

CRIME AND CODE: THE INTEGRATION OF TECHNOLOGY IN CRIMINAL LAW

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ABSTRACT

India is home to 1.4 billion people, with a ratio of 137 police per lakh citizens. The ratio is quite low in comparison to the estimate by the United Nations. In the era of advancement, crimes have evolved in new forms with the support of technology. With the low police-to-population ratio coupled with the increase in crime, technology has become a necessity. Technology has provided investigators with powerful tools to combat crime and bring justice to the victims. Digital forensics is one of the key areas in which technology has made a significant impact. Advancements in data recovery techniques have made it possible to retrieve deleted or encrypted data, providing crucial evidence in criminal cases. Moreover, technology has revolutionised crime scene investigation. High-resolution cameras, drones, and 3D imaging techniques enable investigators to capture detailed images of crime scenes, preserving vital evidence that may be easily overlooked. Furthermore, the use of virtual reality and augmented reality technologies allows investigators to recreate crime scenes, helping them visualise and understand the sequence of events. In addition to aiding investigations, technology has also improved the efficiency of forensic analysis. Fingerprint analysis, 3D Facial Reconstruction, Retinal Scanning, DNA mapping, etc., have streamlined the identification process, making it faster and more accurate. This not only helps in solving crimes but also prevents wrongful convictions and ensures justice is served. The role of technology in investigation and forensics cannot be overstated. It has transformed the way crimes are investigated, evidence is analysed, and justice is served. The digital landscape of technology has an indelible role in criminal investigation and forensics. This is a captivating arena where innovation meets justice; keywords are crime mapping, digital forensics, and system intrusion.

INTRODUCTION

Criminal investigations have transformed in recent years, partly due to technological innovations. Technology integration in criminal investigation has significantly enhanced the

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efficiency and effectiveness of the investigation process. Technology has revolutionised the way criminal investigators and forensic experts approach when building a criminal case. It has become an indispensable tool for law enforcement agencies in their pursuit of justice. Traditional methods of evidence collection, such as fingerprinting and DNA analysis, have been greatly improved through the use of advanced technology. From DNA analysis to digital forensics, it has opened up a whole new world of possibilities. Technology has transformed the way evidence is collected, analysed and transformed in courtrooms. With the rapid advancement in technology, investigators now have access to a wide range of tools and techniques that aid them in their pursuit of truth and justice. Automated Fingerprint Identification Systems (AFIS) and DNA profiling techniques have revolutionised the way investigators link suspects to crime scenes, thus enabling faster and more accurate identification. The advent of digital technology has opened up a whole new realm of evidence in the form of digital data. With the widespread use of Information Technology (IT), investigators now have access to a vast amount of digital evidence. Digital forensics has emerged as a specialised field, allowing experts to extract, analyse and present digital evidence in a legally admissible manner. In addition to evidence collection, technology has also played a significant role in crime scene investigation. Advanced imaging techniques, such as 3D laser scanning and aerial drones, have revolutionised the way crime scenes are documented and analysed. These technologies enable investigators to create accurate and detailed virtual reconstructions of crime scenes, facilitating better visualisation and analysis of the evidence. Furthermore, technology has greatly improved the speed and accuracy of data analysis in criminal investigations. Powerful software tools and algorithms have been developed to analyse large volumes of data such as phone records, financial transactions and surveillance footage. These tools help investigators identify patterns, connections and anomalies that may otherwise go unnoticed, leading to more efficient investigations and the identification of unknown suspects. However, it is important to consider the challenges and ethical implications that come with the use of technology in law enforcement. Privacy concerns, data security and the potential for misuse are all important factors to address. Striking a balance between the benefits of technology and safeguarding individual rights is crucial to ensuring responsible and unethical use of these tools.

HOW TECHNOLOGY HAS REVOLUTIONIZED CRIMINAL INVESTIGATION?

