

Artificial Intelligence as a Tool for Reducing Recidivism in the Criminal Justice System

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ABSTRACT

"In 30 years, a robot will likely be on the cover of Times magazine as the best CEO. Machines will do what human beings are incapable of doing. Machines will partner and cooperate with humans, rather than become mankind's biggest enemy."

– Jack Ma

If you want to assess the progress of any country, one of the best ways is to examine its criminal justice system. If the system demonstrates efficiency, fairness, and effectiveness, it indicates that the country is moving toward development and progress. In the present era, Artificial Intelligence (AI) has emerged as a new milestone that can be utilized to perform a wide range of tasks. AI is not only assisting in the field of computer science but is also proving to be equally effective in many other disciplines. When we talk about criminology, AI has started playing a significant role in supporting the criminal justice system. For instance, in modern times technologies such as facial recognition and fingerprint recognition have become easier and more efficient due to AI, especially through CCTV surveillance systems. Moreover, the reporting and recording of habitual offenders have become much more systematic and convenient. Many things that once seemed impossible are now becoming a reality with the advancement of AI, making the functioning of the criminal justice system more efficient and effective. Progress. In the present era, Artificial Intelligence (AI) has emerged as a new milestone that can be utilized to perform a wide range of tasks. AI is not only assisting in the field of computer science but is also proving to be equally effective in many other disciplines. When we talk about criminology, AI has started playing a significant role in supporting the criminal justice system. For instance, in modern times technologies such as facial recognition and fingerprint recognition have become easier and more efficient due to AI, especially through CCTV surveillance systems. Moreover, the reporting and recording of habitual offenders have become much more systematic and convenient. Many things that once seemed impossible are now becoming a reality with the advancement of AI, making the functioning of the criminal justice system more efficient and effective. Artificial intelligence (AI) increasingly plays a role within law enforcement. According to Hartzog et al., "We are entering a new era when large portions of the law enforcement process may be automated ... with little to no human oversight or intervention."¹The expansion of law enforcement use of AI in recent years can be related to three societal developments: austerity measures and a push toward using more cost-effective means; a growing perception that law enforcement should adopt a preventive or preemptive stance, with an

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¹ Retrieved from Woodrow Hartzog, Gregory Conti, John Nelson, and Lisa A. Shay, "Inefficiently automated law enforcement" (2016) Michigan State Law Review 2015: 1763–1796.

emphasis on anticipating harm; and, finally an increase in the volume and complexity of available data, requiring sophisticated processing tools, also referred to as Big Data.¹

Keywords: Artificial Intelligence, Face Recognition, Digital Trail, Information, Predictive Policing.

Introduction

What Is AI?

AI, simply put, is the desire to make machines as intelligence as humans or even more. The concept dates to the 1960s. British polymath Alan Turing mooted building intelligent machines way back in 1950. His Turing Test, for instance, assesses whether a machine can think like a human or not.

That said, AI formally took shape during a 1956 workshop that was held to explore how machines could be made to simulate aspects of intelligence. The workshop was organized by John McCarthy, at the Dartmouth Summer Research Project on Artificial Intelligence, who is credited with the first use of the term AI in the proposal he co-authored for the workshop with Marvin Minsky, Nathaniel Rochester, and Claude Shannon.²

India got its first look at AI in the 1960s when prof. H.N. Mahabala introduced an AI course at IIT Kanpur. In an interview, Prof. Mahabala recounts computers back then were “flown in and taken by bullock cart to the campus”. Interestingly, it was the very same Prof. Mahabala who mentored Kris Gopalakrishnan- one of the six co-founder of India’s second-largest IT services provider , Infosys Ltd. — at IIT Madras.³

