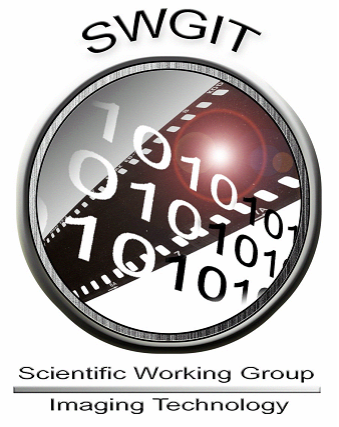

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Section 18

Best Practices for Automated Image Processing

Objective

The objective of this document is to provide personnel with guidance regarding the use of automated image processing.

Introduction

It is common in the evaluation and processing of forensic imagery to use integrated software applications/libraries, hardware, or both that can have automated functions. These automated functions, called "components" in this document, may reduce complex operations to a single "button-push". This can increase productivity and reliability within an organization, but the use of these applications can encourage the naïve user to perform tasks without adequate knowledge of the underlying principles and their impact on the resulting output image. This can lead to inappropriate application of certain algorithms and the use of automated methods when manual processing would be more suitable. It is the responsibility of the practitioner to know how automated methods in their equipment and laboratories work, to know that they work and to know when to use them.

Scope of this document

Automated processes can be found in hardware as well as software. In digital cameras, a great deal of automated image processing can occur, and many of these operations may be under the control of the user. Image processing within a camera performed as part of image acquisition that is not under user control should be considered simply part of nominal camera function. User-controlled in-camera image processing constitutes image processing just as if it was done on a computer and image processing guidelines apply. (See SWGIT document "*Guidelines for Image Processing*") This document provides guidelines for the use of automated processes regardless of platform or application.

The Practitioner Must Know How The Application Works

Many software applications and systems provide access to a large suite of components, many of which are not useful to a particular laboratory or for a specific examination. The practitioner must demonstrate knowledge and competency of those components used but does not need to demonstrate it for those components that he/she does not use.

The practitioner must understand the basic principles of the component and the effects of changing settings within the software application. It is important to understand what artifacts are likely to be produced using any particular component of a software application and how to recognize and interpret them. The user must be able to recognize when a component is not functioning correctly and what steps, if any, can be taken to mitigate this.

Practitioners should attempt to obtain adequate documentation on the principles and implementation of the components in the application used in the laboratory. In some cases, such as open source software, the implementation may be well documented and the source code is available. In other cases, sufficient documentation may be provided by the manufacturer. It may not be necessary for documentation to contain explicit implementation or mathematical details, but it should provide enough information for the practitioner to understand the principles and use. If such documentation is not provided by a manufacturer, then the component should be used with caution. If sufficient understanding of the principles underlying the component cannot be obtained, then the component should not be used. It may be necessary for the practitioner to obtain formal training in the theory or application of the algorithms implemented within components above and beyond manufacturer documentation and vendor-based user-focused courses.

Different software applications may provide the same labeled function using different algorithms or implementations with different numbers and types of settings that can affect the result of applying that function. If the practitioner uses multiple applications, he/she should be aware of these differences and their functional significance.

The Practitioner Must Know That The Application Works

The use of a particular software application must be validated for its intended purpose. Likewise, periodic verification should ensure that the components function properly. If validation or verification fails, then practitioners should know what mitigating steps to take.

Many software applications and integrated systems offer periodic upgrades and updates. While these are often desirable, they are not necessary if the current version performs adequately and meets the needs of the laboratory.

When upgrades or updates are incorporated, the agency must determine and document whether this constitutes a major or minor modification. If deemed “major”, then it is recommended that the application or system be re-validated. If deemed “minor”, then simple verification is appropriate.

The Practitioner Must Know When To Use An Application

The practitioner must know when it is appropriate and not appropriate to use a given component. Even within an appropriate class of images, a given component may have limited utility. The practitioner must know the limits of a given component and how to recognize when those limits are exceeded.

Document Automated Image Processing

Automated image processing that takes place within a camera is typically recorded and preserved in the metadata of the image file. Therefore, there is no need to document this processing in any other manner.

Automated image processing that is performed by an application outside of the camera should be documented. This may be done either through the use of a laboratory SOP and/or as part of the notes on a case-by-case basis as determined by individual agencies. See SWGIT document “*Best Practices for Documenting Image Enhancement*” for more information.

REFERENCE LIST

SWGIT and SWGIT/SWGDE documents can be found at www.swgit.org

Section	Title
Section 1	Overview of SWGIT and the Use of Imaging Technology in the Criminal Justice System
Section 2	Considerations for Managers Migrating to Digital Imaging Technology
Section 3	Field Photography Equipment and Supporting Infrastructure
Section 4	Recommendations and Guidelines for Using Closed-Circuit Television Security Systems in Commercial Institutions
Section 5	Guidelines for Image Processing
Section 6	Guidelines and Recommendations for Training in Imaging Technologies in the Criminal Justice System
Section 7	Best Practices for Forensic Video Analysis
Section 8	General Guidelines for Capturing Latent Impressions Using a Digital Camera
Section 9	General Guidelines for Photographing Tire Impressions
Section 10	General Guidelines for Photographing Footwear Impressions
Section 11	Best Practices for Documenting Image Enhancement
Section 12	Best Practices for Forensic Image Analysis
Section 13	Best Practices for Maintaining the Integrity of Digital Images and Digital Video
Section 14	Best Practices for Image Authentication
Section 15	Best Practices for Archiving Digital and Multimedia Evidence (DME) in the Criminal Justice System
Section 16	Best Practices for Forensic Photographic Comparison
Section 17	Digital Imaging Technology Issues for the Courts
Section 18	Best Practices for Automated Image Processing
Section 19	Issues Relating to Digital Image Compression and File Formats
SWGIT/SWGDE	Proficiency Test Program Guidelines
SWGIT/SWGDE	Guidelines and Recommendations for Training in Digital and Multimedia Evidence
SWGIT/SWGDE	Recommended Guidelines for Developing Standard Operating Procedures
SWGIT/SWGDE	Glossary of Terms