

ARTIFICIAL INTELLIGENCE IN CRIMINAL INVESTIGATION AND CRIMINAL JUSTICE IN INDIAN PERSPECTIVE

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INTRODUCTION

With the development of computer and robotic science now machines are able to behave like human beings. Machines are to perform complicated tasks such as cognitive thinking, visual perception, speech recognition, and learning from past experience at a much higher speed and accuracy than human beings. This ability of a machine to behave like a human being in solving complicated problems is known as artificial intelligence (AI). There is increasing use of this technology in many fields. Government organizations and private companies use this technology to detect and prevent crimes. The idea of AI is also increasingly applied in the field of the criminal investigation. This enables meticulous crime investigation such as bloodstain pattern recognition and analysis, fingerprint analysis, DNA analysis, etc. Now complicated forensic findings are better understood. It helps in the 3D crime scene reconstruction also. Thus, in the coming days, AI technology will be very helpful for forensic scientists in a criminal investigation for a better legal administration.”

Artificial Intelligence (AI) is the ability of a machine or computer program to perform human-like tasks such as visual perception, speech recognition, cognitive thinking, decision making, learning from experiences and solve complex problems with ultimately higher speed and less error rate than humans. AI is the most emerging field which is also applied for the advancement in the area of criminal investigation and Justice System. In the current scenario of Criminal Investigation, experts are facing many challenges due to huge amount of data, tiny pieces of evidences in the chaotic and complex environment, traditional laboratory structures and sometimes insufficient knowledge which may lead to failure of investigation or miscarriage of justice. AI is the weapon to fight against these challenges which involve

machine learning, deep learning. Neural networks, case-based reasoning for errorless, objective and reproducible results in various fields of forensics. AI is currently aiding almost all the prominent fields of Criminal Investigation with its different approaches such as Data analysis, Pattern recognition, Image processing, Computer vision, Data mining, Statistical analysis and probabilistic methods, Computational and mathematical methods, Graphical modelling. Thus, AI is aiding investigators by formulating logical evidence, 3D reconstruction of crime scenes, handling evidence effectively and analysing it to reach logical conclusions at various levels of investigation. AI based algorithms can detect the huge amount of data to discover risk, and are used for detection, prevention and even prediction of future crime or criminal behaviour'.

The hybrid-intelligence of human and machine is also profitably aiding the modern Criminal Investigation by detecting various clues, gunfire, bombs or explosives on the crime scene, the criminal activity from huge volumes of complex data such as videos, images, text files, emails, audio files and monitoring fraud risk. The rise of AI technologies are aiding the police and security professionals for not only crime detection, but also crime prevention and prediction. Some of the advanced algorithms of AI are developed to detect crime patterns and suspicious anomalies, predict future crime spots, assess criminal risk factors, and to uncover criminal networks.

APPLICATION OF AI BASED TECHNOLOGIES FOR MODERNISATION IN CRIMINAL INVESTIGATION

Pattern recognition

Pattern recognition is a process of automatic machine recognition, which is categorized according to the type of learning procedure used to generate the output value. Identification and comparison of specific types of patterns in the suspected data is one of the crucial elements of forensic science. The experts have to analyse a huge amount of data with heavy statistical and probabilistic reasoning techniques. A pattern could be anything like a fingerprint image, a handwritten cursive word, a human face, or a speech signal. Neural networks have been used

in many areas such as interpreting visual scenes, speech recognition, face recognition, fingerprint recognition, iris recognition etc.

Fingerprint Pattern Identification and Classification

‘Deep learning has made tremendous success in the field of computer vision and pattern recognition as it does not require handcrafted feature extraction. Deep learning automatically learns features and structures under a sufficient number of input training data. These advantages of artificial intelligence make it suitable for various tasks in automatic fingerprint identification and classification systems. Also, these automated AI based systems can substantially bring down the number of comparisons at the time of matching with high accuracy’.

