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Brutal Revenge Killing: Police Syncing in with Forensics to Pave the Way for Justice: A Case Study

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Abstract:
A crime investigation is a cryptic puzzle that has to be solved with adroit investigative work, deciphering evidences with the power of science. To fit together various big and small pieces of a puzzle is a tricky task. Even a small missing piece leaves the entire work incomplete. Investigation of violent crimes such as homicide requires extensive teamwork on the part of investigating agency and forensic science. In a revenge murder case, the culprit's wrath on victim's uncle was vented on victim, an innocent child of 13 yrs, who was killed. Victim was kidnapped by the culprit and he demanded to behead victim's uncle and send the photos. Coaxing and pleading by the family members went futile. Police came into action after launch of complaint and the culprit was nabbed within hours. Proper collection and preservation of evidences (digital and biological) by the investigation authority proved helpful for forensic analysis. Analysis of CCTV footages, mobile call recordings and DNA analysis proved the sequence of events and connected the culprit with the crime. Forensic reports played a pivotal role in delivering justice. The honorable court relying upon the scientific reports, convicted the culprit of the offence and sentenced him to suffer double imprisonment for life and to pay a fine of Rs. 50,000/- and in default, to suffer further imprisonment for one year. The case investigation was awarded **"Kendriya Grihmantri Dakshata Padak"** for the year 2024 which is considered as the highest award in the field of investigation.

Keywords: Crime scene investigation, scientific evidences, digital forensics, forensic DNA analysis, court judgment, Kendriya Grihmantri Dakshata Padak.

Introduction:

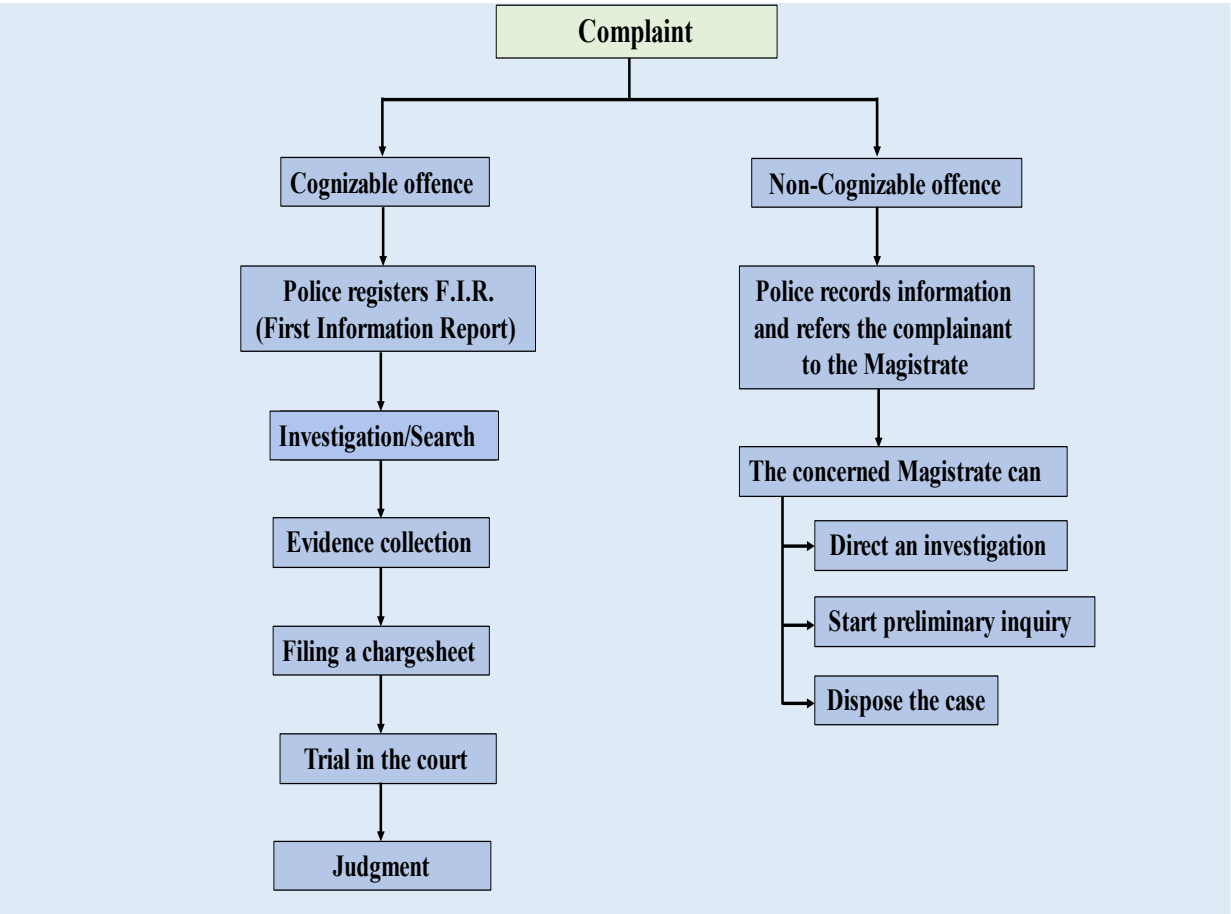
Maharashtra Police responsible for the law and order in the state of Maharashtra, India works on the motto **"सद्रक्षणाय खलनिग्रहणाय",** which means "To protect the good and to restrain the wicked". Maharashtra

