B26 Future Tools for Forensic Digital Audio Analysis

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After attending this presentation, attendees will understand the changing nature of forensic audio tools and analysis. In addition, attendees will realize that Digital and Multimedia sub-disciplines will have an increasing share of common training, forensic tools, and examination requirements.

This presentation will impact the forensic community, especially the sub-disciplines of computer forensics, forensic audio, video, and image analysis, by showing that interdisciplinary communication and cooperation concerning training and forensic tools are vital and will significantly improve future examinations.

The toolbox for the forensic audio examiner of the future will contain an increasing number of computer forensic methods. A timeline is presented which details the accelerating pace of forensic audio technology and tool development. Current practitioners will recognize many tools and methods which, although important and considered cutting-edge when first developed, have been shelved for more accurate and applicable tools of today. These historical changes highlight the trend that new tools require not only additional qualifications and certifications but also far more technical training for audio examiners. Computer hardware and software analysis, and automated technology will demand higher levels of education and technical degrees in order to explain examination results and implications of the findings to a jury in the courtroom. Issues of tool validation, calibration, and technical applicability are new hurdles that will become more prevalent and necessary when examination results are presented to more and more sophisticated courtroom judges and juries.

Training, qualifications, and laboratory accreditation will become more and more aligned with the field of computer forensics. With the incorporation of forensic audio as part of the Digital and Multimedia Sciences discipline, it is clear that a significant amount of computer forensics training is also needed for many aspects of forensic audio analysis. Only after a significant level of computer-related topics will the training diverge into separate “tracks” for the sub-disciplines of forensic audio, video, and image analysis.

Laboratory accreditation will become more prevalent and expected for both large and small forensic laboratories. This trend may cause a number of smaller facilities to stop forensic audio examinations due to the overhead costs of quality assurance programs, accreditation documentation (e.g., SOP’s), ongoing technical requirements, and maintenance costs of both hardware and software tools.

Enhancement of audio recordings now utilizes some powerful new techniques and methods which were not available in the past. New data processing techniques allow an examiner to view an entire audio file visually to identify areas of clipping or distortion, silence, abrupt changes in environment, and background noise levels, etc. The examiner can then select and apply filtering techniques to the recording in a batch process which usually takes far less time than traditional aural review and filtering in real time. The future holds the likelihood that more sophisticated audio enhancement tools will allow examiners to be even more effective in less time than at any point in the past.

Nowhere has the shift in expectations involved in forensic audio been more profound than in audio authenticity examinations. Many traditional techniques are simply not applicable to today’s digital audio authenticity issues. These include magnetic development and physical inspection of analog evidence tapes. Newly designed methods to authenticate recorded files and identify any alterations have been implemented for some law enforcement digital recorders.

Other aspects of forensic audio analysis will also require specialized examination tools. These tools will apply to many aspects of forensic audio including enhancement, authenticity, voice comparison, automated gunshot detection and analysis, and possibly web-based voice surfing capabilities.

It is proposed that the development of any forensic analysis tool of the future must incorporate independent testing, validation, and certification of those tools. The forensic tool validation process must be timely and applicable. Some larger accredited laboratories already have established testing and validation procedures for new tools. Some of the necessary steps in this process include: (1) identification of potential new forensic tools, (2) researching the capabilities and credibility of the manufacturers or source of the new tools, (3) testing the functions and features of the new tools, comparing results to previous tools and to other standard audio discipline techniques, (4) validation of the new tool’s functions by an objective testing facility, and (5) certification and documentation of the new tool for use in forensic audio analysis.

An example for a digital audio authentication method designed for certain law enforcement recorders that incorporates several computer forensic tools will be presented.

Audio, Authenticity, Future Tools

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