International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 11 Issue: 12 | Dec 2024 www.irjet.net p-ISSN: 2395-0072

Artificial Intelligence's Potential To Enhance The Criminal Justice System

Ananya H K[1], Divya N[2], Deepa S S[3], Dilshad Begum K L[4]

[1,2,3,4] *Student, Dept. of ISE, Bapuji institute of engineering and technology, Affiliated to VTU Belagavi, Karnataka, India*

Abstract - The increase in cyberattacks has left the criminal justice system in a state of chaos. Understanding the motivation for crime and combating it is the primary task facing law enforcement officials. This study aims to show how to use artificial intelligence, machine learning, and predictive analysis with soft evidence to forecast crime, use metadata, and classify criminal records that are currently on file. Law enforcement and intelligence services would surely benefit from the database's use in intelligent case investigations. This would enable quicker and more effective investigative processes, which would assist society lower crime. The analyst would also be able to keep an eye on the relationships and recent actions of various criminal components by extracting the precise information from the documentment data. It is possible to comprehend the crime prediction with this research. Researching this topic demonstrates that when the model is given the right data, its chances of producing an accurate forecast are raised. The study also made an effort to identify the psychological components of the offense and the likely reasons why a person would have committed it.

Key Words: information technology legislation, artificial intelligence, criminal justice, law enforcement, prediction algorithms, accuracy, machine learning, motivations, and cyberattacks.

1.INTRODUCTION

In recent years, the science of criminal procedure law has been actively addressing concerns with the use of artificial intelligence (AI). The concept of artificial intelligence (AI) is not governed by laws; rather, it is defined by scientific theories, methods, and practices that seek to replicate human cognitive abilities in computer systems. Based on the outcomes of information processing from the external environment**,** Artificial intelligence**,** according to a number of Russian authors, is a machine that can "act, determine its actions, and evaluate their consequences full control on the part of a human."One According to some authors, computer systems that mimic the human brain and include built-in learning mechanisms might be thought of as artificial intelligence. In other without words, experts in Russian research and practice concur that artificial intelligence is necessary for computers to take the place of people in addressing difficult problems. This will undoubtedly raise the bar for criminal processes and make them more impartial, transparent, and equitable. This is done in recognition of artificial intelligence's growing significance in contemporary law. Research often emphasizes the importance of having a theoretical knowledge of the artificial intelligence phenomenon. books.Most people think of artificial intelligence as a collection of theories and methods for building machines that can think like humans. Three categories—strong, moderate, and weak—are suggested for artificial intelligence. Robust artificial intelligence will enable self-solving of complex issues and world simulation. Weak artificial intelligence will enhance the performance of existing information systems due to algorithmic processing, whereas moderate artificial intelligence will allow for exceptional performance in a certain sector of This is how some authors define artificial intelligence. In other academic journals, the phrase "artificial intelligence" (AI) refers to computer programs that mimic the cognitive processes that people associate with other human min

2. Background

Increased decision-making processes in terms of effectiveness, precision, and objectivity are anticipated when AI is included into the criminal justice system. Concerns of privacy, prejudice, and possible unforeseen repercussions are also brought forward. The purpose of this paper is to provide a thorough overview of artificial intelligence and its present uses in criminal justice.

Artificial Intelligence

AI is a quickly developing area of computer science. The man who is recognized as the creator of artificial intelligence, John McCarthy, 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"). The ability of a computer to independently observe, react to, and carry out tasks that normally call for human intelligence and decision - making processes is known as artificial intelligence (AI), and it can do so without the direct assistance of a human. One facet of human intelligence is the ability to learn by experience. Machine learning, which simulates this ability and enables hardware and software to learn from experience, uses artificial intelligence (AI). From the perspective of criminal justice, pattern recognition is essential. Humans are pattern - spotters, thus with practice, they can discern between a wide

range of objects, people complex human emotions, facts, and circumstances on a regular basis. The goal of artificial intelligence (AI) in computer software and hardware is to mimic human intelligence. Self - learning algorithms, for example, use data sets to learn how to recognize faces in photographs, perform difficult robotics and computer jobs, understand online shopping habits, recognize medical diseases from difficult radiological pictures, and make predictions about the future.