is the third largest state of India area wise, with large urban agglomeration, it is second most industrial state and Maharashtra Police Force is one of the largest police forces in the country. Whenever any person (complainant/ victim) gives information about an incident to the police, depending on whether the incident is a cognizable or non-cognizable offence, the police files an F.I.R. (in cognizable offences), first information report. The complainant is given a copy of the registered complaint and an investigation officer (I.O.) is appointed. The I.O. starts a detailed investigation of the crime which comprises of recording statements of complainant, culprit and witnesses, crime scene investigation such as inspecting and securing crime scene, collecting evidences, taking the concerned for medical examination, conducting forensic analysis of collected evidences and samples collected from medical officer.

The police then

- files a chargesheet with the court if there is sufficient proof to support complaint.
- files a final report if there is no proof to support complaint.
- files a cancellation report if it is found that no crime was committed.
- files an untraced report if the culprit is not found.

The general procedure of any police complaint and its journey can be summarized in the following flowchart:



Lee P. Brown, an American politician, criminologist and businessman has written in his book, Policing in the 21st Century: Community Policing -

"Thoughtful and responsible police leaders endeavour to use resources available to them in the most effective ways. In order to do so, police administrators must approach the job of policing with fresh and open minds, not wedded exclusively to outdated concepts that they have used for long periods of time."

In the present case, when the culprit came to know that the victim's uncle was not in favour of his love affair with a girl of victim' family, he had hatred towards the uncle. Meanwhile the girl was married somewhere else and there was a rumour that the victim's uncle sexually harassed culprit's mother. Keeping these two things in the mind, culprit wanted to take revenge, but as the victim's uncle was well built, he was not able to hurt him directly. He was looking for some suitable soft target to fulfil his evil motive of revenge. Victim, a cricket lover, was abducted by the culprit by luring him to play cricket and took him to the nearby forest on a bike where he was stoned to death before slitting the veins of right hand with surgical blade. The culprit was demanding beheaded picture of victim's uncle to release the boy. He also derived sadistic pleasure while describing how he was torturing the teenager by hanging him from the tree and leaving him gasping for breath. It was learnt that the culprit kept on negotiating with the family members by concealing the murder. He kept on demanding the beheaded picture of the teenager's uncle until he was nabbed by the police. This case is a tragic reminder of vicious revenge cycle. One innocent life was taken, to say nothing of the countless others – friends, family, neighbours – who were traumatized by the killing. This violence is as senseless as it is heartbreaking, not to be tolerated.

In today's scenario, rarely a crime is committed where there is no use of digital gadgets. Therefore, the I.O. must focus on collecting and preserving these electronic evidences along with biological and physical evidences. Digital evidence also called as electronic evidence is data that is in digital format which can be relied upon and used in the court of law. Digital evidence can be obtained from any device that stores digital information and it can be data intercepted while it is being transmitted. It is very fragile in nature, damageable, easily alterable/destructible and require special tools to retrieve. Because of its fragile nature, it becomes very important to take precautionary measures while collecting, preserving and examining digital evidence, so as to make it worthy to be admissible in the court of law [1].

Digital forensics is the application of science to recognize, collect, examine and analyse data taking precaution to maintain its integrity and a chain of custody for the data [2]. The mechanism of uncovering digital evidence from the digital devices i.e. digital forensic analysis is a structured and process driven investigation that ensures the integrity of the data. The core stages of a digital forensic analysis include identification, collection, analysis and presentation [3].

