

AUDIO-VIDEO FORENSICS

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TYPES OF CASES

AUDIO CASES

- ▶ BRIBE CASES IN ACB TRAP
- ▶ KIDNAP
- ▶ ATROCITY CASES
- ▶ COMMUNAL RIVALRY CASES
- ▶ MURDER
- ▶ THREATNING/ABUSING CALLS

VIDEO CASES

- ▶ CCTV VIDEO IN ACCIDENTS/ATTACK/MURDER ETC.,
 - ▶ IDENTIFICATION OF ACCUSED/VEHICLE NUMBER ETC., IN VIDEO RECORDING
 - ▶ SUICIDE CASES
 - ▶ PORNOGRAPHIC VIDEOS
- 

Whether the Questioned video recording

- a) Is edited or not?
- b) Is tampered or not?
- c) Depicts a single uninterrupted incident or not?
- d) The pictures therein have been morphed/manipulated or not?
- e) Various incidents have been joined to form a single recording or not?

TYPES OF EDITING

1. Real time editing
 2. Post production editing
 - a) Assemble editing – laying one scene after another. Both audio & Video editing is done.
 - b) Insert editing – replacing original video with new video leaving the audio portion intact.
- 
- A series of three parallel white diagonal lines in the bottom right corner of the slide, pointing towards the top right.

I. VISUAL OBSERVATIONS

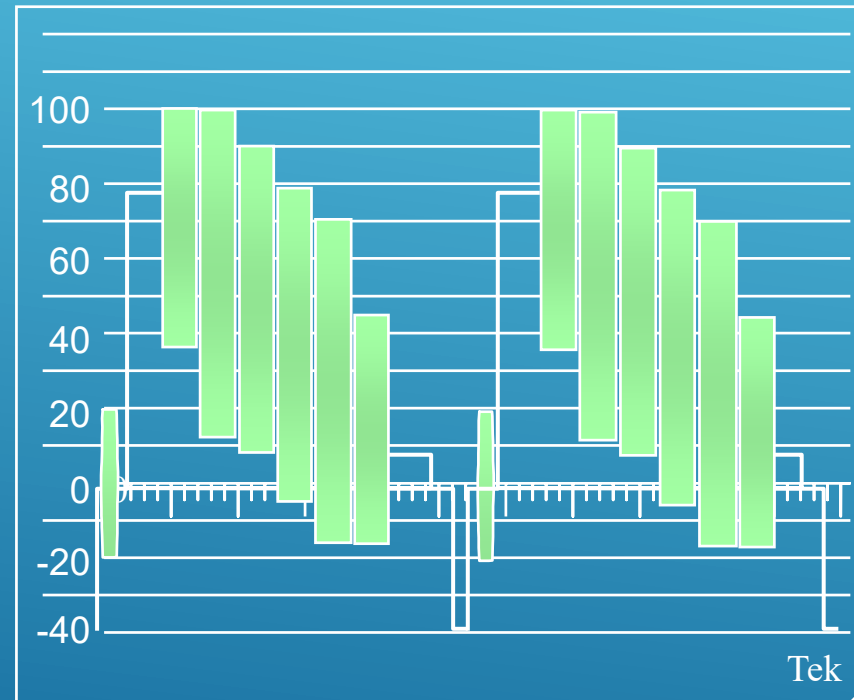
The video recording has to be viewed carefully, observing the scenes, background, smears, vertical jumping, horizontal wavering, colour & hue saturation, any discontinuities, jumps, breaks, abrupt increase/decrease in audio, background sounds, sudden strange sounds, variation in levels of illumination etc.,

II. EXAMINATION UNDER WAVE FORM MONITOR

- ▶ Waveform monitor is nothing but specialized oscilloscope used to evaluate the active video signal recorded in the video cassette. Waveform monitor provides voltage vs time display of the video signal thereby evaluating the luminance portion of the signal. Thus waveform monitor displays signal aberration on the display screen of the instrument.

