**THE ROLE OF ARTIFICIAL INTELLIGENCE IN CRIME PREVENTION: AN INDIAN PERSPECTIVE**

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**Abstract**

*The objective of crime prevention is to reduce crime, resolve cases speedily and deliver justice to the victim[[1]](#footnote-1). Over the time, artificial intelligence has been looked up as a pivotal investigation tool to minimize crime, predicting likeliness of crimes to be committed in the nearest future by analysis of set data records as well as identifying promising targets for police intervention to reduce felonies and ultimately, impart criminal justice. However, with this revolutionized concept of modern security and crime prevention, the technology has had its fair share of criticism. It is believed that such a system will lead to increase in bias towards the marginalized sections of the society during criminal risk assessment due to discrimination occurred towards the former bracket of society, historically. Additionally, there are concerns about the practical implementation of such technology, especially in light of contemporary advancements, including recent issues related to public safety, privacy, and democratic accountability.*

*Through this research paper, the author attempts to critically analyze the efficiency and authenticity of artificial intelligence in crime prevention with the help of secondary sources of data by going through methods involved in crime prevention using AI, measures to enhance the same as well as figuring out varied risks associated with crime prevention due to the use of AI systems. Through detailed research henceforth conducted, it has been found that firstly, though artificial intelligence has a humongous potential in a country like ours, there is a need for more interdisciplinary research to create such an algorithm which is not biased towards any section of society. Furthermore, it becomes evident that if proper data is fed to this model, the chances of crime rate or risk prediction are higher and can be more accurate. Thus, the adoption of complex artificial intelligence technologies should not proceed until it has been confirmed that they are free from bias, uphold fundamental rights and principles, and guarantee citizen privacy through an ethical framework rooted in transparency and accountability.*

**Keywords:** Artificial Intelligence, Crime Prevention, Information Communication Technology (ICT), Privacy, Transparency

**Introduction**

AI or Artificial Intelligence refers to the ability of machines controlled by machines to manually act and respond intelligently and mimic human actions independently without human intervention, AI is expected to challenge and surpass human intellect with the rapid advancements in the industry. Technological advancements in the field of AI or Artificial Intelligence have demonstrated great potential by palliating some of the most significant problems prevailing around the world. AI applications range from unmanned automobiles and social media wed browning, web filtering, and speech recognition to curating entertainment media feed for making recommendations on e-commerce websites and finger recognition and other high-tech features such as virtual smart assistance on smartphones.

The classic conceptual history of AI bloomed when John McCarthy along with other researchers recognized AI as “*making a machine behave in ways that would be called intelligent if a person was to act in that way*”. An intelligent machine is one that is designed and engineered in such a scientific way that it acts intelligently, reacts and responds intelligently and also when confronted with the outside world, makes decisions on its own without any intervention by humans. These technological advancements enable the state to mass surveillance its citizens by tracking, monitoring and digitally surveilling the prevalent pattern of criminal activities and analyzing set data records as well as identifying promising targets for police intervention to reduce felonies and ultimately, impart criminal justice. AI has been profoundly used all over the world as a tool in the prevention, detection, analysis, and investigation of criminal records and criminal activities. Crime prevention can be defined as strategies and measures adopted by the government and concerned authorities to combat the criminal activities prevalent all around by predicting the likeliness of crimes to be committed in the nearest future. AI has been increasingly used by law enforcement agencies for initiating high-impact crime prevention measures.

**Role of AI in Crime Prevention**

1. Methods of Crime Prevention

The classification of different types of artificial intelligence used for crime prevention can be based on the capabilities of the software. The identified types of AI capabilities for crime prevention include the following:

1. *Object Classification*

Object classification software is designed to identify elements within images and videos, subsequently labeling or categorizing these elements in a manner similar to human perception.[[2]](#footnote-2) This approach represents a subset of computer vision, leveraging artificial intelligence to address contemporary challenges in criminal justice. After training an algorithmic model on a dataset containing numerous images, researchers employ this system to classify imagery. Within these images, elements are broken down into smaller components such as pixels or groups of pixels, which are then characterized based on their color, texture, or size.[[3]](#footnote-3) Following this step, the program will engage in a learning process to build a decision tree capable of classifying regions within both the training set images and future images. Consequently, the program will be equipped to classify groups of pixels and thereby identify objects corresponding to the training categories.[[4]](#footnote-4)

Concerned authorities will have the capability to access images linked to criminal incidents and may utilize machine learning to pinpoint the location where an image was captured or recorded. Similarly, law enforcement officers may use this technology to identify indicators of criminal activity depicted in such images. Furthermore, these images could potentially provide evidence of the criminal act(s) taking place.