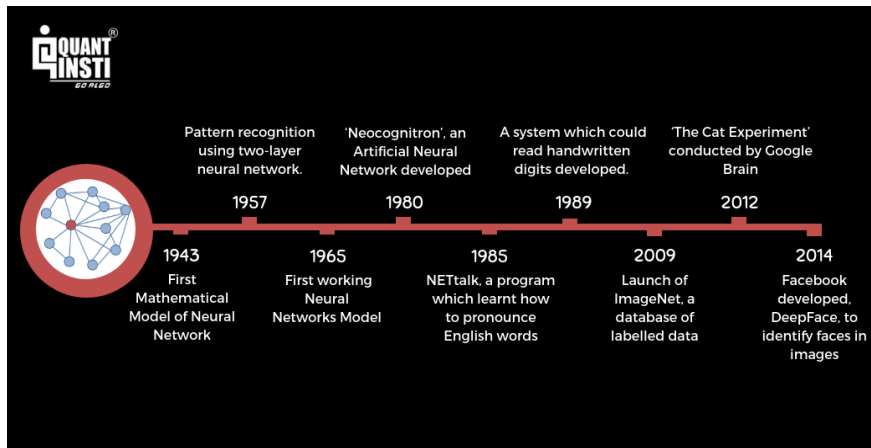


Image:1⁴

Objectives of Research Paper

The objective of this research paper is to examine the role of Artificial Intelligence (AI) in assisting police authorities in the detection and prediction of recidivism through digital trails and data-driven policing methods. The study seeks to analyse how AI-based analytical tools can help law enforcement agencies identify patterns of repeat offending by examining digital footprints such as surveillance data, criminal databases, communication records, and other electronic evidence. By

¹ Retrieved from Alexander Babuta en Marion Oswald, “Machine learning predictive algorithms and the policing of future crimes: governance and oversight,” in Policing and Artificial Intelligence, ed John L. M. McDaniel and Ken Pease (London: Routledge, 2021), 214–236; Rosamunde Van Brakel, pre-emptive big data surveillance and its (dis)empowering consequences: the case of predictive policing, in Bartvan der Sloot, Dennis Broeders, and Erik Schrijvers (eds) Exploring the Boundaries of Big Data (Amsterdam University Press, 2016), 117–141.

² AI100. (2016). One hundred year study on artificial intelligence:226 report. Stanford University. Retrieved from <http://ai100.stanford.edu/2016-report>

³ Economic Times. (n.d.). Meet Professor HN Mahabala, the man who mentored India’s IT icon. Retrieved from <http://economictimes.indiatimes.com/tech/ites/meet-professorhn-mahabala-the-man-who-mentored-indias-it-icons/articleshow/53346662.cms>

⁴ Image Source: <https://blog.quantinsti.com/introduction-deep-learning-neural-network/>

analyzing such digital trails, AI systems can assist the police in identifying habitual offenders and assessing the likelihood of re-offending, thereby enabling more proactive and preventive policing strategies.

The study also aims to evaluate how AI-driven policing systems may contribute to improving the overall efficiency and responsiveness of the criminal justice system. By enabling better coordination between police databases and digital evidence sources, AI tools can assist in monitoring repeat offenders and improving crime prevention strategies. Additionally, digital trail analysis may support more effective tracking of offenders and provide stronger evidentiary support in criminal proceedings.

At the same time, the research intends to critically examine the ethical and legal concerns associated with the use of AI in predicting recidivism. Issues such as algorithmic bias, lack of transparency in automated decision-making, data privacy, and accountability for AI-assisted investigations raise important questions about fairness and due process.

Application of Artificial Intelligence Methods in Criminal Detection

• AI in Policing

The application of AI technologies is not restricted to the field of predictive policing. Emerging AI technologies are central to digital systems that can potentially recognise people by the way they look, walk, speak, write and type. AI systems that contain computer vision capabilities and rules to identify relevant patterns are now capable of identifying people (with some margin of error) by their faces (based on eye shape, colour and distance between eyes, among other features); their gait (i.e. walking or running movements); the way they speak (by recognising patterns in their pronunciation, intonation, syntax and accent); gauging their mood on the basis of their facial expressions; their writing style (by patterns in sentence structure, phrasing and spelling for instance); and even by 'reading' their lips where conversations are inaudible (Quijano- Sanchez, 2018; Joh, 2019). Other forms of 'smart' recognition systems include technologies that can identify vehicle registration plates, knives and the sound of gunshots. The accuracy of recognition systems, particularly facial recognition technologies, have increased dramatically in the past five years, frequently beating human recognition capabilities in head-to-head tests (Brundage et al., 2018). It is important to note, however, that they are still capable of error. Facial recognition technologies, in particular, tend to be high on sensitivity (spotting correlations) but low on specificity (being able to reject weak correlations) at present. One facial recognition technology used by a police service in the UK reportedly generated 'false positives' almost 90 per cent of the time (The Guardian, 2018).

