# AT THE INTERFACE OF FORENSIC SCIENCE (FS) AND ARTIFICIAL INTELLIGENCE (AI)



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The concept of intelligent machines and automation from comic books and science fiction shows has become a reality today. One can find the application of AI in the day to day life i.e. in agriculture, industry, government, education, service sector, finance etc. The features of machines like tirelessness and objectivity have increased productivity as well as reliability. Moreover, it has also reduced errors caused by human beings due to the lack of concentration and tiredness.

Artificial intelligence is the ability of a machine to independently respond to its environment and perform the task that would require human intelligence, problem-solving capability and the decision-making power of humans, without the direct intervention of humans. Due to the advancements in machine learning and deep learning, it has become possible to apply these concepts and make use of this emerging technology in the field of Forensic Science. Forensic Science is the applied branch of science

that deals with the processing of evidence (i.e. from the crime scene to the lab and from the lab to the court of law) for justice. Digital forensics is the branch of Forensic Science that deals with the analysis of digital evidence. It consists of identification, acquisition, preservation, transport and analysis of digital evidence.

The success of AI is data-driven and there is no specific code or programming that controls the output so far. In computer science, AI is split into two- Machine learning and Deep learning. In machine learning, the features are designed by human engineers, unlike deep learning where features are learned from the data using general-purpose learning procedures. For the processing of information and evidence analysis in Forensic Science, this general intelligence of deep learning would be significant. With the advancement of Modus Operandi (MO) of criminals, it has become the need of the hour to take help of such technological and scientific methods for the purpose of investigation of crime.

Pattern recognition and differentiation in objects through experience are among the many tasks performed by the human brain. Machine learning, which is the application of AI, mimics this ability of humans and enables them to learn from experiences. Facial recognition, fingerprint matching etc. are the application of AI for the purpose of screening and identification of the required data, from the huge amount of data for the purpose of the criminal justice system.

## Applications of AI in FS

1. The machine-generated data will increase the objectivity in the results of the analysis.
2. It will lead to the automation of evidence analysis by the automated reasoning method. It will reduce the overlooking of possibilities that may be caused by humans.
3. There will be a reduction in variations in reports due to subjectivity and different interpretations due to different experts.
4. It has the potential to compare the low quality/degraded images as well, by lowering the quality of "standard" to the same extent as "questioned" to get the match.

5. It is possible to design algorithms that will be able to identify objects in the video such as accidents, violent acts, robbery, criminal acts etc. This will reduce the painstaking work of video observation for hours for the purpose of investigations.

6. Machine learning-based systems can be used to analyze complex DNA profiles especially in cases of admixing.

7. Through AI, it is possible to find out the number of guns firing, the ca-liber of the gun by just audio analysis.

8. It can also be used for detecting criminal recidivism and crime forecasting by the analysis of behaviour and pattern on social media. It can be useful to find out the people at risk. Both processes require large amounts of data.

9. After extracting the data and analyzing it, from the given inputs like dead bodies or objects at crime scenes, it can be used to create multiple animated videos to help reconstruction of crime scenes.

10. Artificial intelligence would be especially helpful in tackling current problems of cybersecurity and data security by providing robust and intelligent cyber defense systems.

In the current scenario, the evidence generated using artificial intelligence are not considered as a substitute for human decision making but just a helping hand for the investigation of the crimes. It is considered as a Decision Support System (DSS) i.e. can be used in a trial and be used by a judge as supportive evidence while giving a verdict but not as a substitute to evidence generated by human intervention. Though AI has an exceptional and ice-breaking potential to advance the field of Forensic Science, there is a need for more research and development to realize its full potential.

Myth - Criminals are all very intelligent

Fact - Most of them are of average intelligence.