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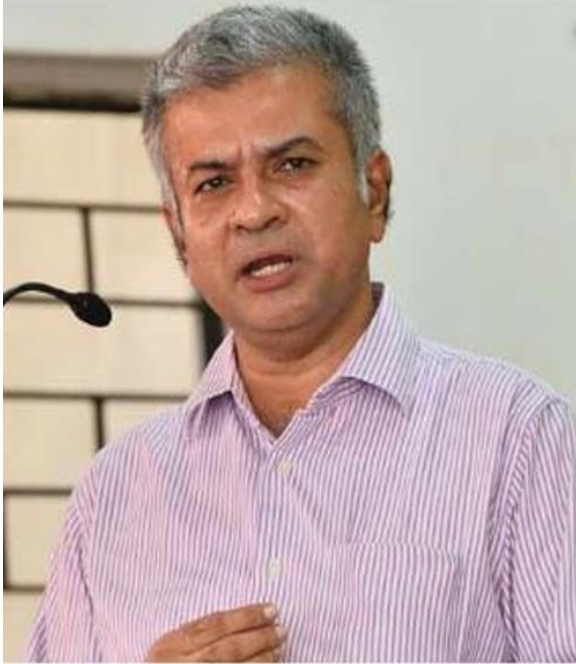
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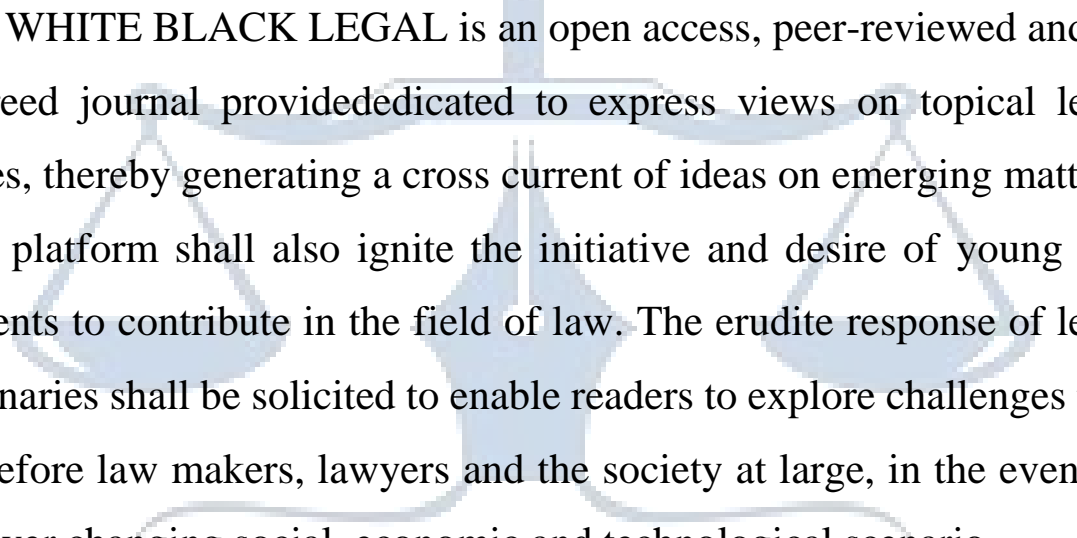
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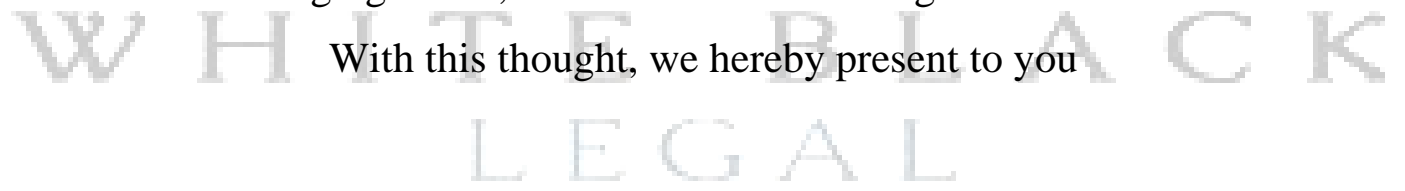
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WHITE BLACK LEGAL is an open access, peer-reviewed and refereed journal providededicated to express views on topical legal issues, thereby generating a cross current of ideas on emerging matters. This platform shall also ignite the initiative and desire of young law students to contribute in the field of law. The erudite response of legal luminaries shall be solicited to enable readers to explore challenges that lie before law makers, lawyers and the society at large, in the event of the ever changing social, economic and technological scenario.