In comparison, humans can only retain a relatively limited amount of information and, in the case of digital footage, cannot constantly monitor multiple screens all of the time. Much CCTV goes unwatched or crime-related occurrences are missed due to human error, and humans do not always recognise a face that they have seen before. AI computer systems can potentially maintain constant vigilance, analyse material rapidly, consistently identify known patterns and edit a selection of relevant clips for human operators to review. Moreover, once identified, a networked AI system connected to a web of cameras and other sensors can potentially locate and track the movements of suspects, objects, witnesses and other persons of interest in real-time or use existing recordings to trace their movements and activities hours or days into the past. These capabilities are hugely valuable to police services, completing tasks far more quickly than humans could, and at significant scale.

AI systems can also help police officers with more mundane data inputs. Systems can use natural language processing to transcribe speech to text, translate from one language to another, speed up data entry through auto-complete and predictive text functions, undertake the mass digitisation of case files, and populate numerous linked databases from individual inputs. Huge libraries of digital data can be organised in a matter of seconds, and the information most salient for decision makers can be highlighted and flagged. For instance, an algorithm trained on relevant legal rules could rapidly identify information of relevance for disclosure purposes when it could take an entire team of humans thousands of hours to do the same work. This is particularly attractive to police officers who have a legal duty to pursue all reasonable lines of inquiry, leading both towards and away from a conviction. Reports suggest that, in reality, investigating officers will only utilise a limited amount of 'digital trail' data, if at all, due to the difficulty of collating and interpreting the vast stores of data that make up an individual's digital footprint. As one chief constable recently observed, AI may be 'the only way' that police services can deal with the volumes of digital evidence currently being produced (Deloitte, 2018: 13). Search algorithms can be hugely beneficial in practice too, allowing officers to manually enter characteristics and personal

information, such as an alias, an age range, a suspect's height, a location or even a particular modus operandi into a search engine. Many types of information processing, from the automation of form-filling to file retrieval, can arguably be undertaken by machine learning systems without controversy, unexpected side effects or impacting on fundamental rights in various contexts (Law Society, 2019). Arranged in a human rights-compliant and consensual manner, some AI technologies could contribute to fewer failed cases and renewed public confidence that good investigative police work is occurring (Joh, 2018). They could even be used to help police officers learn within virtual reality training environments and real-time settings with the aid of a virtual personal assistant. AI technologies of varying sorts could ultimately transform and speed up parts of the policing economy. Our concern, and that of our contributors, is that while some predictive and pool AI technologies may have the potential to effect change for the better, others may effect a significant turn for the worse. We all worry about the latter. Much depends on how they are designed and used in practice.¹



Image:2²

Two Types of Facial Recognition

- **Static Facial Recognition**

How does it work:- It uses individual images and compares them to a database of images to find matches. And Who uses it:- Police use it with images captured from CCTV cameras. Law enforcement agencies use this powerful tool to identify suspects. By analysing facial features and unique characteristics, this technology helps narrow down potential matches from a vast database, aiding investigations and enhancing public safety.³

- **Dynamic Facial Recognition**

How does it work:- Face detection primarily focuses on locating and detecting faces within images or videos. It identifies faces based on contrasting features and patterns. It does not store personal data or link faces to specific individuals, primarily focusing on detecting faces without identifying them. It works in real-time, with cameras positioned in public places. Cameras capture images, which AI software processes to locate and compare faces to a database. It can detect multiple faces in one image and scan large crowds, for example, in security systems at airports or stadiums.⁴

- **Criminal Profiling**

Offender profiling or behavioural analysis, is a technique used by law enforcement agencies to identify characteristics, behaviours, and motivations of perpetrators based on crime scene evidence and behavioural patterns. Traditionally, criminal profiling relied heavily on the expertise of experienced investigators and psychologists. However, with the advent of Artificial Intelligence (AI), algorithms can now be employed to analyse vast amounts of data and derive insights into criminal behaviour, aiding investigators in identifying suspects and understanding their motivations.

