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FORENSIC EVIDENCE IN CRIMINAL INVESTIGATIONS IN INDIA

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ABSTRACT

Forensic evidence plays a fundamental role in India's criminal justice system. It is an advanced tool to determine justice and equity in the matter of criminal cases. Forensic evidence can provide an objective and scientific basis for determining the guilt or innocence of an accused. Additionally, forensic evidence is instrumental in determining the facts of a case and identifying criminals. The process of criminal trials in India involves the importance and the purpose of forensic evidence. Thus, this article discusses issues on forensic evidence and its objectives of bringing out the significance of forensic evidence in the investigative processes and the administration of justice. This paper starts with a broad discussion of forensic science and its development in the Indian scenario, and then narrates various categories of forensic evidence, which include digital, biological, physical, and trace evidence. It will further discuss how forensic evidence works in criminal investigations all over India with discussions on application and efficacy in meeting justice.

INTRODUCTION

Forensic evidence is obtained from a crime scene, victims, suspects, and witnesses. Indeed the vast areas of disciplines covered under forensic science range from digital forensics to toxicology, ballistic, DNA analysis, and fingerprint examination. The gathering and analysis of forensic evidence involves one who can be deemed as an expert and possesses skills and knowledge in forensics, this work of skill is often left in the hands of the forensic experts and laboratories. It has increased manifolds over the past several years. Warranted by the increasing numbers of forensic labs dotting the entire length and breadth of this vast country as well as increasing awareness about the importance of scientific evidence in criminal cases. The Central Forensic Science Laboratory (CFSL) is country's first and foremost forensic lab, and its regional centers are spread all over the country.

A broad spectrum of laws holds the Indian Forensic Evidence together. Forensic science is slowly starting to gain recognition, boosted by sensational cases and public interest, the rise of forensics came with several hurdles such as inadequate numbers of specialist personnel, constraints in infrastructure, and the court system is still getting used to the concept of scientific evidence. The development of forensic science in India has been quite intricate and fascinating by closely paralleling the dynamic judicial landscape of the country with its growth pattern. Historical references in Indian epics indicate a long-standing intersection between medical knowledge and criminal investigations, tracing back to ancient times. However, it was during the late 19th century that forensic science of modern days began to expand.

Objectives of Forensic Science in India

- An integrated perspective of the principles of Criminalistics and Forensic Science that incorporates their concepts, methods, and importance in the larger scheme of the criminal justice system.
- To present how gathering forensic evidence is critical in crime-solving purposes and determining whether the accused is guilty or not, and provides a high-quality result to the law process.
- To Identify and discuss the different statutory provisions underlining criminal investigations with special emphasis on the statutory frameworks and regulations governing the collection and use of forensic evidence.

Types of Forensic Evidence in India

DNA Evidence

This evidence pertains to the examination of genetic material to establish individual identity. The DNA evidence proves of immense value in linking suspects to crime scenes, identification of victims, as well as exonerating the wrongly accused. Additionally, this forensic evidence is the most definitive evidence among others.

Fingerprint Analysis

This is the most reliable and one of the oldest forensic methods of identification. Fingerprint analysis involves an earnest scrutinizing of investigation patterns uniquely present at an individual's fingertips. Fingerprint analysis can be relied upon to make firm connections relating to suspects and scenes of crime.

Ballistic Evidence

This pertains to the examination of guns, bullets, and cartridge cases in regard to identifying their characteristics and the likelihood of their use as a crime tool. Ballistic evidence may tell one of a sort weapon that was used while otherwise tells one the projectile trajectory and may even help one link a suspect to the shooting case.

Digital Forensics

In an era marked by the rise of cybercrime, digital forensics has become increasingly vital. This field focuses on the recovery, preservation, and analysis of data from digital devices such as computers, smartphones, and tablets. It is essential for investigating crimes involving hacking, data breaches, and online fraud. And more on similarly any other evidence digital or physical, data is stored and analyzed by law enforcement officers and if the data gets tampered with or lost it becomes inadmissible in court.

Toxicology

This deals with the testing of body fluids like blood, urine, and saliva in association with drugs, alcohol, or toxins. It is also an essential tool in a case of poisoning overdose or drug/substance abuse case since such information is crucial in understanding the health and status of victims or suspects involved.