With this thought, we hereby present to you



FORENSIC SCIENCE AND CRIMINAL **INVESTIGATION**

AUTHORED BY - AMIT PRAKASH

ABSTRACT

This paper will discuss how forensic science assists in the criminal investigation. We are in the era of technology and development. This is the era of artificial intelligence and modern technology.

The way the world is developing and getting modern technology, no doubt, is very fruitful for us.

But, every coin has two sides and, in this case, there are pros and cons of technology.

Criminals are getting smart day by day, with the help of this technology, they do crimes in different ways.

Forensic science helps us in the investigation of the crime as well as in the whole case, to crack the case the way of thinking of a criminal and create a base on it.

For a better understanding of this paper, we have to go through many sub-parts of different topics which will get a better understanding.

We saw in movies and series how investigation happens and how forensic science help in the investigation, but now here will write the things how all these things are related to each other.

These are some topics on which we will discuss the whole paper.

1. Crime Scene Investigation
2. Forensic Psychology and Crime Investigation
3. Investigative Techniques in Forensic Science
4. Collection and Preservation of Forensic Evidence
5. Role of DNA Profiling Technology
6. Role of Forensics in Identification of Accused and Victim
7. Role of Toxicology, serology, and Narcoanalysis in Investigation
8. Forensic Psychology: Brain Mapping, Polygraph, and Narco-Analysis
9. Forensic Evidence and Expert Opinion
10. Artificial Intelligence

Crime scene Investigation -

It is the place where something happened either negligently, willfully, or against the will or knowledge. Investigation of the crime scene is the first phase of the story of the case. It is the place where we get to know what happened, who is the victim and other things also.



The crime scene is the place where crime investigators and other people work together on the case. It is the place where they collect evidence and other things which will help an investigator or person to get the lead for the case which is necessary.

Investigators and other investigation people secure the areas that may contain evidence and other things.

They take photographs of the crime scene and physical measurements of and collect forensic evidence and maintain a proper record or create a chain of evidence for the case.

Investigator collects -

- Fingerprint
- Victim body
- Tire marks
- Blood samples

¹ <https://cdn.hswstatic.com/gif/csi-lead.jpg>

- Weapon
- CCTV
- Hair sample
- Etc.

After collecting the evidence, they transfer the things to forensic experts for the next step, where they do a proper analysis.

Crime investigators and the team of forensic work as a team.

*Ansar Ahmed vs State (Govt. Of Nct Of Delhi)*²

Sometimes it is very difficult to find the evidence from the crime scene, the reason behind it, and the person who had done the crime so safely or destroyed the evidence.

No, a criminal thinks that he/she will be caught after doing that crime. They just thought they couldn't find us.

We are in the modern era. There is so much modern technology and with the help of them it is very easy to find the evidence and, with the advantage of this evidence, the accused get caught.

In the case of cybercrime,

- Transaction details
- Chats
- Location
- Website or Link
- Mobile Number
- Etc.

*Syed Asifuddin and Ors. v. State of Andhra Pradesh and Anr.*³

Crime scene investigation is the first step only. Now we will discuss the other part of this paper.

Forensic Psychology and Crime Investigation

In India, crime is considered a major vice. With every passing year, crime is increasing everywhere, not only in India but in the whole world and it is affecting people, institutions, governments, and