A notable example of this is the PhotoDNA software developed by Microsoft and Hany Farid of Dartmouth College, which focuses on detecting child pornography. This software operates by creating a unique digital signature for each image to prevent tampering. It also converts the image to black and white, resizes it, divides it into a grid, and quantifies its shading.[[5]](#footnote-5) Subsequently, it compares the digital signature of an image against a database of known illegal images, and any matches can then be reviewed manually by humans.

1. *Object Recognition*

Object recognition is a component of computer vision that concentrates on identifying specific instances within imagery, such as letters, digits, license plate numbers, fingerprints, and other details. The primary distinction between object recognition and object classification is that while both involve identifying objects, object recognition aims to uniquely identify each object as an individual instance rather than categorizing it into a general class of objects.[[6]](#footnote-6)

A considerable example of the same is Faception[[7]](#footnote-7), the namesake of an Israel-based company and software that “*can analyze faces from video streams (recorded and live), cameras, or online/offline databases, encode the faces in proprietary image descriptors and match an individual with various personality traits and types with a high level of accuracy*.” However, one must not forget the loopholes associated with such programs, Faception has faced criticism for potentially enabling “facial profiling” or profiling based on biological traits, which could lead to discrimination. At one point, the company's website featured computerized drawings depicting individuals categorized by their classifiers, showing stereotypical representations such as white-collar offenders wearing sunglasses and terrorists with facial hair and head coverings commonly worn by Muslims and Sikhs. This kind of depiction could create misleading perceptions for authorities and increase the risk of discriminatory profiling.

1. *Speech Recognition*

Speech recognition seeks to detect unique elements within speech patterns to identify the speaker and automatically reproduce the spoken words. This technology analyzes and measures sound waves and frequency patterns of the speech signal.[[8]](#footnote-8) One of the limitations which must be overcome for effective use of this technology is the elimination of background noise coupled with variations in the speed of speaking. This software would then classify extracted blocks or sections of the speech using various techniques such as statistical models or numerous artificial neural networks. The purpose for the same is to classify small segments in terms of sound type and later, classify larger segments of each such sound to determine the words being said and by whom (when used in consonance with object recognition).

One such instance of such voice recognition comes from the usage of Speaker Identification Integrated Project by Interpol or the International Criminal Police Organization.[[9]](#footnote-9) The voice recognition technology expands its functionality by compiling collections of voice samples, analyzing specific behavioral characteristics, and generating "voice prints" to compare with new voice data uploaded to its system, including data from police intercepts and existing voice records of suspected criminals. Additionally, it filters voice samples based on gender, age, language, and accent. It is noteworthy that the Speaker Identification Integrated Project facilitates the uploading and downloading of samples from 192 law enforcement agencies worldwide.

1. *Gunshot detection*

Gunshot detection software aims to identify instances of gunfire and pinpoint its exact location. This technology usually involves deploying a network of microphones across densely populated areas to detect and isolate the distinct sounds of gunshots. Human verification confirms these detections, enabling authorities to be promptly notified when gunshots occur.[[10]](#footnote-10) Gunshot detection can be categorized within the realm of AI because software designers utilize machine learning to train their systems to recognize the audio signature of gunfire and differentiate it from various other background noises typically present in urban environments.

1. *DNA Analysis*

DNA Analysis is considered with application of genetic testing for crime prevention, crime assessment as well as legal purposes.[[11]](#footnote-11) The use of DNA for crime prevention is also used by forensics department to look into the genetic material in criminal investigations and figure out any presence of common DNAs or genetic materials during the course of such investigations to prevent any further criminal activities. Individuals associated with genetic material who are suspected of being criminals may later face trial and interrogation in courts. AI plays a pivotal role in DNA analysis by enhancing the speed and accuracy of DNA analysis and sequence matching processes. Through AI-driven automatic databases, the identification of genetic materials for investigative purposes is streamlined.

