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Deciphering Obliterated Signatures using IR Imaging and Reverse Illumination Technique

Rajat Choudhary[1], Pankaj Mohan[2], Anushri Dutta[3], Meenakshy R V[4]
Central Forensic Science Laboratory, Bhopal, MP

Abstract: ***Obliteration of signatures in questioned documents poses a significant challenge to forensic document examiners, especially when layered with multiple interfering substances such as scribbled pen strokes and correction fluid. This study underscore the efficacy of ultraviolet (UV) and infrared (IR) imaging, using the Docucenter Nirvis system integrated with PIA 7000 software, in deciphering obliterated signatures. Two illumination approaches, front-side and reverse-side were employed. While front-side illumination failed to reveal the obscured content, reverse-side illumination combined with appropriate IR filtering and digital processing enabled successful retrieval of the original signature. The results underscore the importance of reverse illumination as a viable and essential technique in the forensic examination of tampered documents.***

Keywords: Obliteration, signature, decipherment, illumination

[1 &2] Scientist-B Documents, Central Forensic Science Laboratory, Bhopal.
[3 & 4] Forensic Professional, Documents, Central Forensic Science Laboratory, Bhopal.

I. INTRODUCTION

Obliteration is a deliberate act of making written or printed content unreadable with the intention of concealing or destroying the original information. In forensic document examination, obliteration refers to a situation where original writings, signatures, or entries are covered, masked, or erased using various means to prevent their detection and recognition. Common methods of obliteration include overwriting the original text with heavy pen strokes, applying thick ink or marker lines, smudging with ink or pencil, using correction fluid, scratching the surface of the paper, or applying chemicals to destroy the writing. The primary objective behind such acts is to ensure that the underlying writing cannot be read with the naked eye, thus concealing crucial information which may have evidentiary significance. The decipherment of obliterated writings requires the application of specialized forensic techniques such as oblique lighting, transmitted light, ultraviolet (UV) or infrared (IR) illumination, and digital image processing to differentiate the obliterating medium from the original ink or impression. Successful decipherment can reveal concealed entries, authenticate documents, and establish facts that are critical in legal proceedings. In the present case study, obliteration was carried out using a two-step method: initially, the original signature was scribbled over with pen strokes to distort its features, followed by the application of correction fluid to mask it completely. This posed a significant challenge, as both physical and optical obstructions were involved, necessitating a combination of advanced examination techniques to restore and interpret the obliterated signature effectively.

II. BRIEF OF THE CASE

A partnership deed was received in the forensic laboratory from the investigating agency to decipher an obliterated signature of one of the partners. The signature had been completely masked using correction fluid, making it invisible to the naked eye. Such obliteration raised suspicions of deliberate concealment to challenge the authenticity of the document. Considering the legal importance of the deed, systematic forensic techniques were applied to reveal the hidden signature without damaging the document. The examination aimed to establish the identity of the signatory, assist the investigation, and ensure that the true facts are presented for fair judicial proceedings.

III. LABORATORY EXAMINATION AND RESULTS

The obliterated portion of the document was carefully and thoroughly examined under ultraviolet (UV) and infrared (IR) light using the Docucenter Nirvis equipment integrated with PIA 7000 software. The document was analyzed under various magnifications, and the following two attempts were made to decipher the original signature beneath the obliteration:

1) Attempt 1: Illumination from the Front Side

The obliterated area was illuminated from the front. Observations revealed two distinct layers of obliteration. The first layer consisted of scribbled pen strokes. The second layer was applied using correction fluid.

Despite multiple wavelength trials, the original signature could not be deciphered, as the combined effect of both layers prevented visibility of the underlying text.

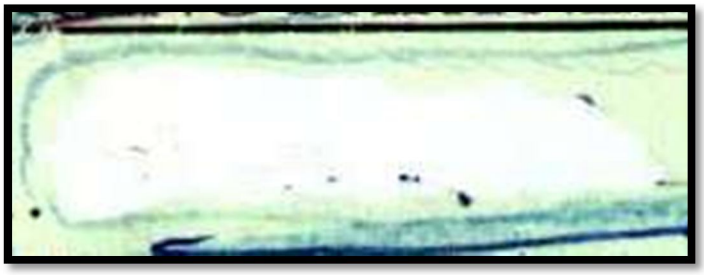

Fig 1: Obliterations made using correction fluid and scribbling of pen strokes

2) Attempt 2: Illumination from the Reverse Side

In the second attempt, the obliterated portion was illuminated from the reverse side of the document. This approach brought the original signature to the forefront, while both layers of obliteration were positioned beneath it. Upon applying a suitable wavelength of light using the LumiIR filter, a reverse image of the obliterated signature was successfully obtained (Fig 2). This reverse image was subsequently digitally flipped using the software's flip tool, which allowed for the decipherment of the original signature(Fig 3).

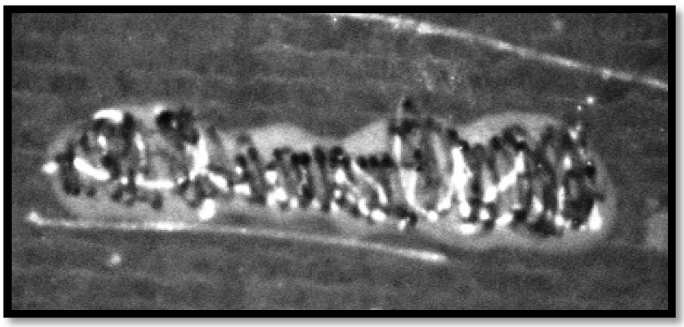

Fig 2: Deciphered reverse image of the obliterated signature.

