



G23 Digital Image Processing for the Forensic Dentist

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Learning Overview: After attending this presentation, attendees will: (1) be able to differentiate between malicious and non-malicious image processing; (2) be aware of the existence and availability of several computer apps used to change digital graphics; and (3) know how to crop, resize, and change the format of digital images.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by allowing forensic dentists to be aware of how digital images can be manipulated.

Digital images are captured, viewed, manipulated, shared, and stored by forensic dentists. Computers and digital records encompass two distinct fields in forensics. Computer forensics, also known as computer forensic science, is a branch of forensic science pertaining to evidence found in computers and digital storage media, while forensic photography, also referred to as crime scene photography, is an activity that records the initial appearance of the crime scene and physical evidence as an aid in investigation and to provide a permanent record for use in the courts and the legal system.

The forensic dentist needs to be aware of the difference between malicious and non-malicious image processing. The purpose of malicious image processing is to deceive the viewer. In dental radiography, caries, fracture, and other pathology can be added to a digital image to aid in obtaining reimbursement from a third-party payer.

Non-malicious image processing makes a graphic easier to view and may highlight the detail in a specific portion of the graphic. The cropping of an image allows the eyes to focus on the subject, while eliminating extraneous elements. Adjusting the brightness, contrast, and color balance of a poorly exposed photograph can yield a more pleasing and informative image.

The marking detail of individual teeth in a bitemark graphic can, at times, be enhanced by adjustment of the color levels. This type of image processing is known as feature extraction and is intended to facilitate human interpretation.

In bitemark images, four distinct types of distortion have been identified, some of which can be corrected by image processing.

The processing of an image leaves tell-tale signs. The detection of image processing relies on various techniques and is known as recognizing if a graphic has been “photoshopped.” The presence of signs of image processing can range from very subtle to quite evident. Shadows and reflections should be realistic in location, size, and depth. Skin color should not appear too perfect or polished. Round selection tools may leave obvious circular patterns in the manipulated graphic. Areas that show excessive blurring and the presence of irregular or broken lines in patterns also reveal evidence of image manipulation.

The working knowledge of the use of several computer applications will benefit the forensic dentist. These applications include the GIMP image manipulation program, Windows® Snip® tool, and Google’s® reverse image search. These apps are available online at no charge. This presentation will guide the forensic dentist in the utilization of these apps to process images and to detect the presence of image manipulation.

Digital, Image, Forensic