Application for AI in Criminal Justice and Public Welfare

Numerous strategies for using AI as a tool for public safety are being investigated. One such AI application that is widely used in both the public and business sectors is facial recognition. For instance, intelligence analysts frequently utilize facial photos to discover and identify people. It takes a lot of time and effort to go through all of the potentially important pictures and videos, and human mistake can occur for a variety of reasons, including fatigue. Machines, in contrast to humans**,** never tire. 4 In an effort to improve public safety, the U. S. Department of Transportation is also investigating, creating, and testing automatic traffic accident detection based on video in order to maintain safe and efficient commuter traffic over a range of locations and weather, lighting, and traffic conditions. The use of AI algorithms in the medical industry to analyze radiological pictures could have a big impact on medical forensics and criminal justice in terms of figuring out how and why someone died. 5 In forensic science, AI algorithms have also been studied in a variety of domains, including DNA analysis. Furthermore, AI is swiftly becoming as a crucial instrument for fraud detection. By consistently adding massive volumes of data to their fraud detection algorithms, online businesses like PayPal are able to both detect and predict unusual trends as well as identify new ones, thus foiling fraudulent attempts. 6

NIH'S Artificial Intelligence Research Portfolio

The majority of AI research funded by NIJ is focused on four areas: gunshot detection, crime predicting, DNA analysis, and public safety video and image analysis.

i.Public safety video and image analysis

The criminal justice and law enforcement sectors employ video and image analysis to gather data about people, locations, and behaviors to help criminal investigations. However, processing information from images and videos is very labor - intensive and demands a large investment in subject matter expertise. Due to the large amount of data, the rapid advancement of operating systems and smartphones, the scarcity of trained staff with the necessary skills, and the volume of information, video and image analysis is also prone to human error. With the help of AI - based technology, we can overcome these shortcomings in humans and carry out tasks expertly. For facial recognition and pattern analysis, traditional software algorithms are restricted to specific criteria like eye color, eye shape, and eye distance. AI video and image algorithms are capable of learning challenging tasks and autonomously generating and building their own complex facial recognition characteristics and parameters, far beyond the capabilities of human intelligence. These algorithms might be able to recognize faces, match objects to people, detect complicated events like crimes and accidents (in progress or after the fact), and identify firearms and other objects. NIJ has invested in a number of areas to enhance the speed, quality, and specificity of data collecting, imaging, and analysis as well as the caliber of contextual information in response to the demands of the criminal justice and law enforcement sectors. With funding from the NIJ and in collaboration with the FBI and the National Institute of Standards and Technology, researchers at the University of Texas at Dallas are assessing facial recognition by humans and exploring methods for efficiently comparing AI algorithms and skilled facial examiners in order to comprehend the potential speed benefits of AI.

Preliminary findings show that AI - based face recognition algorithms created in 2017 perform on par with human facial examiners when the recognition period is limited to 30 seconds. These results suggest that using AI - based algorithms as a "second pair of eyes" to improve the accuracy of skilled human face examiners could increase productivity.

ii. DNA analysis

Artificial intelligence can benefit the legal system from a scientific and evidence-processing perspective. This is particularly true in the case of forensic DNA testing, which during the past two decades has significantly impacted the criminal justice system. When committing a crime, biological material including blood, saliva, semen, and skin cells can be transferred through contact with persons or items. The sensitivity of DNA analysis has increased along with DNA technology, enabling forensic specialists to find and use DNA evidence that was previously useless due to low levels, degradation, or other factors. For instance, labs are increasingly receiving DNA evidence from significant crimes, including decades-old sexual assaults and cold case homicides, for examination. Greater sensitivity allows for the detection of smaller amounts of DNA, increasing the potential for DNA detection. even in minuscule amounts, from several donors. Crime labs are facing new difficulties as a result of these and other developments. For instance, DNA from numerous criminals or from a person unrelated to the crime could be discovered utilizing incredibly sensitive techniques on evidence. This brings up the question of how to interpret DNA mixtures and the necessity of identifying and dissecting individual profiles to generate crucial leads for investigations by law enforcement.

iii. Identification of Gunshots

The detection of pattern signatures in gunshot analysis is another use case for AI algorithms. In one project, the National Institute of Justice awarded funding to Cadre Research Labs, LLC "based on the observation that the type of firearm and ammunition, the geometry of the scene, and the recording device used influence the content and quality of gunshot recordings" through the analysis of gunshot audio files from smartphones and other smart devices. The Cadre scientists are developing algorithms that can detect gunshots, distinguish between muzzle explosions and shock waves, count the quantity of firearms in the area, link certain rounds to certain rifles, and calculate class and caliber probability. Law enforcement may find these algorithms useful in their investigations.