LUMINANCE AND CHROMINANCE

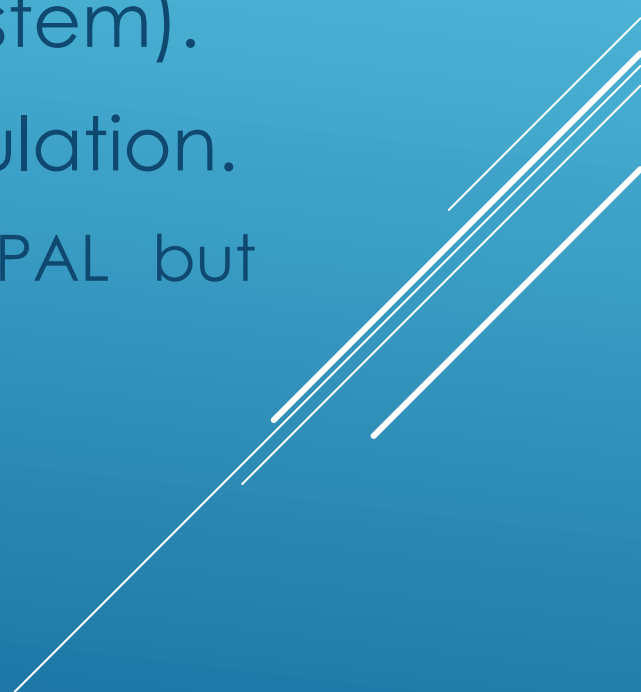
- This is the display for the color bar test signal.



STANDARDS OF VIDEO RECORDING

- ▶ NTSC: National Television Systems Committee.
 - ▶ This standard is followed by the north American countries, S.Koria, N.Koria, canada, Thaiwan etc.,
 - ▶ Equipment: VM700T along with printer (Video Mesurement System)
- 
- A series of three parallel white diagonal lines are located in the bottom right corner of the slide, extending from the right edge towards the center.

STANDARDS OF VIDEO RECORDING

- ▶ PAL: Phase Alteration by Line (European System).
 - ▶ SECAM: Sequential Colour Amplitude Modulation.
 - ▶ Only transmission side this is different from PAL but remaining is similar like PAL.
- 
- A series of three parallel white diagonal lines are positioned in the bottom right corner of the slide, extending from the right edge towards the center.

CAMERA SCANNING PATTERNS

- ▶ Vertical Resolution
 - ▶ 525 horizontal lines per picture. (North America)
 - ▶ 625 horizontal lines per picture. (Most of world)
- ▶ Vertical Scan Rate
 - ▶ Scan at least 48 times per second to reduce flicker.
 - ▶ 525 or 625 lines at 48 times per second difficult to achieve.
- ▶ Interlaced Scan
 - ▶ Show all odd lines one time, all even lines next.
 - ▶ Field
 - ▶ 525 - ~60 Fields
 - ▶ 625 - 50 Fields
 - ▶ Frame
 - ▶ 525 - ~30 Frames
 - ▶ 625 - 25 Frames

THE LUMINANCE VALUES OF THE ACTIVE VIDEO
SIGNAL ARE CAREFULLY STUDIED FOR ANY
ABRUPT CHANGES FOR IDENTIFICATION OF EDIT
POINTS.

Several thin, parallel white lines are drawn diagonally across the bottom right corner of the slide, extending from the right edge towards the bottom left.

III. EXAMINATION UNDER VECTOR SCOPE

VECTOR SCOPE IS ALSO A SPECIALIZED OSCILLOSCOPE DESIGNED FOR ACCURATE EVALUATION OF CHROMINANCE PORTION OF THE SIGNAL. THIS INSTRUMENT DEMODULATES THE PAL SIGNAL AND DISPLAYS THE 'V' (R-Y) COLOUR DIFFERENCE COMPONENT ON THE VERTICAL AXIS AND THE 'U' (B-Y) COLOUR DIFFERENCE COMPONENT ON THE HORIZONTAL AXIS. BY MEASURING CHROMINANCE INFORMATION AND MATCHING BURST OF MULTIPLE SIGNAL, VECTORSCOPE FACILITATES DETECTION OF EDIT POINTS.

A series of white diagonal lines of varying lengths and thicknesses are positioned on the right side of the slide, extending from the middle to the bottom right corner.

ANY ABRUPT SHIFT IN (R-Y) & (B-Y)
VALUES ARE CAREFULLY STUDIED
FOR IDENTIFICATION OF EDIT POINTS

Several thin, parallel white lines are drawn diagonally across the bottom right corner of the slide, adding a modern, geometric touch to the design.