² 123 (2005) DLT 563

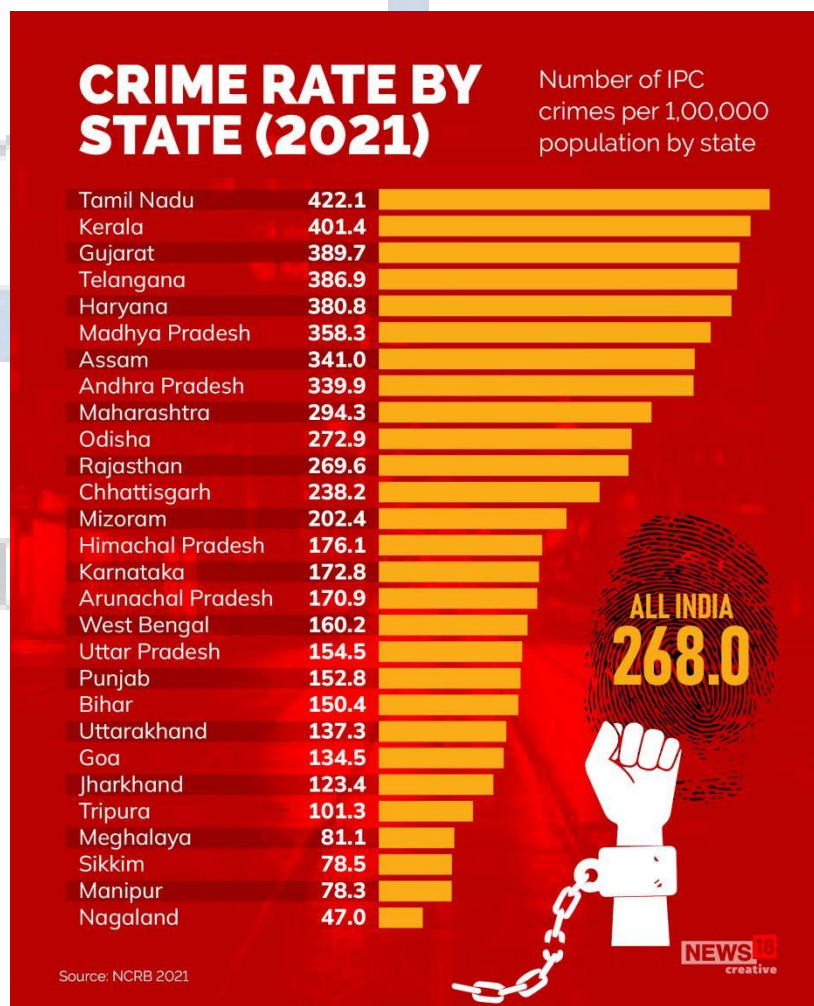
³ 2006 (1) ALD Cri 96, 2005 CriLJ 4314

agencies.

To control these cases, there are a lot of techniques we have adopted, such as

- ◆ Forensic Psychology
- ◆ DNA profiling Technology
- ◆ Brain Mapping, Polygraph, and Narco-Analysis
- ◆ Toxicology, serology, and Narcoanalysis
- ◆ Etc.

I am attaching the report on the crime rate -



This image gives you an overview of the report or rate of crime in India.

⁴ <https://www.news18.com/photogallery/india/kolkata-registers-lowest-crime-rate-among-metros-delhi-tops-chart-in-nbrc-report-2021-in-gfx-5854255-4.html>

Now, the role of forensic psychology in criminal investigation -

A Psychologist assists the police or investigation team in the investigation of cases by advising while doing interrogation of witnesses or suspects, presenting himself as an expert witness in court cases.

The first case in which this technique was used was *McCARDELL v. UNITED STATES DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT*⁵

They apply psychological research, theory, and data for giving any advice related to the case.

The role of a forensic psychologist -

1. Assessment and evaluation
2. Consultation
3. Counseling
4. Treatment
5. Expert opinion
6. Research
7. Etc.

Refer to Section 45 in The Indian Evidence Act, 1872⁶. This section states that the court may take the opinion of an expert.

Investigative Techniques in Forensic Science -

Forensic techniques play an important role in solving many criminal cases.

List of forensic techniques⁷ which were used in solving the case -

- Carbon Dot Powders
- Artificial Intelligence
- Nanotechnology
- Proteomes
- Foldscope
- DNA Phenotyping
- Immunochromatography
- Forensic Palynology
- Blockchain-Based Solutions Cloud Forensics

⁵ <https://blog.iplayers.in/role-forensic-psychology-understanding-criminal-psychology/>

⁶ <https://indiankanoon.org/doc/1025384/>

⁷ <https://www.forensicscolleges.com/blog/resources/10-modern-forensic-science-technologies>

- Digital Vehicle Forensics
- Social Network Forensics
- 3D Technology to Determine Physical Fit
- Drone Forensics
- Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS)
- Video Spectral Comparator 2000
- DNA Sequencer
- High-Speed Ballistics Photography
- Biosensors for Fingerprint Analysis
- Etc.