¹ Retrieved from Predictive Policing and Artificial Intelligence Edited by John L.M. McDaniel and Ken G. Pease For more information about this series, please visit: www.routledge.com/Routledge-Frontiers-of-Criminal-Justice/book-series/RFCJ

² Image source <https://sirixmonitoring.com/blog/facial-recognition-security-camera/>

³ Retrieved from <https://sirixmonitoring.com/blog/facial-recognition-security-camera/>

⁴ Retrieved from <https://sirixmonitoring.com/blog/facial-recognition-security-camera/>

Use of AI Algorithms to Analyse Behavioural Patterns and Characteristics of Criminals: AI algorithms play a crucial role in criminal profiling by analysing behavioural patterns and identifying common traits among perpetrators. These algorithms leverage machine learning techniques to process and analyse diverse datasets, including crime scene evidence, offender characteristics, victim profiles, and historical case data.

By examining patterns in criminal behaviour, AI algorithms can identify similarities and correlations that may not be immediately apparent to human analysts. For example, AI algorithms can analyse the modus operandi (MO) of serial offenders, identifying recurring patterns or signatures that may link seemingly unrelated crimes.

Additionally, AI can analyse linguistic patterns in written communications, such as ransom notes or online postings, to infer characteristics about the perpetrator, such as age, gender, or level of education. Development of Predictive Models to Profile Potential Suspects and Understand Criminal Motivations:

- AI-powered predictive modelling techniques enable law enforcement agencies to develop profiles of potential suspects and understand their motivations. By analysing historical case data and offender characteristics, predictive models can identify common factors associated with specific types of crimes and generate profiles of individuals who may be at higher risk of committing similar offences.
- For example, predictive models can identify demographic factors, such as age, gender, and socioeconomic status that are correlated with certain types of criminal behaviour. These models can also incorporate psychological profiles based on offender characteristics, such as personality traits or past criminal history, to assess the likelihood of reoffending or escalating to more serious crimes.

Ethical Considerations Regarding the use of AI in Criminal Profiling and Potential Biases:

- The use of AI in criminal profiling raises significant ethical considerations, including concerns about privacy, fairness, and potential biases. AI algorithms rely on data inputs to make predictions and recommendations, and if the data used to train these algorithms is biased or incomplete, it can lead to skewed outcomes and discriminatory practices.
- For example, if AI algorithms are trained on historical crime data that reflects systemic biases in law enforcement practices, such as racial profiling or targeting of marginalised communities, it can perpetuate these biases and lead to unjust outcomes. Additionally, the use of AI in criminal profiling raises concerns about privacy infringement and the potential for misuse of personal data. Moreover, the reliance on AI algorithms in criminal profiling may raise questions about the transparency and accountability of decision-making processes. If AI algorithms are used to make decisions that impact individuals' lives, such as determining suspects or allocating resources, it is essential that these algorithms are transparent, interpretable, and subject to scrutiny to ensure fairness and accountability.¹

• **Technology Innovation in India**

The union government has recently informed the Supreme Court that it plans to install AI-Enabled Facial Recognition Systems (FRS) in seven major railway stations across India.

This decision comes in response to a petition filed by the Supreme Court Women Lawyers' Association over the increasing number of crimes against women and shockingly low conviction rates in the country. Responding to the petition, the Ministry of Home Affairs (MHA) submitted an affidavit outlining various measures it plans to implement. These include installing upgraded CCTV cameras with AI-enabled facial recognition and automatic number plate recognition, smart street lighting, and the use of drones to monitor high-risk areas.

The seven major railway stations where this equipment will be first installed are- Mumbai's Chhatrapati Shivaji Maharaj Terminus, New Delhi Railway Station, Howrah Junction and Sealdah Railway Station in Kolkata, Dr M.G.R. Chennai Central Railway Station, Secunderabad Railway Station, and Bihar's Danapur Railway Station.²

¹ Retrieved from International Journal of Scientific Research in Engineering and Management (IJSREM) Volume: 08 Issue: 05 | May - 2024 SJIF Rating: 8.448 ISSN: 2582-3930

² <https://www.outlookindia.com/art-entertainment/interview/ai-enabled-facial-recognition-in-india-necessary-upgrade-or-privacy-compromise-in-conversation-with-sanjay-puri>

AI-powered tools are transforming legal research and document analysis by leveraging vast repositories of case law, statutes and legal texts. Platforms such as ROSS intelligence and case mine provide advanced search capabilities and aid in drafting legal documents by identifying relevant precedents and provisions.