However, questions arise regarding whether law enforcement agencies should be required to obtain judicial authorization before uploading perpetrators' genetic material to genealogy and DNA analysis websites. The limited legal scrutiny and privacy protections surrounding DNA and genetic materials raise concerns. Police organizations considering the use of AI-powered DNA matching and analysis tools must carefully assess whether such actions infringe upon the privacy rights of individuals whose DNA is stored in these databases.[[12]](#footnote-12)

1. Measures to enhance Crime Prevention

AI works on the basis of the algorithm programmed into it, which is basically a number or a set of numeric data containing a holistic profile of the crimes prevailing in the country and a certain solution or conclusion to the same. This dataset helps in the recognition of prior patterned- behavior of crime and helps in training it to act in a way similar to the human mind so as to learn to act in a certain way if confronted with the same or similar situation.

1. ***Predictive Policing***

Predictive Policing can be defined as “*the use of analytical techniques to identify promising targets for police intervention with the goal of preventing crime, solving past crimes, and identifying potential offenders and victims*”. These techniques are being profoundly used all around the countries in the world by enforcement agencies to analyze the prevalent criminal records, develop the crime-related forecast, assessment of promising technical tools and opting the requisite actions based on the same. Sophisticated algorithms have proven to have a rapid, great impact success in helping law enforcement agencies better understand the “who, where, what, how, when, and why” of crime in their jurisdictions. It also involves adopting tactical approaches to draw insight into past criminal records, learning on the basis of past criminal record research, and developing case studies on the same. A developed AI-based predictive policing can be proven to be much more effective as the resources will be deployed by the enforcement agencies at the places where it is needed the most. Predictive policing can be divided into four key categories- crime mapping, predicting the future offenders or perpetrators, predicting the future victims, and predicting hot- spots of crimes.

In United States, several advanced software has been developed for predictive policing, one being PredPol, this software through its operational tools helps in identifying and locating crime-prone areas during a particular time. It helps in locating the possible places and time at which the crime is most likely to happen and helps the state in effectively allocating the resources and reducing the risk by preventing the crime. The predictions by this software are made on the set data of past crimes being reported to the police. The input data used to forecast the crime precisely include crime type, location, and date and time. Predictive policing is not only about predicting the “hot- spots” but also predicting the offenders who are most likely to commit crimes. The city of Chicago has software called” Strategic Subject List” which is used in conducting analysis about the most likely perpetrators and offenders of shootings.

In India, there are several projects being initiated, currently at the developing stage, with the sole purpose to develop AI-based predictive policy technological advancements. National Crime Records Bureau is conducting collaborative research on predictive policing with Advance Data Research Institute (ADRI) in India, Delhi has the most promising predictive policy called” Crime- Mapping: Analytics and Predictive System” which with the help of cluster algorithms helps in spotting hot- sports and exercising special attention to these points.

1. ***Applying Analytics to Crime Analysis***

Crime prevention using analytics and analysis involves collecting data from divergent sources and finding the repetitive patterns and behaviors in criminal activity that occurred in the past. This enables law enforcement agencies to draw conclusions by tracing the crimes committed by seasonal criminals at different locations and during different time spans and drawing a link between them.  Data is collected from various sources such as social media conversations, population data, public- events data, CCTV reports, weather reports, Economic data, etc. Data is processed in a way to identify hidden patterns and trace minute details to derive a correlation between the crimes being occurred.

AI helps in building predictive models by using machine learning algorithms to predict the next possible crime scene. Example- Random Forrest is a tool to analyze and predict the “When” and “Where” of criminal activity. Other techniques are Gradient Boosting Machines, Time Series, Hot- Spot Analysis, Spatiotemporal, etc. Research indicates that there are more than 200 tools utilized across various jurisdictions to guide initial sentencing, parole decisions, and determinations related to post-release monitoring and rehabilitation. However, reliable, unbiased tools demonstrating high predictive accuracy based on forensic psychiatry data are scarce. While several of these tools are still in development and show promising results, they have not yet reached a level of reliability suitable for commercial deployment.

1. Risks associated with Crime Prevention

As the use of AI has been rapidly proliferating, its proclivity to unjustifiably interfere with basic human rights such as the right to equality, non - discrimination and privacy has increased. Though AI serves as a potential tool in crime prevention and ultimately reducing felonies but as the analysis of set data takes place on the past information being inserted, it tends to replicate the bias, revolving around false information, leading to punishing the ones who have already paid- off their debts, it also does not take into consideration the concept of rehabilitation.