There are many other techniques in forensic science but we will stick to these points only.



We are in 2023. technology is upgrading day-by-day and with the help of the above techniques, it is very helpful for crime investigators to reach the suspects and find the main accused of the case.

We can use the techniques legally as an expert opinion.

Fingerprint matching and DNA matching are the most basic techniques which forensic people have been using for a long time.

Every coin has two sides. If investigators or forensic people have these techniques, what about criminals?

⁸ https://legalserviceindia.com/legal/uploads/branchesofforensicscience_6667326070.jpeg

They also use modern techniques, not forensic modern techniques, and other gadgets for their work. If forensic experts or investigators have to catch these criminals, then they have to be the best with the help of modern techniques.

Collection and preservation of Forensic Evidence -

Before coming on to the part of forensic evidence,

Let's discuss different types of crime -

- Money laundering
- Murder
- Theft
- Robbery
- Drug trafficking
- Human trafficking
- Rioting
- Religious violence
- Terrorism
- Kidnapping
- Etc.

There are many more crimes that I have not listed in this paper, but I will stick to these only.

S.K. Viswambaran vs E. Koyakunju & Ors⁹

In the case of murder,

Investigators and a forensic team reach the crime scene. What will they do first -

- 1) Cover the crime scene
- 2) Mark the points
- 3) Collect fingerprints
- 4) Search for the murder weapon
- 5) Footprints
- 6) Take photographs

⁹ 1987 AIR 1436, 1987 SCR (2) 501

K. M. Nanavati vs State Of Maharashtra¹⁰

Apart from this, they will reach out to the nearby people where this crime happened and will ask about the crime.

They will try to find more evidence, like a CCTV camera, from where they entered the place and from where they escaped, from which vehicle they came.

How many people they are or other things?

Then they will send the dead body for postmortem or autopsy in the hospital. Meantime, the forensic team collects the evidence or other things which are relevant to the case and sends it to the forensic lab for further step of testing.

Evidence is the most important thing in the case. Without this evidence, it is impossible to find the suspect or solve the case.

Example -

'X' is the person living in his house 'Y', but one day he does not open the door, and neighbors call the police.

When the police reached location 'Y', they open the door, and they see that the 'X' person was dead.

For the next step,

The investigation has started and a forensic team has also reached the crime scene.

They have covered the whole crime scene and the nearby areas

Why do they do so?

The reason behind doing this is to secure the evidence.

A forensic team started collecting the evidence and sending the body of 'X' for postmortem.

They have secured the 'Y' place where this incident happened. Here 'Y' is the crime scene.

N.S. Jain vs The State¹¹

The steps which I have discussed earlier will be followed here and the investigation of the case will start here.

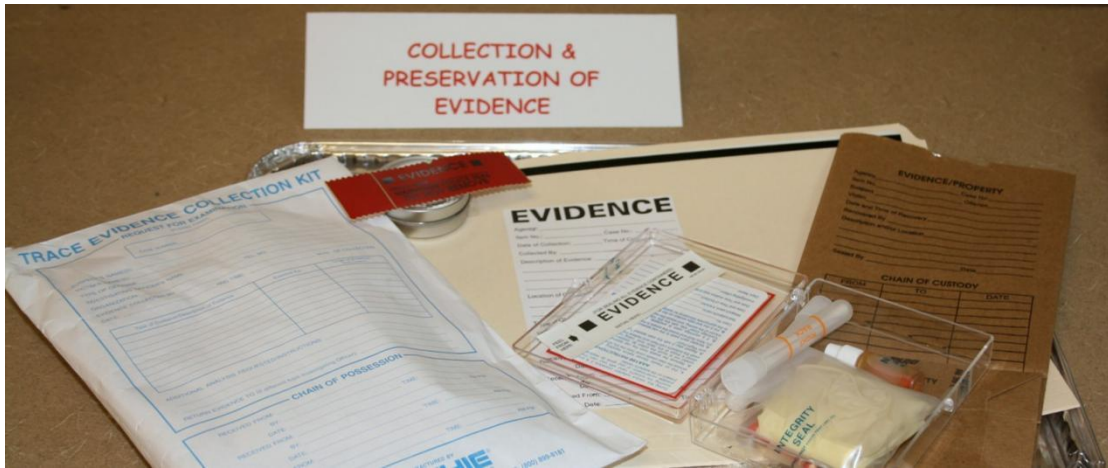
After collecting the evidence, they send it to the forensic department or lab for further procedure.

