E53 Teaching Forensic Image Processing

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After attending this presentation, attendees will understand the benefits of designing an online program for training in forensic image processing.

This presentation will impact the forensic science community by illustrating how surveillance video is nearly ubiquitous, but many analysts are not adequately trained for forensic image processing.

Video surveillance is widely used and it is expected to increase in the coming years. Not too long ago, only banks had video surveillance and the video was typically acquired with low-quality cameras, recorders, and media. Presently, surveillance video is widely used by many businesses and institutions, in addition to video from law enforcement body cams, Unmanned Aerial Vehicle (UAV) systems, cell phones, and more. Forensic image processing is rapidly becoming a critical skill for the criminologist.

Education in forensic image processing has not nearly kept pace with the ubiquitous video systems. Unfortunately, many criminalists and crime scene analysts have only basic skills in forensic image processing. A challenging situation is often compounded by a lack of proper software, and criminalists find themselves at a technological disadvantage.

Either online or in a traditional classroom setting, forensic image processing can be offered as a suite of specialized courses within an AA or BS program or as a certificate program. Open source software is available that is suitable for forensic image processing, relieving the educational institution of a software acquisition expense plus a wide range of logistical challenges.

As with any specialized curriculum, courses in forensic image processing would have prerequisites. The most important prerequisite is linear algebra, and courses such as undergraduate physics and computer science would be needed. With the extensive course offerings from Massive Online Open Courses (MOOCs), a student can easily satisfy prerequisites.

Like many other forensic sciences, forensic image processing is procedural and can be dissembled into a series of operations. This process can be presented in a data flow context and courses in the curriculum can be designed and offered to reflect this data flow perspective. This data flow would be based on the operations needed to correct or suppress the typical video image flaws. These flaws result from internal and/or external noise that is superimposed on a video image, improper lighting that causes saturated or dark images, and improper camera calibration and/or emplacement.

Noise suppression or removal can be accomplished with digital filtering. An understanding of this important technique is critical for a video image analyst. An entire course could be dedicated to this topic and include both theory and practice.

One of the methods for minimizing the effect of improper lighting is modifying the pixel brightness histogram. This topic, which would include a variety of techniques, is as important as digital filtering and, similarly, an entire course would be needed to ensure analyst competency.

The other major topic, suppressing or removing the effects of improper camera calibration and/or emplacement, can partially be addressed with digital filtering and histogram modification; however, a third course could be designed for specialty topics, such as feature identification, classification, sensor and data fusion, and more.

Education, Video Surveillance, Image Processing

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