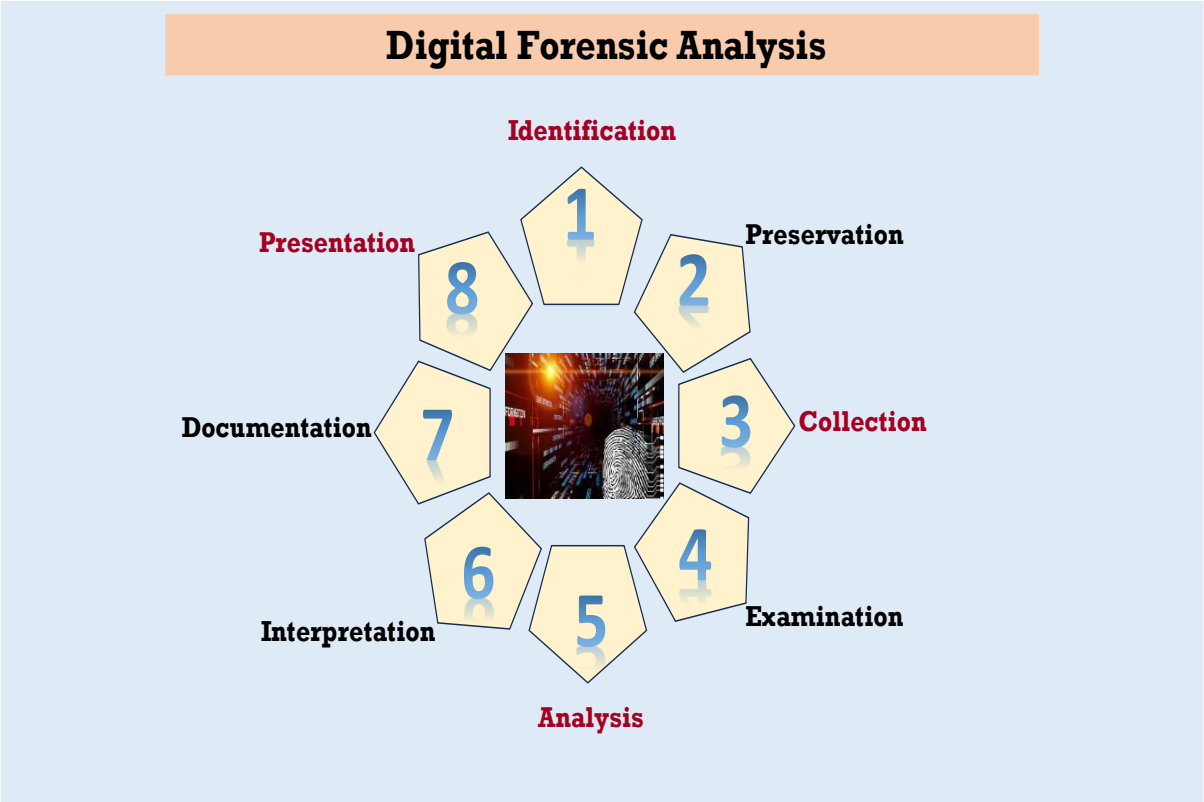
Identification: It involves identifying all the devices and resources that may have relevant data for analysis. This could include organizational devices like desktops, laptops, servers, network systems, digital video recorders and personal devices like smartphones, tablets and external storage media. The investigating officer must have a clear insight into the nature of crime so as to identify the devices required for analysis. Once identified, each device is then secured to prevent any possibility of data tampering. If the data is on servers or in cloud storage, only the investigation agency is allowed to access the data for its security and integrity.

Collection: The next stage is the collection of data. The digital forensic expert uses specialized techniques to extract all potentially relevant data to create a "forensic image", which is an exact bit-by-bit digital copy of the original data. This ensures that the original data is not modified in any way,

remains untouched during the analysis. This process must be documented to ensure replication if required. Even if the analysis encounters any unforeseen issues, tampering of original data or data loss is avoided by this procedure.

Analysis: Analysis involves a detailed inspection of the collected data to pick out relevant portions of information that may be used as evidence. This stage often requires sieving large volumes of data to determine the valuable content. This process includes (i) file or data carving used to identify and recover deleted files by locating and reconstructing file fragments and (ii) keyword searches which involves using specific keywords to locate and analyse relevant information, including deleted data.

Presentation: After completing the analysis stage, the forensic expert creates a detailed report consisting a summary of investigation, the methods used, the evidence collected and the conclusions drawn from the analysis. It is essential to present the findings in clear and concise form and the technical aspects should be explained in a manner that is easily understood by non-experts. All the pertinent evidence should be communicated in an understandable and persuasive manner, thereby supporting the judicial process.



The exhibits received in the Regional Forensic Science Laboratory, Nagpur for audio and video analysis included:

1. Reference photographs of culprit (facing front side, left side and right side).
2. Reference photographs of victim (available photographs).
3. Reference photographs of culprit and victim at different CCTV locations.
4. Video recordings of different CCTV locations in pen drive.
5. Audio files containing speech recordings of culprit and family members in pen drive.
6. Audio files containing speech recording of culprit i.e. specimen voice of culprit.

Tools such as 1) Logicube Falcon-Neo 3.2, 2) Tableau Imager, Ver: 1.2.0, 3) Encase 7.10.04.05 and 4) Amped FIVE Professional v1 were used for reading pen drive, memory card and analysing video and audio files.