Multimedia Analysis

‘AI provides the capacity to overcome human errors during image, video or CCTV footage analysis during criminal investigation. Traditional software algorithms that assist human experts are limited to predetermined features like eye shape, eye colour, distance between eyes for facial recognition and demographics information for pattern analysis. The AI algorithms developed for multimedia analysis could not only learn complex tasks but also can develop and determine their own independent complex facial recognition features & parameters to accomplish given tasks. These advanced AI algorithms have the potential to match faces, identify weapons, compare voices and detect complex events such as accidents or crimes. Various AI based algorithms have been aiding security personnel and experts for audio analysis and speaker identification. Artificial intelligence in speech recognition is also used for speech fluency evaluation and language instruction.

Estimation of range of a projectile will be much easier when AI will be contributing the ballistics field. Artificial Neural Network can guide experts for searching gunpowder, cartridge case and help them for comparison of bullet marks, firearm identification and other ballistic evidence from the database itself with the help of image processing without any manual interference. The applications of 3D digital technologies and AI could be used to enhance particular phases of forensic visualization. It can create 3D graphical models and animations automatically to provide real-time interactivity of the reconstructed scenes. Virtual reality

simulation in the forensic process involves graphical modelling of 3D virtual objects and humans based on measurements and photos and animates the models to recreate the crime scene or incidents concerned. These field of forensic animation include pathological visualization, murder reconstruction, and shooting case evaluation' .

AI NEEDS FOR CRIME PREDICTION

'The rise of AI technologies is aiding the police and security professionals for not only crime detection, but also crime prevention and prediction. Some of the advanced algorithms of AI are developed to detect crime patterns and suspicious anomalies, predict future crime spots, assess criminal risk factors, and to uncover criminal networks. Various machine-learning and artificial intelligence-based algorithms are used to predict the future crime spots by analysing the spread of crime types, crime location, and criminal weapons. Briefly, an AI powered system can successfully aid for the prediction of crime spots using the process data mining and predicting a person who will commit a crime in future using facial recognition and tracking one's behavioural changes'.

AI IN THE INDIAN SCENARIO

'In 2015 Maharashtra police started using AI technologies in crime control by acquiring the predictive policing softwar. 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 investigations. 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. As per the 2016 crime report, Uttar Pradesh (UP) has the highest crime rate in India. To handle these UP police started using various AI technologies such as crime mapping analytics, and predictive systems in partnership with ISRO. In December 2018, the Director-General of Police Om Prakash Singh launched an AI-powered mobile application named 'Trinetra'. Trinetra has a record of 5 lakh criminals which contains a picture, address, and criminal history of each criminal. This information has been collected through the inputs from district police, prison department, and Government Railway Police (GRP). Trinetra has successfully assisted in catching one high-profile criminal in

Lucknow. Delhi Police used AI & other Forensic Technologies in the investigation of 755 cases in North East Delhi violence in 2020. About 945 CCTV footage and video recordings from smartphones were analysed by using facial recognition and other AI technologies and culprits were arrested. In another incident one person named Solanki, 26 yrs., was shot dead on 24th Feb'2021 behind Rajdhani School, Delhi. The mobile phone of the suspect was seized and examined. The crime was established from the analysis of the Google Map installed on his mobile phone. More than 400 cases have been solved and 342 charge sheets have been filed by the Delhi Police by the end of 2020'.

AI NEED FOR JUSTICE

'In India major challenge to the judicial system is long pending cases. Though measures like e-court, Alternative Dispute Resolution were introduced, the judicial system couldn't efficiently curb the rising pending cases. Also, shortage of judicial officers adds to the problem. This leads to delaying of justice which is equivalent to denial of justice. It is high time that some non-conventional tool has to be introduced to restore the effectiveness of justice delivery system. One such tool is introduction of AI in the Justice Administration system. In India, though the Government initiated & promoted digitalization of police records, still the conventional paper-based records are in practice at large. This offline method makes investigation & tracking of criminals a time consuming and tough task. The police require real time information to effectively investigate a case. Here comes the application of AI. With the help of AI, bio-metric details such as face, speech, blood group, fingerprint, details about previous crimes etc. can be recorded. The AI powered search engine enables the Investigation Officer to identify the suspects using these digitally stored data.'

