A216 Evaluation of Universal Latent Workstation for Automated Minutiae Detection

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After attending this presentation, attendees will understand that the minutiae in a single person's fingerprint will change from one deposit to another on similar and different substrates. They will also learn that computer software programs used to automatically extract minutiae in a fingerprint are not always accurate and their assigning of minutiae changes from impression to impression as well as by the positioning of the area of interest selection box.

This presentation will impact the forensic science community by demonstrating the ability of the universal latent workstation to automatically extract minutiae in two consecutively deposited fingerprint exemplars and two consecutively deposited latent fingerprints.

A fingerprint is made up of ridge paths that form minutiae points which a latent print examiner uses in comparisons and identifications. Some examiners use software programs in the evaluation phase before comparisons to find minutiae and judge latent print quality that can aid in reducing searching time. There are a number of vendors that sell latent print search software that can also extract latent print minutiae. However, these vendors all use different computer algorithms to assign search print minutiae which cannot be readily compared because of proprietary source codes. Unfortunately, these vendors sell to multiple agencies at the local, state, and national level. This presents a problem of scanning a fingerprint using one vendor's software and trying to find a potential match in another system. The Universal Latent Workstation (ULW) was developed by the Advanced Technology Unit, Criminal Justice Information Services (CJIS) Division of the FBI to aid in solving this problem. ULW is a program developed to identify and extract minutiae in fingerprints so the print can be encoded once and searched many times in a number of vendor systems. ULW uses an algorithm called MINDTCT which locates and records minutiae.

The purpose of this preliminary study is to determine what changes, if any, are detected by ULW when minutiae are auto extracted in two sequentially recorded inked prints and in two sequentially lifted controlled latent prints using black fingerprint powder. It is expected that there will be relatively high accuracy in auto extraction in both the sequential prints and that there will be a low number of incorrectly located and labeled minutiae with few artifacts; to wit: identified and plotted minutiae where none is present.

Several volunteers supplied record inked fingerprints, controlled latent prints, and actual latent fingerprints in the collection of a ground truth fingerprint sample set for another study. Only the right index finger, finger number two, was recorded 30 times on three standard fingerprint cards using black ink. The volunteers also provided latent prints on glass slides with both uncontrolled and controlled pressure. Another latent print was collected by adding one pound of lead sheeting to a beaker and having the volunteer momentarily lift the beaker from and return it to a countertop. Two sequential recorded inked prints were randomly chosen for this preliminary study as was a single controlled latent from a glass slide. The latent print was visualized using black fingerprint powder and lifted twice. The second lift was accomplished without the reapplication of powder. The inked and latent prints were cropped and scanned at 1000ppi.

It is expected that when latent fingerprint examiners comparing fingerprints from the same individual, even if they are on different substrates or if the print has been lifted multiple times, the same minutiae should be detected. However, for a software program like ULW, it will be expected that when those same fingerprints are encoded, there will be variability in the number of minutiae assigned depending on the quality, clarity, and contrast of the print as well as the number of times the print was lifted and where the area of interest selection box is positioned.

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Ground Truth; Fingerprints; Universal Latent Workstation

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