The process of digital forensics starts with forensic imaging. It is the process of creating an exact duplicate (or image) of a digital storage device such as pen drive or memory card. This duplicate is then analysed with the original device unstirred. Some of the most important advantages of forensic imaging are:

1. Preservation of original data: By creating a forensic image, the expert ensures that the original data is not compromised. While working with an exact copy of the original, if any changes are made, it will not affect the original evidence.
2. Large amounts of data can be analysed with ease: A digital storage device can have hundreds or thousands of gigabytes (GB) of data. Manual checking of data becomes time consuming and some crucial pieces of evidence may get missed out.

After creating forensic image of the pen drives, hash values were generated. Hash value is generated during data acquisition [4]. By generating hash value for an amount of data, it can be later compared with the hash value of the received data to verify if any alterations occurred during transit. Just as DNA is used to authenticate biological evidence, hash value is used to authenticate digital evidence [5]. A hashing algorithm takes the data, runs a complex calculation on it and gives a fixed-length strings called hash value. Hash values are important when the evidence is admitted into the court because even the smallest bit of data alteration will lead to a completely new hash value.

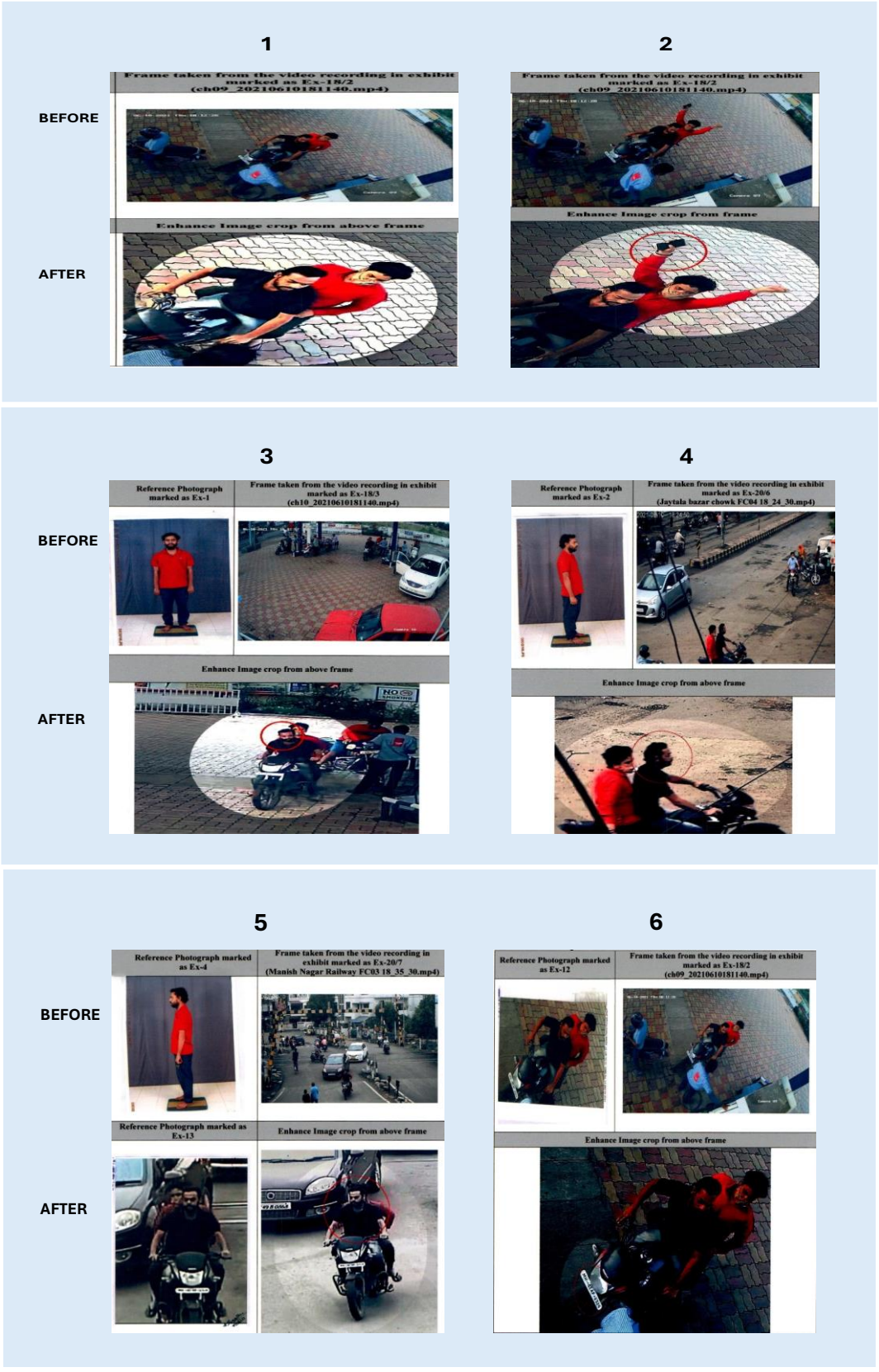
Video analysis was done by Amped FIVE Professional v1 tool. It is used for video framing, enhancing video or particular frame of the video. Reference photographs of the culprit and victim were matched with the persons in the CCTV footage video by video analysis or frame by frame analysis. After the video analysis and subsequent frame by frame analysis, it revealed that