IV. FRAME BY FRAME STUDY

THE VIDEO RECORDING IS CONVERTED IN TO DIGITAL VIDEO FORMAT AND THE DIGITAL IMAGE OF THE VIDEO IS CAPTURED ON TO THE HARD DISK OF THE COMPUTER. FRAME BY FRAME STUDY OF THE DIGITAL VIDEO FORMAT CAN THEN BE STUDIED BY USING APPROPRIATE SOFTWARE SUCH AS AMPED FIVE SOFTWARE TO OBSERVE FOR ANY EDIT POINTS.

Several white lines of varying lengths and angles are positioned in the bottom right corner of the slide, creating a modern, abstract graphic element.

V. OBSERVATION OF LIP SYNC

THE AUDIO AND VIDEO IS LISTENED AND OBSERVED FROM THE BEGINNING TO THE END. THE LIP MOVEMENT OF THE PERSONS IN THE VIDEO WITH RESPECT TO THE AUDIO IS CAREFULLY OBSERVED TO ASCERTAIN WHETHER THEY ARE PERFECTLY MATCHING OR NOT.

AUDIO TO VIDEO DELAY THAT MAY BE OBSERVED CAN ALSO MAY BE MEASURED; THEREBY ESTABLISHING EDITING.

Several white lines of varying lengths and slopes are positioned on the right side of the slide, extending from the middle to the bottom right corner.

VI. STUDY OF TIME CODE

Study of time code (an electrical signal which tracks individual frames for the purpose of editing) for its continuity frame by frame will also yield edit points.

A series of white lines of varying lengths and slopes are positioned in the bottom right corner of the slide, creating a modern, abstract graphic element.

VII. SIMULATED STUDIES

- ▶ Extensive simulated video recording (specimen video) has to be carried out if the original recording devices such as video camera or camcorder is recovered in order to observe for any colour aberrations or any other peculiar characteristics

TOOLS / SOFTWARE USED FOR FORENSIC EXAMINATION OF VIDEO



Amped

FIVE

Forensic Image and Video Enhancement

Conduct investigations with advanced and fully customizable processes for conversion, restoration, enhancement, measurement, presentation

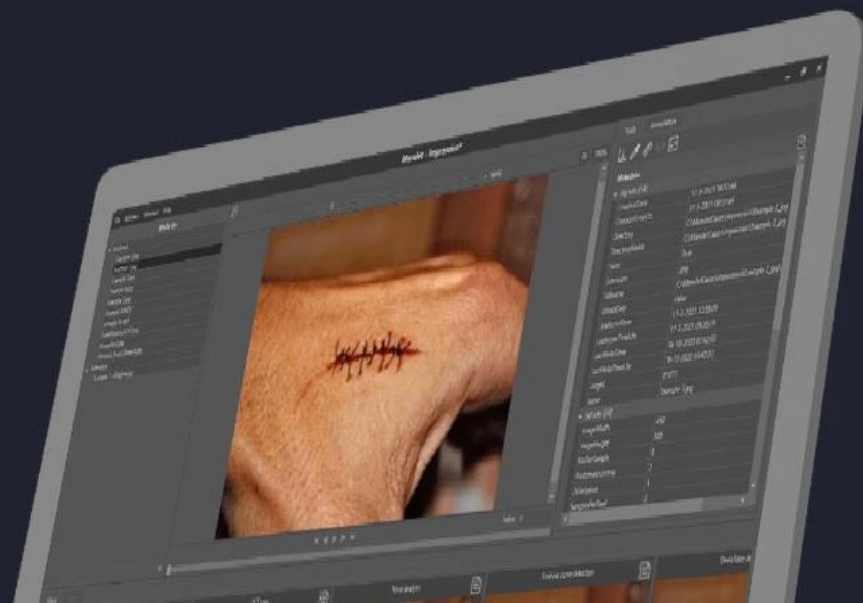


Mandet

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We can no longer trust what we see

The increasing availability of image and video manipulation tools has led to a rise in false imagery and information. Mandet provides an easy to use platform on which images and video files can be investigated. Traces of



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FaceVACS Engine

enables clients to develop new face recognition and facial image analysis applications

Cognitec's products incorporate state-of-the-art technologies relevant to working with facial images, in particular deep learning, computer vision, and pattern recognition technologies. Algorithmic optimization since 1995 has resulted in superior independence from facial variances such as pose, mimic, age variance, different hair styles, glasses or temporary lighting changes.

