



W28 Forensic Multimedia Authentication: Real-Life Challenges and Solutions

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Learning Overview: After attending this workshop, attendees will: (1) be familiar with the latest developments in forensic video and audio authentication; (2) understand criteria used for media authentication; (3) understand how to conduct analysis within a forensic framework; and (4) understand the current challenges and scientific solutions.

Impact on the Forensic Science Community: This workshop will impact the forensic science community by: (1) explaining the scientific approach in forensic media authentication; (2) demonstrating an authentication investigation framework; and (3) discussing tools used to combat multimedia forgery.

Digital multimedia authentication seeks to determine the validity of digital multimedia containers and contents by investigating their format, structure, time, frequency, and pixel and/or sample level features. This workshop will discuss the multimedia authentication process providing the user with methods of authenticating both video and audio. It will also demonstrate the incorporation of multiple tools and techniques into unified frameworks appropriate in forensic examinations where reducing examiner bias and error is crucial.

This workshop will cover video and audio authentication analyses. The goal is to provide an overall view of conducting comprehensive examinations that rely on the results of multiple analyses to inform an ultimate finding or opinion. First covered is a video authentication framework, focusing on camera verification/identification, and image and video attack detection. Photo Response Non-Uniformity (PRNU) are small artifacts of the sensor and can be used as a type of fingerprint for the sensor. For video and images, it can be determined with a high likelihood that a certain image or video has been made with a specific camera. PRNU can also be used for detecting deep fakes. Splicing, copy-move, and removal artifacts are also investigated in a complex video authentication process and will be discussed and exemplified with original and manipulated videos.

In the second section of this workshop, real-life audio challenges and solutions will be presented. The proposed audio authentication framework combines both container and content analysis to determine authenticity of the recording as well as the purported source. Audio container analysis will exploit characteristics of the multimedia file format and structure while content analysis will cover time and frequency domain techniques, including quantization level, power, direct current offset, butt splice, long-term averaged spectrum, long-term averaged sorted spectrum, compression level, and Modified Discrete Cosine Transform (MDCT) analysis.

Multimedia, Forensic, Video and Audio