iv. Crime Forecasting

Predictive analysis is a complex technique that uses a lot of data to estimate and produce future events. This task is mostly the responsibility of police, probation officers, and other criminal justice professionals, who must hone their abilities over many years. 8. Using a wealth of legal precedent, social data, and media data, artificial intelligence (AI) may be used to find illegal enterprises, predict and identify those who are at danger from criminal enterprises, and recommend decisions. To enhance and expedite the work of professionals like judges, lawyers, prosecutors, and administrative staff, the University of Pittsburgh is investigating and developing computational methods for statutory interpretation. These researchers are receiving money from the NIJ. Theoretically, a computer system could recognize specific language kinds that are crucial for reading laws automatically. The goal is to develop a proof-of-concept expert system that can automatically interpret cybercrime.

Criminal justice cycle:

A representation of these tools is unavoidably lacking in the flowchart that follows. A major contributing factor is the intentional lack of transparency. Due to trade secret carveouts in Open Government laws and comparable obstacles in evidentiary and discovery standards, affected individuals frequently lack knowledge about the technologies used by the jurisdictions in which they reside. The following explanations, documents, and chart illustrate which tools are used where. They also show the results of Open Government requests, news articles that frequently reveal a problematic use of one of the tools, and the patchwork of jurisdictions that are occasionally forthright about the tools they use.

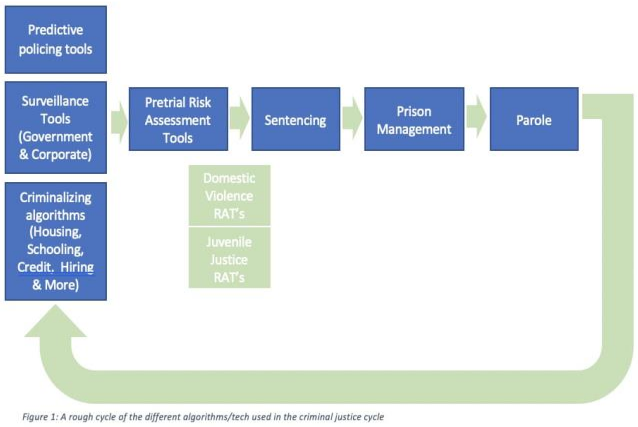

Figure: A rough cycle of the different algorithms /techniques used in the criminal justice cycle

3.Future of Artificial Intelligence in Criminal Justice

AI applications for criminal justice may be emerging daily, which could result in further opportunities to support the criminal justice system in the future and ultimately enhance public safety. Movement and pattern analysis, video analytics for integrated facial recognition, closed-circuit television for detecting people across multiple cameras or locations, and object and activity detection can all be used to help investigate crimes by identifying suspects and preventing crimes before they occur. Artificial intelligence (AI) may be able to identify crimes that would otherwise go undetected and improve public safety by looking into possible criminal activities because of the massive amounts of data produced by gadgets like cameras, video, and social media.

The public will thus have greater trust in law enforcement and the criminal justice system. Crime laboratories around the country may benefit from AI for jobs like complex DNA combination analysis. By analyzing data trends, illegal conduct can be stopped, curbed, and penalized. By keeping victims and potential offenders from turning into criminals, algorithms may also help criminal justice professionals in ways that were previously unimaginable. Law enforcement may benefit from AI's capacity to provide context and situational awareness since it would allow officers to react to potentially dangerous situations more intelligently and safely.

Additionally, robots and drones can be used to monitor public safety, be incorporated into broader public safety systems, and be presented as a safe alternative to endangering the public and law enforcement. Robots and drones could provide valuable intelligence, aid in recovery efforts, and provide unexpected assistance to criminal justice personnel.

Criminal justice system:

