, lessen, and punish illegal activities. By preventing victims and potential offenders from turning into criminals, algorithms may also help criminal justice professionals safeguard the public in ways that were previously unimaginable.

Another advantage of AI technology is its potential to provide situational awareness and context to law enforcement, improving officers' safety through more knowledgeable responses to potentially dangerous situations. Additionally, robotics and drone technology could be utilised to monitor public safety, be combined into bigger public safety systems, and provide a safe alternative to endangering law enforcement and the general population. Robotics and drones may perform recovery chores, provide valuable intelligence, and assist criminal justice employees in unanticipated ways.

CONCLUSION

There is no denying that AI is ingrained in every aspect of our life. By using machine learning and AI algorithms, there have already been notable improvements in the areas of healthcare, finance, security, and transportation. It encourages creative decision-making and shortens the backlog in court cases. Additionally, AI helps lawyers and judges conduct fair and open investigations, which has a significant impact on the legal sector. As AI lacks emotional intelligence, it does not follow that it can replace lawyers and judges with modern technology. Prior to AI being widely used in Indian law, it is critical to address worries about potential violations of the constitutionally protected right to privacy.

Since there is currently no legal framework for the collecting and protection of data that can be fed into the system for legal and judicial use, a significant amount of data must be fed into the system in order to employ AI. On the practical front, before integrating AI into the judicial system, legal officers and attorneys will need to receive proper training. Any legal database will require regular updates to include the most recent case laws and judicial trends. As a result, applying AI to the judicial system requires proof and a research-based strategy rather than a hit-and-miss one.

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