Preserving evidence is the main priority for the case. The Evidence collection procedures apply to both pre-collection and post-collection as well.

Depending on the circumstances, the forensic team or investigator has to wear a suit to secure the evidence.

¹⁰ 1962 AIR 605, 1962 SCR Supl. (1) 567

¹¹ ILR 1978 Delhi 327, 1978 RLR 442



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The forensic departments secure this evidence very properly, so at any cost, the evidence doesn't get tampered or any kind of negligent act happens.

The evidence is kept in a proper place and at a very constant temperature. Without the evidence, it is very difficult to solve the case.

They trace the evidence from place to place to establish the proper chain of custody.

Most of the evidence is kept in paper containers, such as envelopes and bags.

Without a proper chain of custody or documentation, a court may rule that evidence is compromised and inadmissible at trial.

Role of DNA profiling technology -

DNA profiling technology is a forensic technique that is used by forensic experts in a criminal investigation or criminal case.

The DNA profiling technique is used to find out the suspect by matching their DNA with the records. This technique is also used in paternity testing.

For example -

In the case of paternity testing,

'X' is a kid and 'Y' is claiming that 'X' is his child on the other hand

'Z' is also claimed the same, in such cases this technique is used.

In criminal cases,

At a crime scene, a forensic team finds some evidence, like, hair or blood sample which is not of the victim, Then in that case,

¹² <https://californiainnocenceproject.org/wp-content/uploads/2018/05/evidence.jpg>

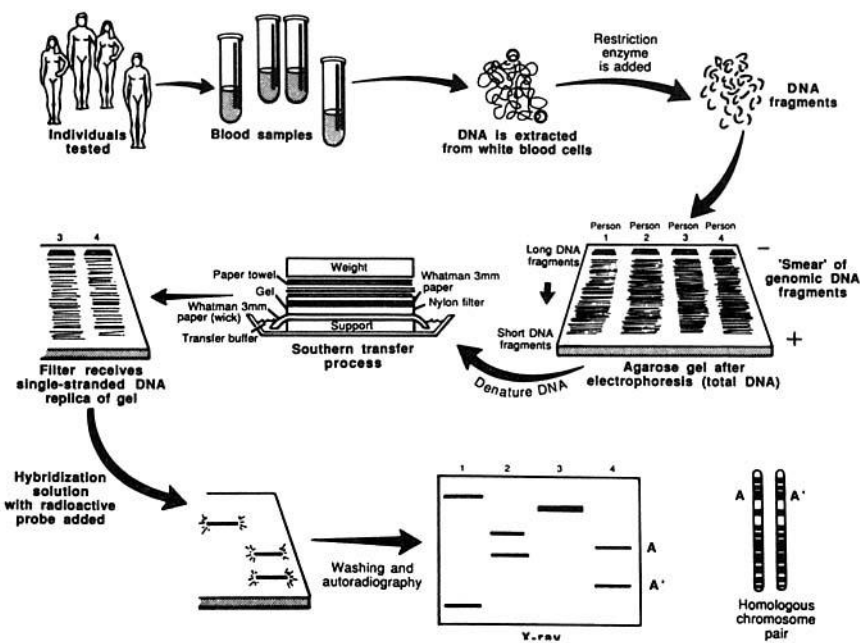
They will try to match the criminal record and, with the help of this, they find the suspect or accused.

As per Wikipedia, the technique of DNA was first used in the 1980s¹³.

It is not as easy as we think. It is a long process and a very critical process.

- Shri Banarsi Dass vs Mrs. Teeku Dutta And Anr¹⁴.
- Amarjit Kaur vs Harbhajan Singh And Anr¹⁵.
- State (Through Cbi) vs Santosh Kumar Singh¹⁶

Three landmark cases are related to the topic or technique.