- the persons in questioned video recording at the petrol pump and other two locations appeared similar to the reference photographs of culprit and victim.
- the bike number plate of culprit as per the police forwarding letter was observed in the reference photograph from video recording at petrol pump. This reference photograph was provided by the police authority.

Challenges faced by the forensic expert during video analysis:

- Frame by frame analysis of video
- Low resolution made it difficult for person identification
- Long distance of the cameras

Despite all these challenges, culprit and victim were identified travelling together on the date of crime. The registration number of the vehicle used by the culprit was also identified.



Some examples showing before and after images of video enhancement.

The next part of the digital forensics in this case was audio analysis. It involves systematic examination and scientific interpretation of the audio recordings. A wide range of activities like authentication, voice identification, speaker profiling, transcription and interpretation, enhancement, speaker attribution, stress

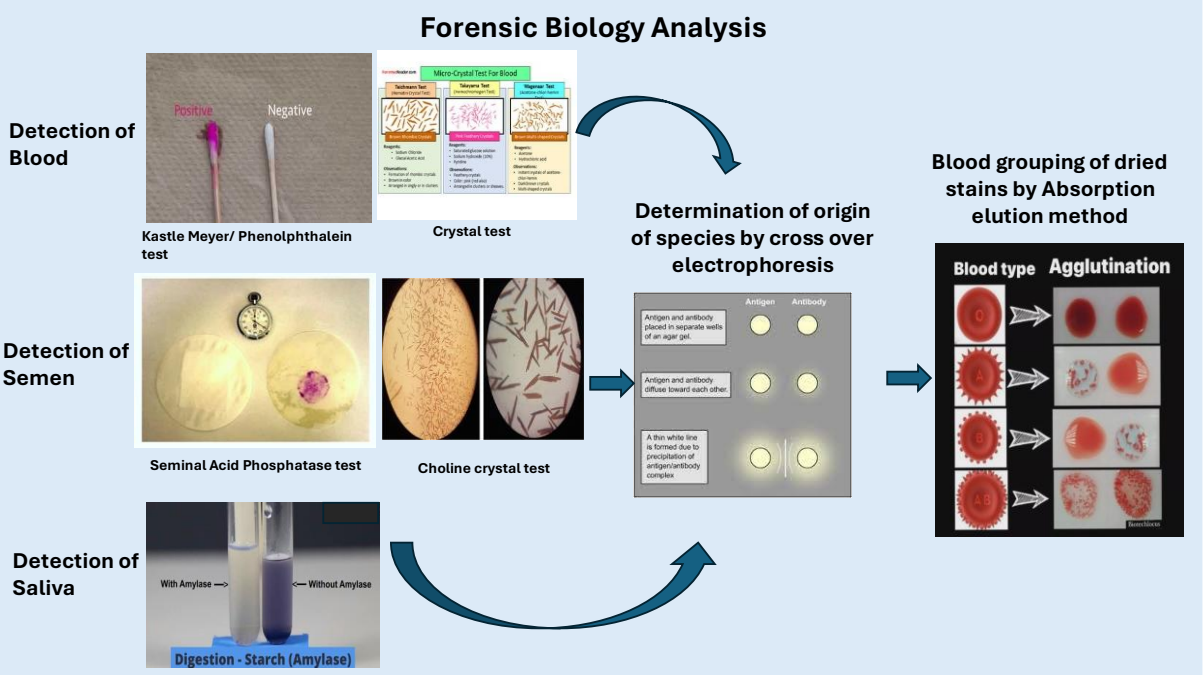
analysis, and Forensic Phonetics are carried out during audio analysis [6]. Any audio file received must be assessed for authenticity, content enhancement and interpretation probability and whether relevant to the investigation [7]. The audio recordings received for forensic analysis are generally made in nonideal surroundings and usually have noise, distortion and interfering sounds which lead to signal degradation. To improve the audibility of the digital evidence, audio enhancement is to be done. It is accomplished with processes operating in both the time domain (noise gates and automatic gain controls) and in the frequency domain (frequency-selective filters) [8]. Forensic audio enhancement requires experience and patience to do meticulous experimentation that will obtain useful results.