Customers can license Cognitec's core technology, the FaceVACS® Engine, through customized software development kits.

[Technology made in Germany](#)[Version 9.9 highlights](#)[How to purchase our technology](#)

CCTV VIDEO Footage IN MURDER CASE



11-08-2019 Sun 02:18:58 PM

23 R 4 P403



**ENHANCED SCREEN SHOT SHOWING
ACCUSED**

CCTV VIDEO Footage IN POCSO CASE





Filename	20191107_215619.jpg
Path	phone/raw3/DCIM/Camera/20191107_215619.jpg
Size	4.68 MB
Modified	14-11-2019 16:19:44 (UTC+5:30)
Accessed	07-11-2019 21:56:19 (UTC+5:30)
Exposure Time	1 / 20 s
Focal Length	3.701 mm
F-Number	2.2
Width	4160 px
Height	3120 px
Camera Manufacturer	LG Electronics
Camera Model	LG-M700
Format	jpeg
Rotation	270°
Date of Generation	07-11-2019 21:56:18 (UTC+5:30)
Date of Digitization	07-11-2019 21:56:18 (UTC+5:30)
Source File	phone/raw3/DCIM/Camera/20191107_215619.jpg



 Filename	20191107_215622.jpg
Path	phone/raw3/DCIM/Camera/20191107_215622.jpg
Size	4.97 MB
 Modified	14-11-2019 16:19:40 (UTC+5:30)
 Accessed	07-11-2019 21:56:22 (UTC+5:30)
Exposure Time	1 / 20 s
Focal Length	3.701 mm
F-Number	2.2
 Width	4160 px
 Height	3120 px
Camera Manufacturer	LG Electronics
Camera Model	LG-M700
Format	jpeg
 Rotation	270°
 Date of Generation	07-11-2019 21:56:22 (UTC+5:30)
 Date of Digitization	07-11-2019 21:56:22 (UTC+5:30)
Source File	phone/raw3/DCIM/Camera/20191107_215622.jpg

17 20191107_215703.jpg



 Filename	20191107_215703.jpg
Path	phone/raw3/DCIM/Camera/20191107_215703.jpg
Size	4.00 MB
 Modified	14-11-2019 16:19:36 (UTC+5:30)
 Accessed	07-11-2019 21:57:04 (UTC+5:30)
Exposure Time	1 / 14 s
Focal Length	3.701 mm
F-Number	2.2
 Width	4160 px
 Height	3120 px
Camera Manufacturer	LG Electronics
Camera Model	LG-M700
Format	jpeg
 Rotation	270°
 Date of Generation	07-11-2019 21:57:03 (UTC+5:30)
 Date of Digitization	07-11-2019 21:57:03 (UTC+5:30)
Source File	phone/raw3/DCIM/Camera/20191107_215703.jpg



CCTV VIDEO Footage IN KIDNAP CASE





CCTV VIDEO Footage IN ATTACK CASE



16-10-2016 21:27:46



CAM 2

PUBLISHING PORN VIDEO

This is a case of unauthorized recording of video chatting between a female person and her fiancé by a cybercafé owner (without the knowledge of the victim girl) and publishing the porn video.

Two CPUs, one CD, one DVD and Web Camera were referred to APFSL for examination.