Autopsy

After death, the examination of the body by “post mortem” is known as Autopsy. There are different kinds of autopsies named as ‘Coroner’s or Forensic autopsy’; ‘Academic autopsies’; ‘Medico-legal autopsy’; and ‘pathological autopsy’.

Role of Artificial Intelligence in this Topic

Artificial Intelligence plays a significant role in modern forensic investigations, revolutionizing the way evidence is processed, analyzed, and interpreted in criminal cases. Here are several key roles of Artificial intelligence in forensic evidence:

1. Digital Forensics and Data Recovery

- **AI-driven tools** are essential for analyzing large volumes of digital evidence, these tools can recover deleted files, track online activities, and uncover encrypted data, which might otherwise be too complex or time-consuming for human investigators to handle manually.
- Machine learning algorithms can help identify patterns in data, detecting anomalies or hidden links between digital traces.

2. Facial Recognition

- Artificial Intelligence powered **Document recognition technology** is increasingly used to analyze surveillance footage and match faces with criminal databases. This can help identify suspects quickly, especially in cases involving high-resolution video or images.
- Artificial Intelligence can also compare facial features to existing records in a database, significantly speeding up investigations and providing leads that might have been missed otherwise.

3. Voice and Speech Analysis

- In cases where audio recordings are involved, this can be used for **recognition** and **text-to-text conversion**. This allows investigators to transcribe and analyze conversations more efficiently.
- Artificial Intelligence can also help identify patterns, which can be useful in distinguishing between suspects or corroborating testimony.

4. Pattern Recognition and Behavioural Profiling

- Machine learning algorithms excel at identifying **patterns** in criminal behaviour, which can assist in profiling suspects. This tools analyze data from previous criminal cases to predict possible future actions or identify repeat offenders.
- These systems can also flag **abnormal patterns in financial transactions**, helping to identify fraudulent activity or money laundering.

5. DNA and Biometrics Analysis

- It has been applied to improving **DNA analysis**, making it faster and more accurate. This can help with identifying genetic markers and even predicting possible familial connections that could point to a suspect or victim.
- In addition to DNA, artificial intelligence tools can analyze other biometric data like fingerprints, retinal scans, and even gait analysis to match evidence with individuals.

6. Automating Evidence Sorting

- Investigations often involve vast amounts of evidence can be used to quickly sort through and categorize evidence—such as photographs, documents, and videos—based on relevance or certain characteristics.
- This can assist forensic experts by marking relevant evidence, reducing time spent on menial tasks, and allowing them to focus on more critical aspects of the investigation.

7. Crime Scene Reconstruction

- The Artificial intelligence can help create by analyzing documental evidence. This can be especially valuable in understanding complex crime scenes and presenting evidence in court.
- These reconstructions can provide a clearer picture of what happened, and can even simulate how events might have unfolded.

8. Predictive Policing and Crime Prevention

- This systems are increasingly being used in **predictive policing**, analyzing crime data to forecast where and when future crimes may occur. While this tool is controversial, it can help allocate resources more effectively, potentially preventing crimes or ensuring faster response times to incidents.

CONCLUSION

Forensic science is transforming into one of the best techniques that can be utilized. Because it combines scientific principles and analytical techniques it deters from committing similar activities and provides a way for the victims of crimes to seek justice. Forensic specialists are important, be it when they are performing investigations or documenting evidence in a court of law. All of this pervasive macrostructure further states the positive role, that forensic science plays, in the **legal system** and the administration of justice.

In India, as a general specialty, some forensic certificates can be issued voluntarily, and thus, it once again reflects the misery of this particular professional field. Forensic investigators have two faces; the first one is to **assist law enforcement** in the practice of investigative processes and the second one is to position judges with lucid and dependable insights. That enables the judiciary to make wise choices in matters of a criminal nature or even in civil ones without a doubt.

As it is understood today, forensic science is now being improved, and its usage is extended to other domains within and without the justice system. It enables the threat to society to be neutralized and seeks the elimination of such social defects through means that involve both science as well as technology.