Another aspect of forensic audio analysis is critical listening. Critical listening means to focus on the technical aspects of the sound. It is also called as evaluative or interpretive listening. The forensic expert carefully listens to the audio and any irregularities or changes are noted. Speaker identification involves identification of individual speaker traits found in recorded speech to infer the speaker identity [9]. The assessment process is described in the report and evaluation regarding whether the audio file is genuine, a copy or has been altered in any manner is given.

The audio files received in the laboratory were mobile phone call recordings between culprit and family members of victim. The auditory analysis of recorded questioned voice exhibit of culprit and specimen voice exhibit of culprit and subsequent spectrographic analysis revealed that the questioned voice exhibit of culprit was similar to specimen voice exhibit of culprit.

Thus, forensic video analysis helped identify the culprit and victim in the video recording and audio analysis identified the culprit's voice in the mobile call recordings.

Crime scene articles, clothes of victim and culprit and articles collected by the medical officer were sent to the Biology division for detection of blood/semen. Detection of blood on crime scene articles, clothes of victim and culprit was caried out by Kastle-Meyer phenolphthalein test which confirms that the particular stain is blood and precipitin test verifies that it is human blood [10, 11]. After confirming the blood to be of human, grouping of dried blood stains is carried out by Absorption elution method. It is a reliable and sensitive method for determination of A, B, AB and O blood group [12].



Blood-stained articles from the crime scene, bloodstains on weapon, victim's and culprit's clothes, the blood and nail clippings of the victim were referred for DNA analysis to DNA division. Identification of individuals based on their unique genetic makeup is possible because of state-of-the-art procedure called DNA profiling. The human body is made up of cells and nearly every cell in the human body has the same DNA. It was found that certain regions of DNA contained repeated DNA sequences. DNA regions with short repeat units (usually 2-6 base pairs in length) are called Short Tandem Repeats (STR). STRs are extensively used in forensic casework across the world during the past few decades [13, 14]. Autosomal STRs are highly discriminating, abundantly present in the human genome, have a low mutation rate and smaller amplicon size. These loci have become very useful markers in human identification, parentage testing & population genetic studies [15].

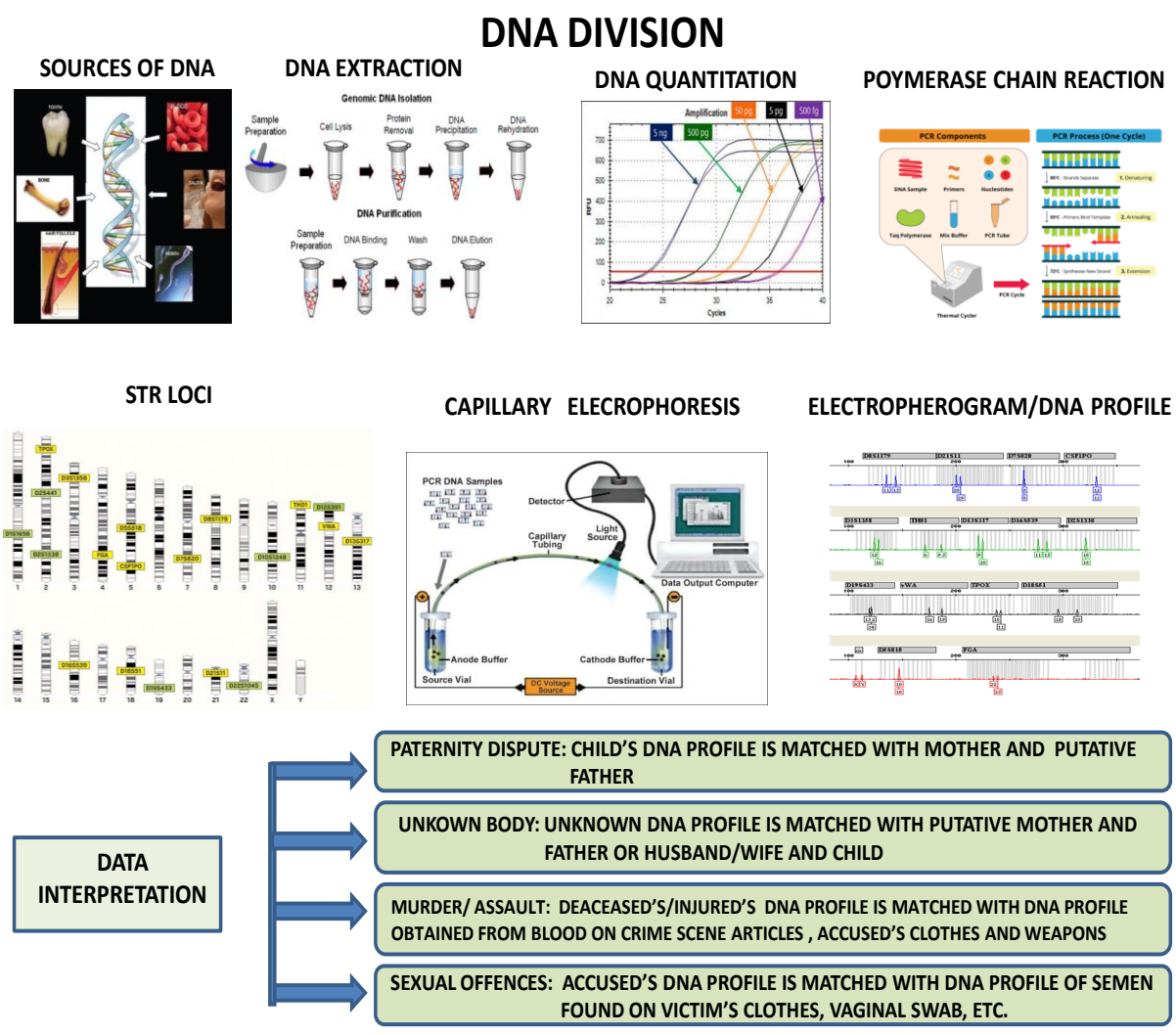
DNA profiling can be divided into four stages:

Extraction of DNA: DNA was extracted from the biological samples using EZ1 Advanced Machine and EZ1 Investigator kits as per the manufacturer's protocol [16]. Operational steps include lysis of the samples i.e. cells, binding the nucleic acids to the beads, washing and finally eluting the nucleic acids.

Quantitation of DNA: Quantification of DNA is used to determine the proper amount of DNA required for downstream analysis so that maximum amount of evidence is preserved for re-examination.

Amplification of DNA: For the interpretation purpose, the quantity of DNA has to be amplified and this is achieved through the Polymerase Chain Reaction technique (PCR). PCR allows the production of thousands of millions of copies of DNA from a very small amount of initial DNA. [17]. DNA amplification was performed using Amp FlSTR® Identifiler kit following the manufacturer's user manual.

Data Interpretation of amplified DNA: Amplified products were separated and detected using 3500 Genetic Analyzer [18]. DNA sequencing is achieved through capillary electrophoresis on automated systems called Genetic analysers. In capillary electrophoresis, DNA fragments attached with dye-labelled primers migrate through a polymer and are hit by a laser at a particular point. The fluorescence that is emitted is measured. The movement of fragments is achieved through Electrokinetic injection which is performed by applying a voltage (kilovolts) at both ends of the capillary. The voltage makes the fragments move through the polymer following the electroosmotic flow. Sixteen STR Loci are simultaneously amplified and analysed [19]. The result is in the form of electropherogram where alleles on all the 16 loci are displayed. This electropherogram is generally referred to as DNA profile.



The DNA extracted from blood detected on articles from crime scene, blood stain on weapon, victim's and culprit's clothes, nail clippings of victim was typed at 15 STR LOCI and gender specific Amelogenin locus using PCR Amplification technique.

The results of DNA typing for each of the above exhibits are summarized below:

STR Loci	**GENOTYPE**						
	Prepared blood stain From stone (weapon)	Hair found on stone (weapon)	Prepared blood stain From Surgical blade (weapon)	Blood stain Full Shirt of victim	Blood stain Full Jeans Pant of culprit	Blood stain Half T-shirt of culprit	Nail clipping of victim
D8S1179	13, 15	13, 15	13, 15	13, 15	13, 15	13, 15	13, 15
D21S11	32.2, 34.2	32.2, 34.2	32.2, 34.2	32.2, 34.2	32.2, 34.2	32.2, 34.2	32.2, 34.2

D7S820	8, 10	8, 10	8, 10	8, 10	8, 10	8, 10	8, 10
CSF1PO	12, 12	12, 12	12, 12	12, 12	12, 12	12, 12	12, 12
D3S1358	16, 17	16, 17	16, 17	16, 17	16, 17	16, 17	16, 17
THO1	7, 9	7, 9	7, 9	7, 9	7, 9	7, 9	7, 9
D13S317	8, 14	8, 14	8, 14	8, 14	8, 14	8, 14	8, 14
D16S539	12, 14	12, 14	12, 14	12, 14	12, 14	12, 14	12, 14
D2S1338	17, 20	17, 20	17, 20	17, 20	17, 20	17, 20	17, 20
D19S433	14, 15	14, 15	14, 15	14, 15	14, 15	14, 15	14, 15
vWA	14, 17	14, 17	14, 17	14, 17	14, 17	14, 17	14, 17
TPOX	11, 11	11, 11	11, 11	11, 11	11, 11	11, 11	11, 11
D18S51	13, 15	13, 15	13, 15	13, 15	13, 15	13, 15	13, 15
AMELOGENIN	X, Y	X, Y	X, Y	X, Y	X, Y	X, Y	X, Y
D5S818	12, 12	12, 12	12, 12	12, 12	12, 12	12, 12	12, 12
FGA	22, 23	22, 23	22, 23	22, 23	22, 23	22, 23	22, 23

Comparison of DNA profiles revealed that:
DNA profiles obtained from blood detected on articles from crime scene, blood stain on weapon, victim's and culprit's clothes, nail clippings of victim are identical and from one and the same source of male origin and matched with DNA profile obtained from Nail clipping of victim.