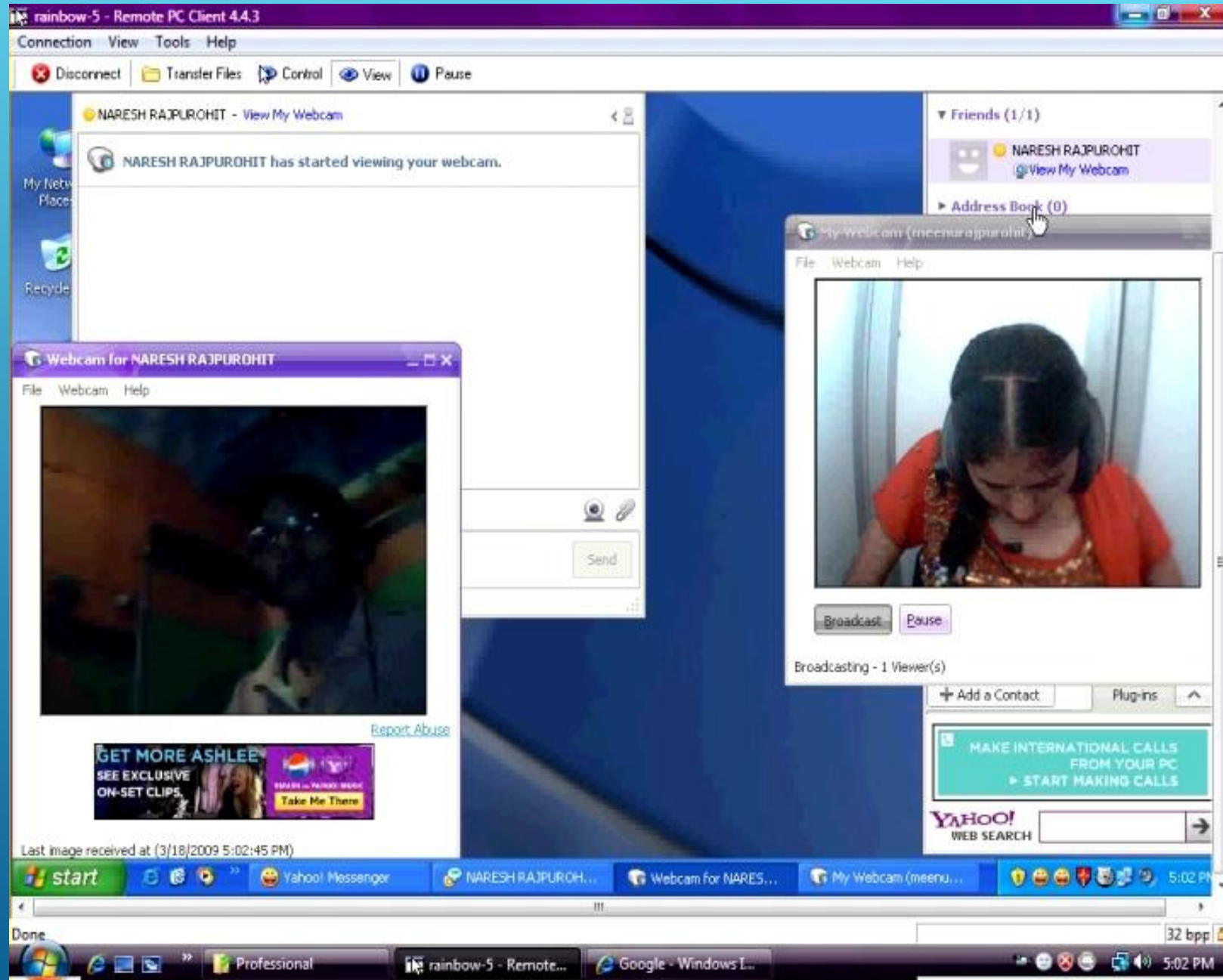
All the items were analyzed using Forensic Software and Hardware Tools.

It is opined that video chat (containing obscene video) between a female and a male person was captured with another computer by using “Rainbow 5 – Remote PC client” software.