Three main objectives of DNA profiling are -

- Identifying criminals
- Associating body parts
- Identifying victims

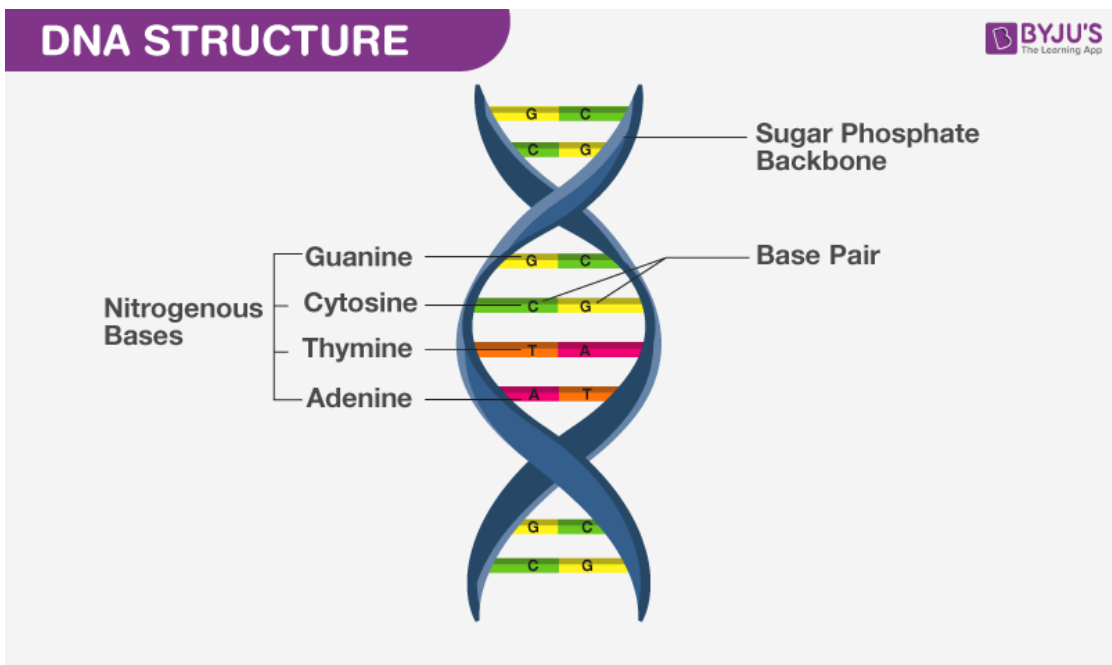
¹³https://en.wikipedia.org/wiki/DNA_profiling#:~:text=DNA%20profiling%20is%20a%20forensic,in%20geneological%20and%20medical%20research.

¹⁴ Appeal (civil) 2918 of 2005

¹⁵ 2003 (1) AWC 344 SC, (2003) 2 CALLT 23 SC, I (2006) DMC 27 SC, JT 2002 (9) SC 440, (2006) 142 PLR 385, (2003) 10 SCC 228, 2003 (2) WLN 671

¹⁶ 2007 CriLJ 964, 133 (2006) DLT 393

¹⁷ <https://nap.nationalacademies.org/read/1866/chapter/2#5>



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The above diagram clarifies the structure of DNA.

With the basic, DNA is extracted from a sample of blood or saliva.

Role of Forensics in Identification of Accused and Victim

As we have earlier discussed, the collection and preservation of Forensic Evidence and the role of DNA profiling technology, and other points of forensic technology.

We got a clear image of how forensic technology helps in finding the criminal. Now we will discuss the other part in detail.

The role of forensic investigation has increased in recent years and, with the help of this technology, it is now easy to solve cases.

Forensic evidence plays an important role in the investigation, whether in finding the victim's identity or finding the suspect.

Despite the importance of forensic evidence in an investigation, there are a lot of challenges that are faced by forensic experts.

One of the main challenges in forensic evidence is the lack of infrastructure and resources.

Despite having modern technology, the forensic department has to face this challenge, but day by day it is improving.

Another challenge we are facing is a lack of awareness about forensic science or techniques.

¹⁸ <https://byjus.com/biology/dna-structure/>



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How does this technology help the team to find the victims and accused?

With the help of their fingerprint, blood sample, or saliva, the forensic team extracts the DNA sample from them and finds it in their records to find the accused or, in the case of the victim, they match the sample with their family members.

Role of Toxicology, serology, and Narcoanalysis in Investigation

Different methods in forensic science are used in criminal investigations to detect deception and lying by the accused and suspects.