Technology plays a pivotal role in enhancing the efficiency and accuracy of criminal investigations and the pursuit of truth. It has transformed the way crimes are investigated, and justice is served. The cyber investigation has become a vital part of a modern criminal investigation. The ability of technology to trace digital footprints has opened up new avenues for investigators to solve complex crimes. Technology has transformed the way criminal investigators approach cases. The implementation of efficient tools of technology has played a significant role in improving the criminal justice system. It has revolutionised the methods of identifying and locating suspects, enhancing evidence collection, analysis and integration of data and providing a criminal history of suspects.

Information Technology (IT) has turned out to be a transformative tool in addressing the criminal history of suspects, reacting to criminals and intervening in police hotspots. It has transformed the way crimes are investigated by police and the public is defended. It allows investigators to collect and analyse digital evidence that helps identify suspects, retrieve deleted files, extract valuable information, and track suspect online activities. Data analysis techniques of IT, such as data mining and machine learning, assist investigators in uncovering hidden relationships of suspects and predicting their criminal behaviour. It facilitates the exchange of critical information through communication channels and shared databases, which coordinates the joint working of investigators and faster decision-making. It also plays a crucial role in investigating cybercrimes. It identifies cybercrime networks, traces hackers and gathers evidence related to cyber-attacks. IT, in combination with Geographic Information System (GIS), assists in the analysis of spatial data related to crime scenes, mapping the crime spot and identifying the geographical patterns that lead to the criminal activity.

Artificial Intelligence (AI) algorithms play a significant role in revolutionising the way crime investigators analyse and investigate crime. It analyses historical criminal data to identify recurring patterns and anomalies in criminal behaviour. The ability to analyse social networks helps to identify connections and associations among suspects of criminal activities. This helps investigators outlay the structure of criminal networks and generate and target key leads. The facial recognition tool of AI speeds up the process of investigation and evidence collection by identifying potential suspects from surveillance footage and images of crime scenes and comparing them with databases. The video analysis feature of AI detects suspicious activities, objects, and individuals and assists investigators in the reconstruction of crime scenes. Real-

time sketches generated from witness descriptions of suspects create a facial composite that assists investigators in conducting a search of unknown suspects from existing databases. AI also analyses audio recordings, which detect speaker identification, emotion detection, and lie detection. Investigators utilise AI-powered Natural Language Processing (NLP) tools to uncover relevant information and identify potential threats from large volumes of textual data such as emails, chats, social media posts, etc. It also analyses financial records, phone records and social media data to process hidden data, criminal networks, or profiles of individuals involved in a case. AI plays a crucial role in detecting cyber network traffic suspicious of cybercrime and potential vulnerabilities in digital networks. This eases the process of investigation and prosecution of cybercriminals.

Biometric identification is a powerful tool in criminal investigation. The accuracy and efficiency of this technology have revolutionised the investigation process. It involves the use of physical characteristics such as fingerprints, voice, face, and DNA to identify an individual. Fingerprints collected from crime scenes help investigators match them with the existing databases of potential suspects using the Automated Fingerprint Identification System (AFIS). Analysis of DNA samples collected from a suspect or crime scene serves as a source of evidence in establishing links between separate criminal cases and criminals. Voice recognition technology analyses unique vocal characteristics such as pitch, tone, pronunciation and cadence of voice samples extracted from phone records, voice recordings, etc. This creates voice profiles of individuals that help investigators gain insight into the suspect's background or geographical origin.

Gunshot detection aids investigators in real-time detection and location of accurate sources of gunshots. This proves to be valuable evidence for reconstructing the sequence of events and establishing the trajectory of bullets. This information helps in identifying the patterns and hotspots of gun violence, thereby enhancing the investigation process.

3D imaging is a game-changer technology in criminal investigation. It creates precise digital replicas of crime scenes, objects and human remains, allowing investigators to explore them from different perspectives. This virtual walkthrough of the crime scene helps investigators capture critical details such as blood spatter patterns, bullet trajectories, orientation of objects, etc. This wealth of information is invaluable for uncovering hidden clues and establishing the sequence of events. This technology is also helpful in the analysis of physical evidence such as weapons, tool marks or footprints.

