Chapter 13
Evolving Role of AI in Forensic Science and Crime Investigation

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ABSTRACT

Investigating crime scenes is complex for forensic investigators, but artificial intelligence (AI) has streamlined the process, enhancing efficiency and speed. AI plays a vital role in various areas, including genotyping, biometrics, and digital forensics, addressing issues like data privacy and accountability. In crime detection and prevention, AI aids in statistical processing, identification, and forecasting. Challenges

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such as vast data, subtle clues, and outdated techniques can lead to investigative errors and miscarriages of justice. This chapter emphasizes AI's significance in processing digital evidence, enabling investigators to track suspect movements and decrypt messages, crucial for combating cybercrime. Looking ahead, AI's potential in forensic science is immense. When properly implemented, AI can transform the criminal justice system, making it more effective, safe, and fair, ultimately ensuring justice for all involved.

1. INTRODUCTION

Crime solving has now been revolutionized with the help of technology, especially with AI's help. Before, detectives and forensic experts depended on clues such as fingerprints, blood, and what the eyewitnesses had to narrate. However, as criminals have also gotten more brilliant, the methods of apprehending them have changed significantly. They use AI to assist investigators in working at higher speeds and with increased precision. It can go through considerable amounts of data quickly and find patterns that a human could spend much time investigating. This chapter will, therefore, look at how AI is being employed in forensic science and why it is relevant in today's society to apprehend perpetrators. AI is helpful because it can quickly read and scrutinize all this information. AI can assist police in nabbing criminals, solving crimes before they occur, and solving previous cases that could have been too difficult to crack. Forensic technology plays a crucial role in solving present-day crime since it has integrated AI into practice, although in this chapter, we will focus on describing this issue thoroughly.(Yadav et al., 2022).

1.1 Overview of Forensic Science and AI Integration

Forensic science is paramount in crime detection and solving in the current world and uses several approaches to analyzing physical and electronic evidence. The traditional role of forensic scientists used to be searching for evidence, handling samples, and making comparisons to conclusions. This process was, however, very efficient many times over, but it was largely cumbersome and frequently marred by human interference. However, some of these steps have been made more accessible and efficient through artificial intelligence, as highlighted next. The overall application of AI in forensic science results in improved completion of a wide range of evidence, such as DNA and fingerprints, among other digital footprints. For instance, facial recognition systems can scan the images and hours of the CCTVs within minutes to look for the potential suspects that correspond to the patterns. Also, DNA analysis, which is conducted to match against the database of known

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