Results and Discussion: A criminal trial in court which is based on truth and accuracy, depends on scientific evidences. An evidence can be inculpatory- indicating guilt of a person or exculpatory- indicating innocence of a person. Eyewitness testimony, forensic analysis of biological/chemical evidences and video footages are evidences which can be used to prove guilt or innocence. Evidence must have some properties so that it can be useful in the court of law:

- **Admissible:** Collection and preservation of evidence in a recommended way are vital to make it admissible.
- **Authentic:** It must conform with the incident in a relevant way to prove something.
- **Complete:** It must be clear, complete, well aligned and connected to the whole story.
- **Reliable:** The tools and methodology used should not cause any doubt about accuracy and authenticity.
- **Believable:** The forensic expert must be able to explain his analysis and how integrity was preserved.

Forensic analysis of digital and biological evidences in this case clearly connected the crime scene, weapon and culprit with the crime. Detailed information about the chain of evidences on the basis of which Honourable court awarded the sentence is as follows:

- Testimony of witnesses before the court.
- Pancha's statement before the court.
- Circumstantial chain of evidence.
- Statements of experts.
- Scientific/Technical evidences:

1. The blood stains found on the clothes of culprit were of victim as per DNA analysis report.

2. CCTV footages from 12 locations on the path adopted by the culprit after abducting victim were properly collected and preserved and sent to forensic laboratory along with reference photographs. The person carrying the victim was identified as culprit by digital analysis.
3. Audio analysis revealed that the questioned voice in the mobile call recordings of the victim's family members and reference voice sample of culprit were similar.
4. Technical analysis of call details record/ subscriber's details records of culprit and victim confirmed culprit's presence at the crime scene and that he was in contact with the family members of victim.

The investigating officer precisely linked the entire chain of investigation and ably proved it during testimony before court.

The honourable court appreciated the efforts of the investigating officer for investigating the case in professional manner and collecting scientific evidence. After considering the totality of the evidence, the honourable court was of the view that the prosecution had established the case beyond reasonable doubt and gave the order that

1. The accused is convicted under Section 364(A) of the Indian Penal Code and sentenced to suffer imprisonment for life and to pay a fine of Rs. 50,000/- and in default to suffer further imprisonment for one year.
2. The accused is further convicted as per Section 235(2) of the Code of Criminal Procedure for the offence punishable under Section 302 of the Indian Penal Code and sentenced to suffer imprisonment for life and to pay a fine of Rs. 50,000/- and in default to suffer further imprisonment for one year [20].

Thus, the accused is sentenced for double life imprisonment with the order that both the substantive sentences shall run concurrently.

This case was given the best conviction award for the month of June 2023 by The Additional Director General of Police, State Criminal Investigation Department, Maharashtra. The Investigation Officer in this case was awarded the prestigious **"Kendriya Grihmantri Dakshata Padak"** for the year 2024 which is considered as the highest award in the field of investigation.

The "Kendriya Grihmantri Dakshata Padak" has been instituted vide Ministry of Home Affairs' Notification dated 1st February, 2024. It is conferred on members of the Police Forces, Security Organization, Intelligence Wing/Branch/Special Branch of State/ UTs/CPOs/CAPFs/National Security Guard (NSG)/Assam Rifles; and Forensic Science (Central/State/Union Territories) in consideration for excellence in Operations, outstanding service in Investigation, exceptional performance indomitable & daring intelligence service, meritorious work done by Serving Government Scientists in the field of Forensic Science. The medal will be announced on 31st of October every year, i.e., on the occasion of Birth Anniversary of Sardar Vallabhbhai Patel.

Conclusion:

As modernization has become a part of our life, the criminals are also using advanced technology changing the nature and technique of crime. Therefore, it has become mandatory for the investigating agency to be at par with the growing technology and natures of crime. Forensic science is the critical aspect of criminal investigation as it allows to identify suspects and also helps to determine when and how a crime was committed. Forensic analysis assists law enforcement agency by providing accurate, objective analysis of criminal evidence. It does not replace traditional research methods, but complements them. Authorities combine traditional investigative methods, such as observations and interrogations, with forensic analysis to provide most accurate findings. From investigating the facts of a crime to presenting expert evidence, the forensic expert's role contributes to a variety of crime-solving situations. This strong collaboration between police and forensics has led to conviction in the court of law and skilful and systematic handling of the case resulted in conferment of illustrious award at state and national level.

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