Provisions	Bhartiya Nyaya Sanhita Bill 2023	Bharatiya Nagarik Suraksha Sanhita Bill 2023	Bharatiya Sakshya Bill 2023
Replaces	Indian Penal Code, 1860	Criminal Procedure Code, 1898	Indian Evidence Act, 1872
Focus	Reflects Indian ethos, justice-oriented	Enhances citizens' protection	Modernizes evidence presentation
Sections	356 sections (replacing 511)	533 sections (160 changed)	170 sections (23 changed)
Women and Children	A separate chapter dedicated to them; New offence: false promise of marriage, Employment etc.; Initiating children into crime made punishable.	Sexual intercourse on false promise of marriage, employment, etc., is a new offence.	
Digital Integration	Expanded definition of documents; Address newer crimes, cyber offences	Digitization of processes	Accepted documents include electronic and digital records, video recordings, emails, etc.
Speedy Trials	Summary trials, time limits	Trial expedited; 90-day window for investigation after chargesheet filing; Witness protection scheme to be made by states; Bail after serving 1/3rd of the maximum sentence for first-time offenders.	Video recording of search and seizure operations by the police
Victim Support	Compulsory status updates of victim support	Protection, timely information	Video recording of search and seizure operations by the police
Terrorism and Organized Crime	New definitions of Terrorism for 1st time; Armed rebellion, separatist activities, organized crimes, etc.; Mob lynching made an offence explicitly	Harsher provisions against gangs	Define and address organized crimes
Fugitive		Trials for fugitives in absentia	
FIR Visit Insights IAS Daily CA	Zero FIR, e-FIR introduced	Zero FIR, e-FIR introduced; community service as punishment	Mandatory digitization of FIR, chargesheets; Mandatory use of Forensic services for offences punishable with 7 or more years
Sedition Law	Repealed		

3. CONCLUSIONS

Without a question, artificial intelligence is present in every aspect of our life. Thanks to machine learning and AI algorithms, there have been notable developments in the domains of healthcare, finance, security, and transportation. It encourages creative decision-making and clears the backlog of court cases. AI also makes it easier for judges and lawyers to conduct fair and open investigations, which has a significant effect on the legal sector. Because AI lacks emotional intelligence, it cannot serve as a judge or an attorney. This is a drawback of modern technology.

Before AI is extensively used in Indian law, it is crucial to address worries about possible infringements of the constitutionally guaranteed right to privacy. Since there is currently no legal framework for the collecting and protection of data that can be put into the system for legal and judicial use, using AI requires a significant volume of data to be fed into the system. Practically speaking, before integrating AI into the legal system, legal officers and lawyers must have the appropriate training. It will always be required to update a legal database with the most recent case laws and judicial trends.As a result, incorporating AI into the legal system requires proof and a systematic approach rather than a haphazard one.

REFERENCES

1. Alexandrov AS, Andreeva OI, Zaitsev OA (2019) On the prospects for the development of Russian criminal proceedings in the context of digitalization. Bulletin of Tomsk State University 448: 199 - 207. doi: 10.17223/15617793/448.

2. Barr A, Feigenbaum EA (1981) The Handbook of artificial intelligence. Vol.1 p.427

3. Egbert S (2018) About discursive storylines and techno - fixes: The political framing of the implementation of predictive policing in Germany. European Journal for Security Research 3 (2): 95–114

4. Ferguson AG (2017) The Rise of Big Data Policing: Surveillance, Race, and the Future of Law Enforcement.

5. Kaplan A, Haenlein M. Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence.

https://www.sciencedirect.com/science/article/pii

/S0007681318301393. Accessed 10 Jan 2020

6. Kehl L, Kessler A (2017) Algorithms in the criminal justice system: Assessing the use of risk assessments in sentencing. http: //nrs. harvard. edu/urn - 3: HUL. InstRepos: 33746041. Accessed 20.01.2020.

7. Neapolitan R, Jiang X (2018) Artificial Intelligence: With an Introduction to Machine Learning. Chapman & Hall/CRC. p.220 p.

8. Nilsson N (1998) Artificial Intelligence: A New Synthesis. Morgan Kaufmann. p.185.

9. Russell SJ, Norvig P (2009) Artificial Intelligence: A Modern Approach. Upper Saddle River, New Jersey. p.178.

10. Stanier I (2016) Enhancing intelligence - led policing: Law enforcement's big data revolution. In: Bunnik A, Cawley A, Mulqueen M, Zwitter A (eds) Big Data Challenges: Society, Security, Innovation and Ethics. London: Palgrave Macmillan, p.97–113.

BIOGRAPHIES

Ananya H K student at Bapuji Institute of Engineering and Technology, Davangere. Affiliation to VTU, Belagavi.

Divya N student at Bapuji Institute of Engineering and Technology, Davangere. Affiliation to VTU, Belagavi.

Deepa S S student at Bapuji of Institute of Engineering and Technology, Davangere. Affiliation to VTU, Belagavi

Dilshad Begum K L student at Bapuji Institute of Engineering and Technology, Davangere. Affiliation to VTU, Belagavi