COMPUTER USED TO CAPTURE WEB CHATING



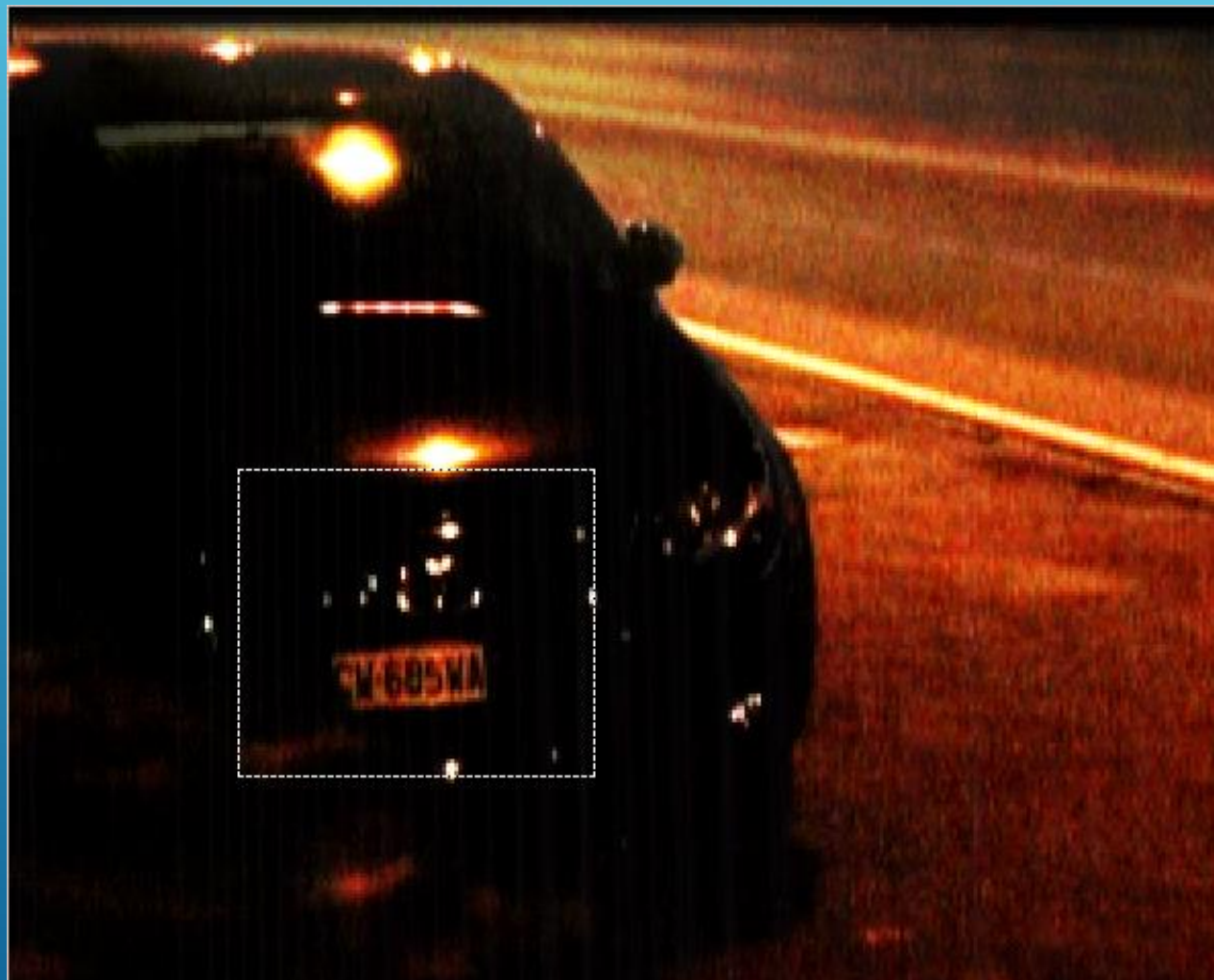
SCREEN SHOT SHOWING TWO TASK BARS



Enhancing a dark license plate:

To enhance a dark license plate in a video file using the Exposure filter, stabilizing it using the Local Stabilization filter, reducing the noise with Frame Averaging and modifying a filter while showing the impact it has on the others.





FIRE ACCIDENT

- Origin of fire found in the CCTV footage



VIDEO FOOTAGE IN A BRIBE CASE





UM700T Video Measurement Set

Channel A System Default

16-Dec-03 14:57:21

Volts

0.5

10.0

APL = 40.
625 line P
Slow clamp

ync Off

2 3 4



IMAGE AUTHENTICATION





IMAGE AUTHENTICATION

IMAGE -1

Evidence Image: C:\Users\User\Desktop\video class\Amped Authenticate\PHY 30 2019\1.jpg

Reference Image:

Size: 3264x4928, JPEG, Q: 98%, Camera: NIKON CORPORAT... N

... Visual Inspection

File Format

... JPEG Structure

Hex Viewer

Hex Strings



.... JPEG QT

.... JPEG HT

.... Social Media Identification

Thumbnail

- Global Analysis

 DCT Plot

Project

Select a bookmark to view and edit the description.

