C31 A Proposed Framework for Digital Video Authentication

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Learning Overview: After attending this presentation, attendees will understand the proposed authentication process for digital video using methods based upon scientific research and publication in which various analyses may be combined into a framework.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing a logical and scientifically sound process for digital video authentication.

Digital video authentication is a complex process of establishing the provenance of a questioned recording to determine whether it is consistent with an original recording or if there is evidence of alteration. One simply has to look at news outlets or social media to see that our society video records events from births to deaths and everything in between. A trial court's acceptance of videos supporting administrative hearings, civil litigation, and criminal cases is based on a foundation that the videos offered into evidence are authentic; however, technological advancements in video editing capabilities provide an easy method to edit digital videos.

The proposed framework offers a structured approach to evaluate and incorporate methods, existing and new, that come from scientific research and publication. The proposed framework incorporates methods or techniques that are evaluated for reproducibility, repeatability, accuracy, and precision while meeting the general legal requirements (a general application of the *Daubert* standard) recognized by courts in the international community, United States, and many countries around the world.

This presentation offers a quick overview of digital video file creation chain. This also includes factors that influence the final digital media streams and a general description of camera sensor noises for both Complementary Metal-Oxide-Semiconductor, and Charge Couple Device type sensors.

This presentation addresses the overall development and proposed use of the framework, previous research of analysis methods/techniques, testing of the methods/techniques, and an overview of the testing results. The framework provides the forensic video examiner a structured approach to subjecting the questioned video file to a series of smaller tests while using previously published and forensic community-recognized methods/techniques. The proposed framework also has a proposed workflow optimization option for use by management in an effort to manage resources and personnel. The framework has a built-in methodology evaluation tool based upon a general application of the *Daubert* standard. The methodology evaluation tool includes a methodology validation assessment and a legal assessment to aid the forensic video examiner in determining if a proposed method should be included or excluded from use as part of the specific framework protocol for each video file considered for authentication. Also, the proposed framework offers the forensic video examiner a methodology to assess published video and audio authentication techniques recognized in the forensic science community while using generally accepted criteria to test and evaluate the techniques as expected by the courts.

This presentation will also note some limitations to the use of the proposed framework for digital video authentication. The limitations include the following: acceptance of the proposed framework for video authentication by the courts will always be based upon a case-by-case basis dependent upon each case's facts, proper use of the scientific methods, and the overall experience, training, and knowledge of the forensic video examiner who testifies as an expert; the proposed framework is intended for digital video and is not applicable to analog video; and no scientific inquiry, including those in media forensics, produce results of absolute certainty—this includes digital video authentication. The proposed framework uses a philosophy that avoids implying 100% certainty with the exception of known alterations or deletions applied in the underlying testing/experiments for the development of the proposed framework.

This presentation will also note that the framework is designed for incorporation of new digital video authentication methods that are developed in the forensic science community, as they are proven to be based upon scientific research and publication and are accepted in the forensic science community.

Digital Video, Authentication, Camera Sensor Noise

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