AI ISSUES AND REGULATIONS

'As diverse kinds of data can be collected and processed thus, AI is being used in various sectors like healthcare, E-commerce, the Defence sector, Autonomous vehicles, the legal profession, the education sector, etc. As it is said: With great power comes great responsibility, AI is the power that needs continuous regulation to ensure there is no misuse. With many benefits and comforts come the drawbacks which challenge their existence. The foremost

concern of AI is data protection and safety. AI relies totally on big data and as data is readily available, risks associated with it should be accounted for. The sensitive information of a user can be exposed in the process and be threatful. As humans try to supersede artificial intelligence as it is also a product made by a human, stricter laws are needed to reduce the risk. Secondly, there is a lack of accountability for the actions of an AI. The question arises who is to be blamed for errors made by AI due to which users suffer a particular loss. There is no one to be held responsible for the mistakes. Thirdly, autonomous weapons are designed in such a way that they work on AI and can be highly desirable for planning a war. A large number of casualties may occur if such technology reaches the wrong hands, various AI-wars will be held further making it difficult to handle. With the accelerated progress and boundless use of AI, the dangers caused by it have alarmed the Government. The Government has more cause to worry as India does not have any specific law related to AI. There is a need to intervene as this has become an issue on a national platform. Currently, AI is being adapted and encouraged in India at a faster pace than expected. The need for regulation arose due to the high pace of advancement in the adoption of AI. Now, the Government is hurt by contriving new laws, guidelines, policies in regards to AI. In 2017 one of the steps taken to safeguard the people was the introduction of the Right to Privacy as a fundamental right shielded under the Indian Constitution. Justice Srikrishna committee recommends the government introduction of privacy laws. A Personal Data Protection Bill has been drafted in 2019, once it is passed by both houses of the Parliament it will become a law. The Government of India has prioritized building up a Digital India and has launched various schemes related to AI. According to NITI Aayog has adopted a three jagged theory:

- Initiate projects which involve the full proof concept of AI
- Building an atmosphere and ecosystem of AI in India.
- Collaboration with contributors and professionals.

‘In 2018, the planning commission of India, NITI Aayog introduced the National Strategy on Artificial Intelligence [NSAI]. Various provisions regarding the application of AI were discussed. The NITI Aayog report suggests the following:

- Setting up a panel consisting of The Ministry of Corporate Affairs and the Department of Industrial Policy and Promotion to look over the regulations needed in intellectual property laws.
- Formation of appealing IP regimes for AI upgrades.
- Introduction of legal networks for data protection, security and privacy.
- Creation of ethics concerning each sector.

Four committees were set in motion by the Ministry of and Information Technology to analyse multiple ethical issues. The Bureau of India Standards has launched a new committee for systematic and levelled AI. The government is working on various safety parameters to limit the risk associated with its interaction. Another initiative taken by NITI Aayog is the establishment of AIRAWAT – AI Research, Analytics and Knowledge Assimilation platform. It is an approach paper given by senior adviser, Anna Roy recommending AI Specific Cloud Compute Infrastructure. As India has relied on cloud-based AI, AIRAWAT talks about requirements for the ideal use of AI.

- Bringing up a specialised AI structure and atmosphere will aid the computing needs of the Centre of Research Excellence, International Centres Transformational AI, start-ups, researchers, students, various Innovation Hubs, etc will be satisfied.
- An inter-ministerial task force backed with cross-sectoral representation will execute AIRAWAT as prescribed.
- The task force will keep a check on funding and program the approach.
- Funding for AIRAWAT will be done by the National Supercomputing Mission.
- It will incorporate equipment, arrangements, staff, maintenance and up-gradation done in the process.’

CONCLUSION

Having discussed the various applications of Artificial Intelligence (AI) in different fields and also its potential use in the Forensic Science and Criminal Investigation to assist forensic experts, police investigators and security personnel, it is evidently concluded that Artificial

Intelligence powered machines, or programs, or software can help experts or investigators to shorten the time taken in various tasks at different stages of an examination and investigation. Saving time would inevitably mean better efficiencies in disposing of cases which would ultimately contribute to the cause of bringing down their pendency only due to slow and complex investigation procedures. More accuracy, competency and lack of biases would eventually land up in proper criminal justice. Scientists and researchers have been developing more such AI based programs and machines to make the forensic investigation procedures more sophisticated. These newly invented AI powered software would make forensic investigation and predictive policing systems, our security and defence systems more powerful.