Toxicology

Serology

Narco-analysis

These are the methods that are used in criminal investigations by forensic experts.

There are more methods which I will discuss later in this paper.

Toxicology -

It is the study of adverse effects on living creatures or human beings due to different chemicals.

This method plays an important role in the investigation of murder cases.

¹⁹ https://www.livelaw.in/h-upload/2022/09/26/750x450_436574-forensic-evidence-and-right-to-privacy.jpg

Serology -

A serology test or Antibody testing. This test is done to check the presence of antibodies by taking the blood sample from the veins and sending it to a forensic lab where the next part of the procedure is done.

Narco Analysis -

Before this technology, it was very difficult to find the accused but with the help of these techniques, it is now easy to find them.

Narco analysis is a type of statement given by the accused with the help of scientific tools which may be a part of evidence against him in the case.

Many scholars and jurists agreed that the procedure of Narco analysis is a violation of Article 20(3) of the Indian Constitution.

Narco Analysis is the process by which the accused gives a statement again. During this process, the person who is giving the statement is semi-conscious.

The constitutional validity of this technique was challenged before the Hon'ble Supreme Court in the case of Selvi v. State of Karnataka²⁰.

The judgment given by the Hon'ble Court was -

Use of such a technique is a clear violation of an accused person's right against self-incrimination under Article 20(3) and Article 21 right to life and personal liberty.

Forensic Psychology: Brain Mapping, Polygraph

There is a definition given by Society for Brain Mapping and Therapeutics (SBMT)²¹ in 2013 - the study of the anatomy and function of the brain and spinal cord through the use of imaging, immunohistochemistry, molecular & optogenetics, stem cell and cellular biology, engineering, neurophysiology, and nanotechnology.

The Brain Mapping test is a part of Narco analysis, and it is also known as the P-300 test.

In this technique or test of Brain mapping, (P-300) the suspect is first interviewed and interrogated to find out whether he is concealing any information.

The polygraph test is also known as the Lie detector test.

This is also one of the techniques of forensic science which is used to find the evidence or truth

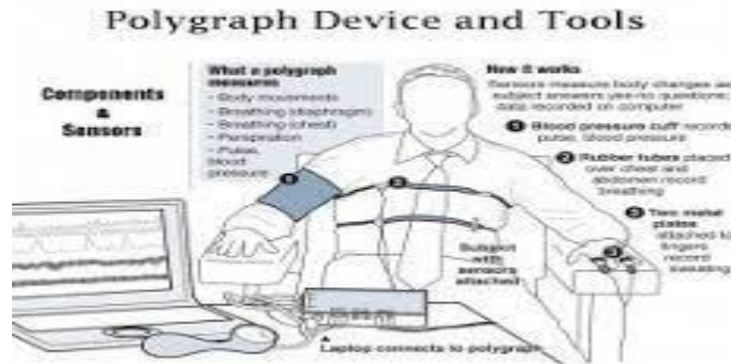
²⁰ AIR 2010 SC 1974, (2010) 7 SCC 263

²¹ <https://www.worldbrainmapping.org/About/What-Is-Brain-Mapping>

from the accused or suspect.

It is a device or a procedure that measures and records several activities of the body, such as blood pressure, respiration, pulse, and skin conductivity.

This is done when a series of questions are asked to the accused and they monitor the machine reading.



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We have seen in movies and series where we see investigators or forensic experts doing lie-detector tests or polygraph tests and trying to find the truth.

Artificial Intelligence

We have earlier discussed the forensic technology or techniques via which cases are solved.

There are a lot of forensic techniques through which we can find the accused or the identity of the victim.

Now I will discuss the other part of this paper, which is cybercrime and artificial intelligence.

Artificial intelligence is defined as the simulation of human intelligence processes by machines, especially computer systems²³.

Artificial intelligence is made by humans, the way we are upgrading, and this is the era of modern technology.

The need for artificial intelligence is very important for the future because this is the future.