ID	Name	Evidence Image Value	Reference Image Value
70	[IPTC] ApplicationRecordVersion	0	
71	[IPTC] DateCreated	2015:06:02	
72	[IPTC] TimeCreated	00:07:45+00:00	
73	[Photoshop] IPTCDigest	053fa9f77d933e5894d9bcf9a81676d9	
74	[Photoshop] XResolution	300	
75	[Photoshop] DisplayedUnitsX	inches	
76	[Photoshop] YResolution	300	
77	[Photoshop] DisplayedUnitsY	inches	
78	[Photoshop] PrintStyle	Centered	
79	[Photoshop] PrintPosition	0 0	
80	[Photoshop] PrintScale	1	
81	[Photoshop] GlobalAngle	56	
82	[Photoshop] GlobalAltitude	30	
83	[Photoshop] URL_List		
84	[Photoshop] SlicesGroupName	01	
85	[Photoshop] NumSlices	1	
86	[Photoshop] PixelAspectRatio	1	
87	[Photoshop] PhotoshopThumbnail	(Binary data 7277 bytes, use -b option to extr	
88	[Photoshop] HasRealMergedData	Yes	
89	[Photoshop] WriterName	Adobe Photoshop	
90	[Photoshop] ReaderName	Adobe Photoshop CS5	
91	[Photoshop] PhotoshopQuality	12	
92	[Photoshop] PhotoshopFormat	Progressive	
93	[Photoshop] ProgressiveScans	3 Scans	
94	[XMP] XMPToolkit	Adobe XMP Core 5.0-c060 61.134777, 2010/02/12-	
95	[XMP] ModifyDate	2015:08:22 15:19:39+05:30	
96	[XMP] CreateDate	2015:06:02 00:07:45.10+05:30	
97	[XMP] CreatorTool	Adobe Photoshop CS5 Windows	
98	[XMP] MetadataDate	2015:08:22 15:19:39+05:30	
99	[XMP] ...	...	



IMAGE -2

Evidence Image: C:\Users\User\Desktop\video class\Amped Authenticate\PHY 30 2019\2.jpg

Reference Image:

Size: 4928x3264, JPEG, Q: 98%, Camera: NIKON CORPORAT... N

Filters

.... Visual Inspection

File Format

File Analysis

... JPEG Structure

Hex Viewer

.... Hex Strings

.... EXIF

.... JPEG QT

.... JPEG HT

... Social Media Identification

Thumbnail

- Global Analysis

 DCT Plot

 JPEG Ghosts Plot

Project

Select a bookmark to view and edit the description.

Id	Name	Evidence Image Value	Reference Image Value
67	[IPTC] CodedCharacterSet	UTF8	
68	[IPTC] CodedCharacterSet	UTF8	
69	[IPTC] ApplicationRecordVersion	0	
70	[IPTC] DateCreated	2015:05:01	
71	[IPTC] TimeCreated	23:07:20+00:00	
72	[Photoshop] IPTCDigest	6d761f9aa829113c8545980313f319c7	
73	[Photoshop] XResolution	300	
74	[Photoshop] DisplayedUnitsX	inches	
75	[Photoshop] YResolution	300	
76	[Photoshop] DisplayedUnitsY	inches	
77	[Photoshop] PrintStyle	Centered	
78	[Photoshop] PrintPosition	0 0	
79	[Photoshop] PrintScale	1	
80	[Photoshop] GlobalAngle	30	
81	[Photoshop] GlobalAltitude	30	
82	[Photoshop] URL_List		
83	[Photoshop] SlicesGroupName	03	
84	[Photoshop] NumSlices	1	
85	[Photoshop] PixelAspectRatio	1	
86	[Photoshop] PhotoshopThumbnail	(Binary data 6713 bytes, use -b option to extr	
87	[Photoshop] HasRealMergedData	Yes	
88	[Photoshop] WriterName	Adobe Photoshop	
89	[Photoshop] ReaderName	Adobe Photoshop CS5	
90	[Photoshop] PhotoshopQuality	12	
91	[Photoshop] PhotoshopFormat	Progressive	
92	[Photoshop] ProgressiveScans	3 Scans	
93	[XMP] XMPToolkit	Adobe XMP Core 5.0-c060 61.134777, 2010/02/12-	
94	[XMP] ModifyDate	2015:08:22 15:19:27+05:30	
95	[XMP] CreateDate	2015:05:01 23:07:20.40+05:30	
96	[XMP] CreatorTool	Adobe Photoshop CS5 Windows	



IMAGE -3



Evidence Image: C:\Users\User\Desktop\video class\Amped Authenticate\PHY 30 2019\3.jpg

Reference Image:

Size: 3264x4928, JPEG, Q: 98%, Camera: NIKON CORPORAT... N



Filters



... Visual Inspection

File Format

.. File Analysis

... JPEG Structure

... Hex Viewer

... Hex Strings

... JPEG QT

... JPEG HT

... Social Media Identification

Thumbnail

.. Global Analysis

 DCT Plot

⊕ JPEG Ghosts Plot

Project



Select a bookmark to view and edit the description.