1. ***Transparency***

AI is permeating in almost every industrial sector in America and elsewhere. The system is being deployed and developed by corporations that rely on complex algorithms and programs, the issue arises when there is a lack of information transparency to the public as a whole about the models being used in their development and how they are being used in taking critical decisions affecting the public. Though it is true that should be greater transparency ensured, it comes with major risks.

Transparency in relation to AI usage and patented codes falls under the ambit of the trade laws, which are protected by the state and banned from making public. If the complex algorithms and tech codes are being made public then such codes may be subject to hacking, which could possibly lead to the dismantling of these codes. There exists a fine line between protecting the rights of the citizens and being accountable. Transparency also leads to greater scrutiny from the public. Transparency in AI laws can help in reducing bias and ensuring privacy but, somehow, it will endanger the safety and protection of the state cyber-systems being governed by these algorithms. If AI is being used to suffice the transparency making it viable for human audit, it will pose a greater threat to human rights.

1. ***Heavy Bias and Discrimination***

Discrimination refers to where one individual is treated differently or inferior to another in a particular situation based on real or perceived characteristics. It drives away basic human rights from the people; it is an inherent peril of society. Such biases are prevalent in all decisions made by human beings, owing to the objective nature of the AI it was believed to be free from such bias, unlike humans, but, since the data fed into such systems is installed by humans and in this regard, already contain human biases, leading to an immanent amount of discrimination towards a certain group of people, depriving them of the right to equality and fairness.

Due to prevalent human biases, certain groups tend to be seen as more suspicious than another and are stopped by the police more often. The human standards and parameters used at the time of designing and implementing AI software would play a greater role in the objectivity of AI decision-making. If pure AI-based crime prevention software may be installed in India, then it will tend to show more error-based bias towards minorities, Dalits, and other communities. There is a possibility of showing more “hot spots” in such areas where there were more criminal arrests, leading to geographical discrimination. Thus, AI can sometimes be extremely risky and discriminatory towards certain people even if not programmed to do so by programmers.

1. ***Privacy Concerns***

Privacy is an indispensable and essential basic human right ensured to every human being; it also helps in the enforcement of other rights such as freedom of association, freedom of choice, and right to equality.  International Human Right Conventions state that if any restrictions are being imposed on the citizens' right to privacy, then it should be in direct proportion to the laws and not otherwise. Data Protection is an inseparable part of the right to privacy, though closely related, they have significantly different meanings but impact each other greatly.

Data protection plays an important role in guarding privacy and protecting human dignity. A lot of data is being used in the development of a “holistic” profile for AI predictive policing and for ascertaining risk and analyzing the various statistics. These data sets also include the private information of the citizens which is otherwise protected to be used, by the laws. When individual data is being collected, there is a major concern as to what extent should the data be transferred and allowed to be used by the state and private corporations. To protect private companies and the state from intruding into an individual’s life, a high level of confidentiality should be maintained at all times during the training of the AI system and the subsequent data should be guarded against going into the wrong hands. Though AI in Crime prevention can be beneficial in facilitating a searchable platform for identifying and verifying criminals and sharing their information with other enforcement agencies its susceptible misuse will pose a great threat to the rights and dignity of individuals. As the use of AI-based systems has expanded, it poses a serious threat to the privacy of human beings. Example- AI-based Facial Recognition connects the face image with the programmed database profile of that person and also the other significant data available in this respect. The challenge is to protect the rights of individuals without posing a restriction on the development and deployment of AI technology in the state.

In India, there isn’t a prevalent specified guideline or legislation to ensure data privacy and for regulation of AI-based technology. Given the rise in AI usage all over the world and the expansion of AI applications, data protection laws are alarmingly weak in India in comparison to other countries such as USA and UK.

**Critical Analysis**

It can be noted from developing an understanding of various AI tools for crime prevention as well as their instances in other countries and international organizations, AI could perform with relatively high accuracy when provided with filtered useful information without any bias or prior gaps in database. Over the years, AI systems have increased efficiency and provided insights which have been totally useful. These technologies have identified patterns and provided insights into resource allocation for crime prevention. However, there are limitations when applying AI in crime prevention, as it heavily relies on extensive datasets. Nonetheless, the dependence on large datasets does not inherently limit AI capabilities. Humans must curate and provide these datasets to enable AI systems to operate with reduced errors and higher accuracy. This involves ongoing model training and development.[[13]](#footnote-13)

Undoubtedly, Artificial Intelligence holds significant potential in law enforcement and criminology for crime prevention, yet further research and development are necessary. Collaboration among researchers from diverse fields such as criminology and computer science could lead to more comprehensive investigations. This includes systematically testing whether distinct crime types exhibit predictable patterns. Such interdisciplinary collaboration may improve the accuracy of AI systems, which rely on the information provided by humans. The synergy of expertise could elevate the accuracy of prediction and prevention efforts, providing deeper insights into the concept that crimes can be likened to a communicable disease within the framework of AI-based crime prediction and prevention.