There are mainly four types of artificial intelligence -

1. Limited memory
2. Reactive machines

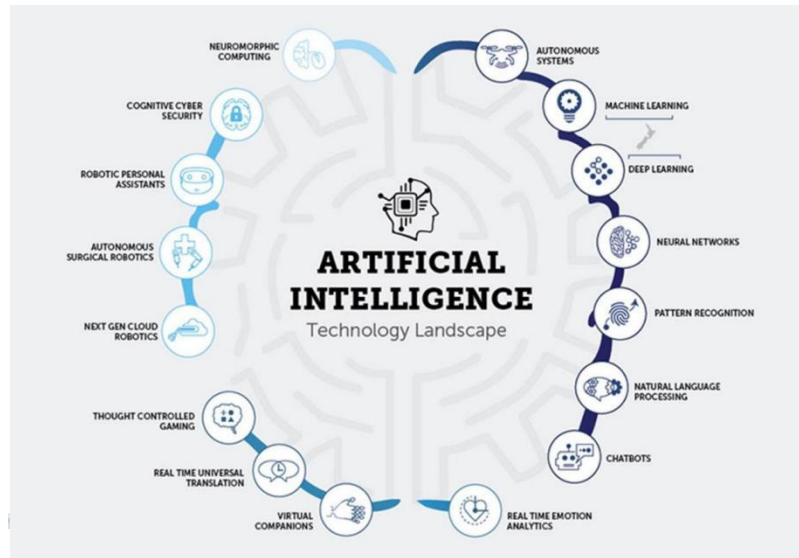
²² <https://vollmerinstitute.com/how-does-a-polygraph-device-operate/>

²³ <https://www.techtarget.com/searchenterpriseai/definition/AI-Artificial-Intelligence#:~:text=Artificial%20intelligence%20is%20the%20simulation,speech%20recognition%20and%20machine%20vision.>

Intelligence#:~:text=Artificial%20intelligence%20is%20the%20simulation,speech%20recognition%20and%20machine%20vision.

3. Theory of mind

4. Self-awareness



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With the help of artificial intelligence, it is now easier to identify potential crimes such as money laundering, fraud, terrorist financing, and criminal conspiracy.

We are all well aware of the advantages of artificial intelligence and its relationship to modern technology.

Let's talk about the disadvantages of it.

We human beings know the value of life or we have feelings or emotions towards society.

For example -

'X' person is given a gun to 'Y' that he will use in self-defense or if you think it is needed.

Now he is well aware of whom he has to shoot or not.

What about robots or AI?

Do they have feelings?

How do they handle the situation?

They will just follow the order and start firing at others without knowing who is coming from the front.

From the point of advantage, it is now easy for agencies or companies to identify and locate the people who are crimes or planning to do so.

²⁴ <https://www.aitimejournal.com/what-is-artificial-intelligence-ai/29625/>

Cyber Crime -

At the crime scenes of a murder case, we have to find the evidence. For example -

- Fingerprints
- Blood sample
- Footprints
- Weapon
- Car or bike

Apart from this, from where the accused entered and from where he escaped after doing the crime.

Now, what about cybercrime?

There is no crime scene, no fingerprint, no blood sample.

Then, we have modern technology,

For example -

'X' is the person who gets a message from an unknown number that you have won Rs 1,00,00,000/- in a lucky draw. He is very excited by that message.

In the message, it is written that you have to click on this link and have to fill in the details later on.

'X' person filled in the form, bank details, etc.

Finally, he has to share the OTP which he has received from the bank.

After entering the OTP, within seconds, his saving was transferred from his account to someone another account without his consent or his knowledge.

He just shared the details of his account and what happened!

His savings were transferred to an unknown person.

For these types of cases, the Cyber cell deals with this type of situation.



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²⁵ <https://knowledge.insead.edu/operations/professionalisation-cyber-criminals>

Conclusion

In this paper, I have discussed the topics which I am mentioning,

- Crime Scene Investigation
- Forensic Psychology and Crime Investigation
- Investigative Techniques in Forensic Science
- Collection and Preservation of Forensic Evidence
- Role of DNA Profiling Technology
- Role of Forensics in Identification of Accused and Victim
- Role of Toxicology, serology, and Narcoanalysis in Investigation
- Forensic Psychology: Brain Mapping, Polygraph, and Narco-Analysis
- Forensic Evidence and Expert Opinion
- Artificial Intelligence

Forensic science and criminal investigation are very interesting topics. The two different fields and two different states of mind work together on the same platform and solve the case as a team.

From the initial to the conclusion of the case, everything is connected.

After reading this paper, you will get some idea of how forensic science helps the investigating team in solving the case.

W H I T E B L A C K
L E G A L