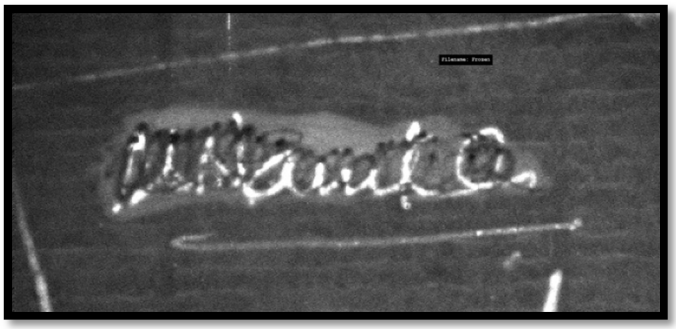

Fig 3: Digitally flipped image of original deciphered signature

IV. CONCLUSION

Reverse-side infrared (IR) illumination, combined with advanced imaging and digital processing, proves to be a powerful and non-destructive technique for deciphering signatures hidden beneath multiple layers of obliteration. While front-side examination often fails due to ink density and overlap, reverse illumination exploits the varying optical properties of inks, making concealed content visible. The integration of IR light with digital enhancement tools ensures accurate recovery of original writings without damaging the document. The results support earlier studies showing that reverse-side imaging is often successful in revealing hidden or covered text.

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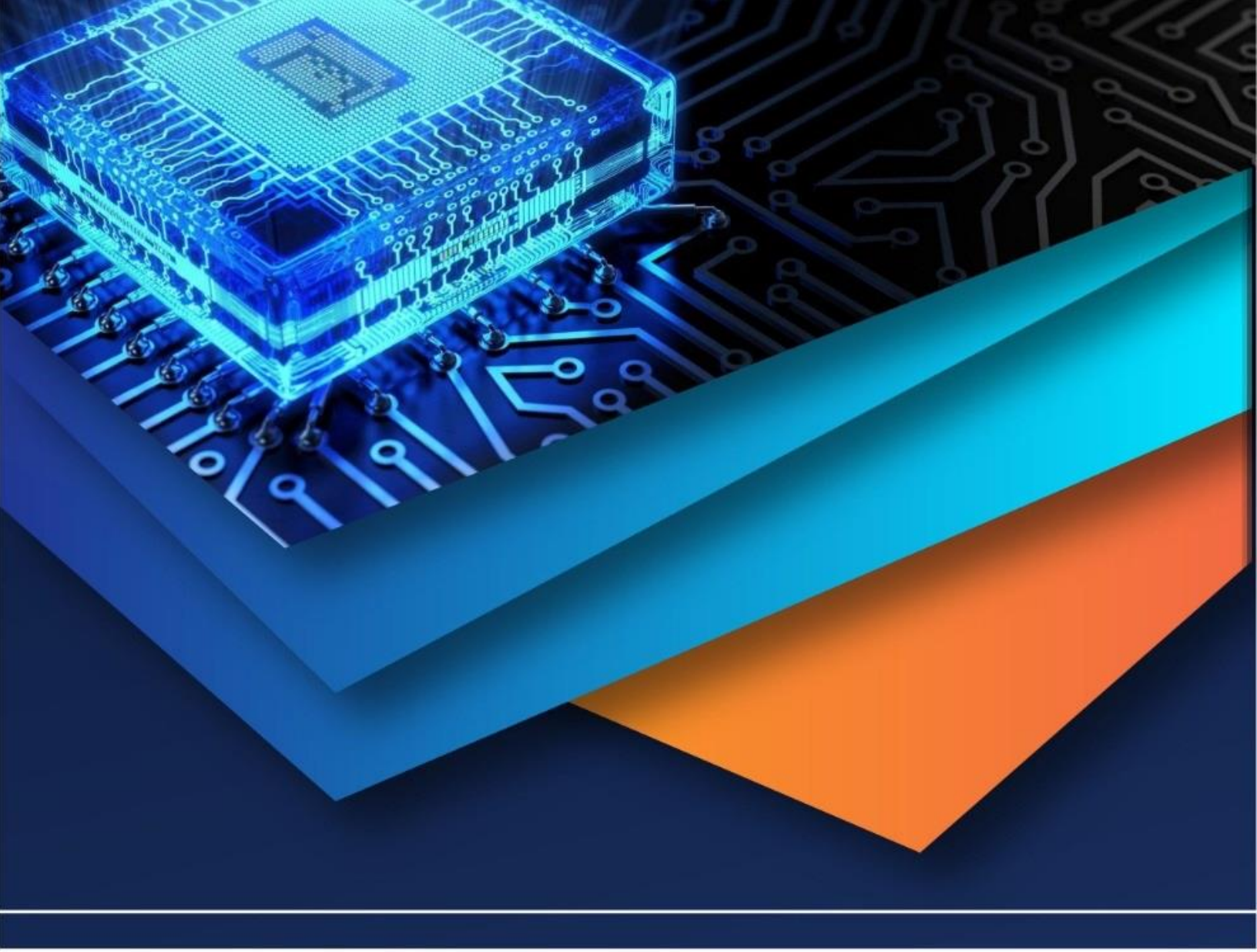

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