Thermal imaging aids in the investigation of complex cases. It detects infrared radiation and heat signatures emitted by the human body, which helps detect hidden individuals. These cameras have the ability to identify individuals even in darkness or obscured environments, which is helpful in search and rescue missions, locating and identifying potential threats. Moreover, it assists arson investigators in identifying areas of smouldering within a fire scene. The analysis of thermo-grams helps investigators determine the cause and origin of the fire and identify any accelerants used. These are employed in surveillance operations in crime scenes to monitor the detection of individuals attempting to hide in densely populated areas. Thermal imaging is also helpful in the detection of illicit drug labs and manufacturing units by the identification of abnormal heat signatures generated through these labs. It has proved to be a valuable tool in forensics. It identifies temperature variations on the surface to detect the presence of latent fingerprints or evidence that leads to the identification of potential suspects or the sequence of events leading to crime. Thermo-grams help in the investigation of crimes related to wildlife. It tracks and apprehends wildlife poachers by detecting heat signatures of animals, even in low-light or densely forested areas.

CHALLENGES OF USING TECHNOLOGY IN CRIMINAL INVESTIGATION

A coin has two sides. While technology has proved to be a potential tool for investigators in enhancing criminal investigation, it has also posed serious issues and challenges that cannot be overlooked. The use of technology involves ethical and legal implications that raise concerns about privacy and liberties. There is a risk of investigators' misuse of databases by potential threats and hackers. Striking a perfect balance between the implication of technology and protecting personal privacy poses a constant challenge associated with the use of technology. Another concern is the potential for technical errors during analysis, interpretation, or data collection, which can generate false leads or exonerate the innocent. Investigators and analysts need to exercise caution when relying on technological advancements. Human judgments should be combined with technological tools to ensure efficiency. One of the main issues is the rapid pace of technology. There is also the risk of technological bias in data analysis by computer algorithms, which can result in unfair targeting or profiling. With the emergence of new technologies, investigating agencies should constantly update their skills to match the pace with evolving technology as criminal professionals exploit them for their illicit purposes. Cybersecurity is a critical issue that cannot be overlooked. The digital systems and networks used by police agencies become vulnerable to cyber-attacks. There may be attempts to hack

databases to manipulate evidence or disrupt investigations. Robust cyber security measures should be recognised to respond to cyber threats and maintain the integrity of the investigation process.

CRITICAL ANALYSIS

Technology has proved to be a greatest boon for criminal investigation. It has revolutionised the way crimes are solved, and justice is served. The ability of technology to collect and analyse large amounts of data efficiently has proved advantageous in criminal investigations. Digital evidence and advanced forensic techniques play a crucial role in the pursuit of truth. The use of technology has improved collaboration among enforcement agencies in solving a mystery. Joint coordination on digital platforms leads to faster and more efficient investigation in complex cases that span multiple jurisdictions. However, the limitations and potential drawbacks of technology should essentially be examined to ensure the accuracy of the investigation. The major concerns associated with the use of technology are the technical errors and biases that can create loopholes in criminal investigations. It is important to address these issues to ensure the ethical use of technology.

CONCLUSION

Technology has revolutionised the way crimes are investigated, cases are solved, and justice is served. The quick and efficient collection and analysis of vast amounts of database and criminal records and even digital evidence is possible only with the aid of technological advancements. Moreover, technology has contributed to the collaboration of different investigation agencies in solving cases that span multiple jurisdictions. However, it is essential to critically examine the ethical and legal limitations and drawbacks of relying heavily on technology. Technical errors and biases during data collection and interpretation may generate false leads or wrongful accusations, which can cause the exoneration of an innocent person who deviates from the path of criminal justice. The collection and storage of personal data raises concerns about privacy and civil liberties, which should be responsibly handled to strike a balance between the use of technology and the protection of individual rights. Investigation techniques and databases should be subjected to robust cyber security to protect sensitive information and respond to cyber threats. It is also necessary to train and update the skills of investigation officers to maintain pace with the ever-evolving landscape of technology. In the realm of criminal

investigation, technology has become the investigator's companion to uncover the invisible, solve the unsolvable and bring justice in ways never before possible.