**Conclusion and Suggestions**

The integration of Artificial Intelligence (AI) into crime prevention strategies marks a significant advancement in law enforcement and public safety efforts worldwide. AI technologies, ranging from object classification and recognition to speech analysis and predictive policing, have shown immense potential in identifying crime patterns, allocating resources effectively, and predicting future criminal activities. However, this transformative shift is not without its challenges and ethical considerations. AI's ability to process vast datasets and identify complex patterns has enabled law enforcement agencies to better understand and respond to criminal activities. Predictive policing models like PredPol have shown promise in pinpointing crime hotspots and potential offenders, aiding in proactive law enforcement strategies. Moreover, technologies such as DNA analysis and facial recognition have enhanced investigative capabilities, leading to more efficient crime prevention and detection.

Despite these advancements, there are significant risks associated with the use of AI in crime prevention. Transparency remains a critical concern, as proprietary algorithms and data sources used in AI models are often shielded from public scrutiny, raising questions about accountability and potential biases. The inherent biases in training data can perpetuate discrimination and privacy concerns, especially when sensitive personal information is utilized for predictive analytics. In addition to legal and privacy challenges, the ethical implications of AI-driven crime prevention strategies must be carefully considered. The potential for discriminatory outcomes, based on biased data inputs, underscores the importance of ethical oversight and regulatory frameworks to safeguard individual rights and ensure algorithmic fairness.

By establishing guidelines and regulations that promote transparency in AI development and deployment for crime prevention as well as public oversight, independent audits of AI systems, these can help mitigate biases and ensure accountability. Moreover, a formalized scrutiny and oversight, such as a commission, task force, or committee board, are imperative to ensure compliance with the regulatory framework. When dealing with biases, implementing measures to identify and mitigate biases in training datasets used for AI models as well as incorporating corporate diversity and inclusion principles into the design and testing phases of AI systems to promote fairness and non-discrimination can go a long way in ensuring a non-biased software.

In addition to the same, when robust data protection laws and regulations can be developed they would strive at safeguarding of individual privacy rights while enabling the responsible use of data for crime prevention. These AI applications will also comply with international human rights standards and would be able to facilitate information-sharing and collaboration among law enforcement agencies globally to leverage AI technologies for cross-border crime prevention while respecting legal and privacy frameworks. Even involving communities in the development and implementation of AI-driven crime prevention strategies would help foster trust and transparency through meaningful public consultations and participatory decision-making processes.

By addressing these challenges and embracing ethical guidelines, AI technologies can play a transformative role in enhancing crime prevention efforts while upholding fundamental human rights and principles of justice. It is essential to navigate the complex landscape of AI in law enforcement with a balanced approach that prioritizes accountability, fairness, and transparency for the benefit of society as a whole.

Therefore, it can be concluded that AI systems have the potential to play a crucial role in crime prevention in countries like India following further research and development. It is essential to develop datasets that enhance the performance of AI systems to ensure higher prediction accuracy. Clear guidance and comprehensive codes of practice should be established to govern how authorities trial and utilize algorithmic tools urgently. Additionally, a regulatory framework is necessary to set minimum standards for the use of algorithmic tools by police forces, especially regarding relevant data protection laws, transparency, intelligibility of AI systems, and adherence to human rights and administrative law principles. Retroactive deconstruction of algorithms should be mandated and included as a required element in all public-procurement agreements to assess factors influencing AI model predictions.

Ethics boards comprising multidisciplinary members—including practitioners, technical experts, academics, criminal lawyers, and experienced judges—should be established to advise on integrating AI technology with existing crime prevention methods. This approach should be collaborative and interdisciplinary to ensure representation from diverse experts and stakeholders. The board would provide recommendations to individual law enforcement agencies on practice, strategy, and policy decisions related to algorithm usage.

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