AI technologies are revolutionising contract review processes by automating the extraction and analysis of key clauses and terms. In India, law firms utilise AI-powered platforms like Kira Systems and Legal Sifter to expedite due diligence tasks and ensure regulatory compliance.

Indian legal-tech start-ups have developed AI-driven chatbots and virtual assistants to offer legal guidance, address queries and provide basic legal services. These virtual assistants improve access to legal information and services, especially for individuals with limited resources¹

Important Consideration to keep in Mind

There are a few caveats when applying AI for the purpose of predictive policing, including problems with transparency and accountability, possible bias, especially automation bias, and positive, feedback loops. The following section introduces and discusses these challenges to provide clarity on the existing shortcomings.

- **Transparency: the “black-box” Problem**

The way in which machine-learning models generate results can be opaque. This stems from a number of factors, that often conflate. Algorithms are often very complex and thus difficult to grasp for end users. Additionally, self-learning models may take decisions on the basis of rules it has set for itself. Finally, a degree of opacity may be built in by developers as an intentional form of self-protection. ML algorithms collect and process vast amounts of data and keep learning during the calculations. Steps made by the ML algorithm are too complex to retrace for humans, even for those who designed the algorithm. In other words, it becomes impossible, both in theory and in practice, to unveil the reasons behind a specific result or. ML algorithms are therefore often depicted as black box.

- **Accountability: the “Many Hands” Problem**

The “black-box” problem feeds into the second-issue relating AI, sometimes referred as the many hands problem, referring to a scenario in which a range of individuals and organisations are involved in the development and deployment of complex systems. As this is often the case with AI products in general and predictive policing in particular, it is often impossible to unambiguously identify who is to blame for the harms and fundamental rights violations resulting from the AI implementation in predictive policing.

- **Bias**

The third issue of AI is its potential for bias. We can generally identify two sources of bias when it comes to AI systems: (a) Algorithmic bias and (b) Big Data bias. In the context of predictive policing, so-called “gender-neutral” risk assessments can overstate the recidivism risk of women because women tend to reoffend less often than men. Datasets can also disproportionately target minority groups in this scenario. If minority neighbourhoods have been over-policed in the past, more crime would have been found there than in other areas.²

Conclusion

Law enforcement will become increasingly dependent on AI in the coming years, especially if it is considered to be superior to traditional policing methods, and cheaper than hiring more officers. Current models of regulating, organizing, and explaining policing are based on models of human decision-making. However, as more policing will be performed by machines, we will urgently need changes to those assumptions and rules.³

While some of the earlier mentioned issues and challenges are dealt with by the upcoming AI regulation, as shown, it remains to be seen to which extent these safeguards will be taken up and be duly applicable in the context of law enforcement. Like the way regulation of data processing by law enforcement is always striving to find a balance between law enforcement goals and fundamental rights, the proposed AI regulation aims to find a balance between on the one hand corporate and law

¹ Tripathi S, Ghatak C. [Artificial intelligence and intellectual property law](#). Christ ULJ. 2018;7:83.

² <https://eucpn.org/sites/default/files/document/files/PP%20%282%29.pdf>

³ Joh,2019

enforcement needs and on the other protecting fundamental rights. However, to address the social and ethical issues of AI, it is necessary to shift the focus in governance from the compulsion to show "balance" by always referring to AI's alleged potential for good by acknowledging that the social benefits are still speculative while the harms have been empirically demonstrated.¹

The transition from traditional policing to **AI-driven predictive policing** marks a shift toward a more proactive criminal justice framework. By leveraging "digital trails"-from gait analysis to automated records-AI can process data at a scale humans cannot match, effectively acting as a force multiplier for law enforcement.

However, the "Black Box" nature of these algorithms remains a primary hurdle. When systems like those used in the UK report **false positive rates as high as 90%**, the risk of wrongful detention or harassment becomes a tangible threat. Furthermore, while AI is intended to reduce recidivism by identifying habitual offenders, there is a legitimate danger that it will instead create "**feedback loops**," where over-policed minority communities continue to be targeted simply because historical data (which the AI learns from) is skewed.

Ultimately, AI is an effective **administrative and investigative tool**, but it is currently too fallible to serve as a **judicial or predictive authority** without heavy human oversight.

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