



Forensic Multimedia Unit

Comparative Analysis

Crime Scene/Digital and Multimedia Division



1. Comparative Analysis

1.1. Scope

- 1.1.1. Comparative Analysis provides comparisons of videos, images, and known exemplars. These types of comparisons may be used for demonstrative purposes only; as well as, provide expert opinions that can result in identification, elimination, or inconclusive.
- 1.1.2. This procedure applies to Forensic Multimedia Unit (FMU) analysts whose responsibility is to enhance/clarify digital multimedia evidence for the purpose of conducting comparative analysis.
- 1.1.3. This procedure only applies to comparisons involving vehicles, clothing, objects, and/or distinguishing marks/features. This procedure does not apply to height analysis, speed analysis, etc.

1.2. Limitations

- 1.2.1. Image/video processing and adjustments should assist the analyst in the overall examination. Over-processing could negatively affect the quality of the video/image.
- 1.2.2. Conclusions are opinion-based. Opinions must be corroborated with documentation from a credible source.

1.3. Recommended Equipment/Hardware

- Computer/Laptop – administrative access, CD/DVD optical drive, USB ports etc.
- Media card reader

1.4. Recommended Software

- Adobe Photoshop
- Amped FIVE
- iNPUT-ACE

1.5. Procedure

- 1.5.1. Submitted video/images must first be examined to determine if comparative analysis is a possibility. This must be documented in the case record. Factors affecting this determination include but are not limited to: resolution, distance from camera, artifacts, compression, lighting conditions, camera angles, frame rate, aspect ratio, hardware/recording limitations, etc.
 - 1.5.1.1. If the video/images are not suitable for comparative analysis, a report will be issued informing the requesting agency.
- 1.5.2. Images may need enhancements/adjustments prior to a comparison being done. Refer to the Forensic Multimedia Unit's procedure on Forensic Video/Image Enhancement.



- 1.5.3. Once the image(s) is determined to be of good quality for a comparison, a known item/image must be submitted or identified. This can be done in the following ways:
 - 1.5.3.1. The physical item can be submitted and then photographed by the analyst. This method would be the preferred method for clothing/shoe comparisons.
 - 1.5.3.2. Images of an item can be submitted if the actual item cannot (i.e. vehicle). The analyst must note any factors affecting comparison such as camera angle.
 - 1.5.3.3. An image can be used from credible websites such as vehicle manufacturers. The analyst must be sure to use images of similar nature to the original submitted item (i.e. angle of vehicle). The website address where the image was located must be documented in the case record. In cases where the website may not be found again at a later date, a scan or PDF copy of the website with the image must be uploaded into LIMS.
- 1.5.4. If the known image(s) submitted is not suitable for comparative analysis, and no other options are available, a report will be issued informing the requesting agency.
- 1.5.5. An assessment must be made of the submitted item and the known item to determine any class and/or individualizing characteristics. Once these are determined, a composite can be created. (Refer to *SWGDE Best Practices for Photographic Comparison for All Disciplines* and *SWGIT Best Practices for Forensic Photographic Comparison* for more information)
 - 1.5.5.1. The ACE-V method should be implemented when doing a comparison. Not all comparisons will need this method (i.e. demonstrative comparisons). This method involves four stages:
 - 1.5.5.1.1. Analysis involves the thorough assessment of the properties and attributes of the features contained in the images/video. This will include determining which characteristics are class and/or individual.
 - 1.5.5.1.2. Comparison is the assessment of the similarities/dissimilarities of the characteristics that were identified in the Analysis stage.
 - 1.5.5.1.3. Evaluation is the stage where a tentative conclusion is reached, and the similarities/dissimilarities are tested against it.
 - 1.5.5.1.3.1. Three types of dissimilarities may be observed:
 - 1.5.5.1.3.1.1. Explainable differences = may result from the imaging process or conditions at the scene
 - 1.5.5.1.3.1.2. Unexplainable differences = dissimilarities exist but are of unknown source and may or may not lead to an elimination
 - 1.5.5.1.3.1.3. Exclusionary differences = dissimilarities that are true differences between the images being compared
 - 1.5.5.1.4. Verification is the stage in which the results of the examination are reviewed/evaluated by a second trained and competent analyst. (Refer to 1.8 of this SOP)



- 1.5.6. Using image enhancement software (i.e. Adobe Photoshop), the analyst will create a composite based on the needs of the case. More than one composite may be needed.
- 1.5.7. Noted characteristics whether similar or dissimilar must be documented on the composite (excluding demonstrative comparisons). This can be done using arrows, lines, bullet points, etc.
- 1.5.8. The composite must have the forensic case number, agency case number, and the analyst's initials on it.
- 1.5.9. Images must be clearly identified on the composite so as to show origin.

1.6. Considerations

- 1.6.1. It may be necessary to determine the conditions in which the video/image was recorded (i.e. infrared camera, camera angle, etc.). Photographing/recording the known under the same conditions may be necessary in order to compare. This process must be documented in the case record. If this cannot be done, the analyst must document this as a possible factor affecting the comparison.
- 1.6.2. It is important that the analyst not mistake artifacts as characteristics.

1.7. Conclusions

- 1.7.1. Comparative analysis may require an opinion-based conclusion. The following conclusions can be used when doing a comparison:
 - 1.7.1.1. Similarities = both the submitted item and known item contain similarities but no individualizing characteristics (class characteristics only)
 - 1.7.1.2. Identification = both the submitted item and known item contain the same individualizing characteristics (cannot be determined based on class characteristics alone)
 - 1.7.1.3. Elimination/Dissimilarities = the submitted item and known item contain different characteristics (class and/or individual characteristics)
 - 1.7.1.4. Inconclusive = not enough characteristics to render an opinion
 - 1.7.1.5. Not suitable for comparison = reason for this must be documented in case report
 - 1.7.1.6. No comparison possible = reason for this must be documented in case report
- 1.7.2. Comparative analysis could also be demonstrative in nature. These comparisons will not have an opinion-based conclusion.

1.8. Technical Review

- 1.8.1. A second analyst who is trained and competent in comparative analysis must review each composite and technically review the case.



- 1.8.2. If the second analyst agrees with the composite(s) then the technical review will be done in compliance with the Forensic Multimedia Unit's Administrative/Quality procedures and the HFSC Quality Manual.
- 1.8.3. If the technical reviewer does not agree with the composite(s), the reviewer will discuss it with the primary analyst in the case.
- 1.8.4. If no agreement can be made between the technical reviewer and the analyst, then it must be brought to the unit supervisor/manager's attention and resolved.

1.9. Derivatives

- 1.9.1. The composite(s) with all layers must be saved to the FMU server under the forensic case number's file until all reviews are completed.
- 1.9.2. The composite must be flattened with no layers when saved and returned to the submitting agency.
- 1.9.3. Both technical and administrative reviews must be completed prior to releasing opinion-based comparisons.
- 1.9.4. Demonstrative comparisons can be released after a technical review and with approval from the section supervisor/manager.

1.10. References

- SWGIT Best Practices for Forensic Video Analysis, Version 1.0 2009.01.16
- SWGDE Best Practices for Photographic Comparison for All Disciplines, Version 1.0
- SWGIT Best Practices for Forensic Photographic Comparison, Version 1.1 2013.01.11