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1	[EXIF] ImageWidth	3264	
2	[EXIF] ImageHeight	4928	
3	[EXIF] BitsPerSample	8 8 8	
4	[EXIF] PhotometricInterpretation	RGB	
5	[EXIF] Make	NIKON CORPORATION	
6	[EXIF] Model	NIKON D7000	
7	[EXIF] Orientation	Horizontal (normal)	
8	[EXIF] SamplesPerPixel	3	
9	[EXIF] XResolution	300	
10	[EXIF] YResolution	300	
11	[EXIF] ResolutionUnit	inches	
12	[EXIF] Software	Adobe Photoshop CS5 Windows	
13	[EXIF] ModifyDate	2015:08:22 15:30:10	
14	[EXIF] YCbCrPositioning	Co-sited	
15	[EXIF] ExposureTime	1/125	
16	[EXIF] FNumber	5.6	
17	[EXIF] ExposureProgram	Manual	
18	[EXIF] ISO	250	
19	[EXIF] SensitivityType	Recommended Exposure Index	
20	[EXIF] ExifVersion	0230	
21	[EXIF] DateTimeOriginal	2014:12:08 02:42:51	
22	[EXIF] CreateDate	2014:12:08 02:42:51	
23	[EXIF] ComponentsConfiguration	Y, Cb, Cr, -	
24	[EXIF] CompressedBitsPerPixel	4	
25	[EXIF] ShutterSpeedValue	1/125	
26	[EXIF] ApertureValue	5.6	
27	[EXIF] ExposureCompensation	+2/3	
28	[EXIF] MaxApertureValue	3.7	
29	[EXIF] SubjectDistance	0.45 m	
30	[EXIF] MeteringMode	Multi-segment	

ID	Name	Evidence Image Value	Reference Image Value
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71	[IPTC] DateCreated	2014:12:08	
72	[IPTC] TimeCreated	02:42:51+00:00	
73	[Photoshop] IPTCDigest	d624d82073fa71e9a091ec949e18542d	
74	[Photoshop] XResolution	300	
75	[Photoshop] DisplayedUnitsX	inches	
76	[Photoshop] YResolution	300	
77	[Photoshop] DisplayedUnitsY	inches	
78	[Photoshop] PrintStyle	Centered	
79	[Photoshop] PrintPosition	0 0	
80	[Photoshop] PrintScale	1	
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82	[Photoshop] GlobalAltitude	30	
83	[Photoshop] URL_List		
84	[Photoshop] SlicesGroupName	02	
85	[Photoshop] NumSlices	1	
86	[Photoshop] PixelAspectRatio	1	
87	[Photoshop] PhotoshopThumbnail	(Binary data 5897 bytes, use -b option to extr	
88	[Photoshop] HasRealMergedData	Yes	
89	[Photoshop] WriterName	Adobe Photoshop	
90	[Photoshop] ReaderName	Adobe Photoshop CS5	
91	[Photoshop] PhotoshopQuality	12	
92	[Photoshop] PhotoshopFormat	Progressive	
93	[Photoshop] ProgressiveScans	3 Scans	
94	[XMP] XMPToolkit	Adobe XMP Core 5.0-c060 61.134777, 2010/02/12-	
95	[XMP] ModifyDate	2015:08:22 15:30:10+05:30	
96	[XMP] CreateDate	2014:12:08 02:42:51.30+05:30	
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98	[XMP] MetadataDate	2015:08:22 15:30:10+05:30	
99	[XMP] ImageTitle	10-105mm-5/2-5-5-6	

IMAGE AUTHENTICATION

- ▶ Received colour photographs and digital images pertinent to 498A case from Hon'ble family court, Kadapa for forensic examination.





Thank You
For Your Attention

