



Questioned Documents Section - 2013

J7 Role of Automation in the Forensic Examination of Handwritten Items

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After attending this presentation, attendees will be updated on the research on automation of examination procedures.

This presentation will impact the forensic science community by providing the status of research regarding automation of a forensic handwriting analysis.

The most common task in Forensic Document Examination (FDE) is the examination of handwritten items. Procedures for handwriting examination developed by the FDE community have been refined over several decades, and described among several standards published by the American Society for Testing and Materials (ASTM). During the last few years, the artificial intelligence community has also developed several software automation tools for FDE. Some of these tools attempt to replicate human FDE procedures, e.g., for determining whether a given handwriting specimen can be attributed to the writer of the known writing. As with expert systems in other manually intensive procedures, such as medical diagnosis, current automation tools are useful only as part of the overall procedure. Incorporating the computational approach within the standard FDE procedure not only places these tools in context but also helps validate and improve existing manual procedures. The standard work flow in FDE of handwritten items is considered and the steps where automation is available or possible is annotated. In this instance, the well-known Lindbergh kidnapping case is considered. The case involved multiple, handwritten ransom notes which were tested for the presence of multiple writers on the same, and all, documents; determining whether the writing is disguised; consideration of the effect of comparing formally-written known writing with informally-written questioned writing, etc.

The necessary groundwork has already been laid down with the ASTM document Standard Guide for Examination of Handwritten Items which lists steps that forensic document examiners follow when examining and comparing bodies of writing. Hereinafter, this will be referred to as the standard procedure, as it represents the knowledge engineering necessary for an expert system. For the validation purpose, the standard procedure has been vetted and accepted by the FDE community. When following the standard procedure, the examiner often needs to make several decisions, since every case has special needs, e.g., ransom notes could be written by multiple writers, thus requiring comparison of document sub-parts; with historical manuscripts; different writers may be more similar to each other than with contemporary writers; thus requiring recalibration of individualizing characteristics; and, there is always the potential for disguised writing. The standard procedure will be described and steps will be annotated where existing and future computational tools are useful. The well-known Lindbergh ransom note case was chosen as it is familiar to the forensic community, and illustrates the range of problems to be considered, including extended writing, addressed envelopes, disguise, poor quality images, writer training, and, finally, expression of an opinion.

The CEDAR-FOX system is an interactive tool for FDEs which assists in performing several steps of the standard procedure. First the questioned and known documents are scanned, then several interactive tools are available for preparing the document for processing, which would assist in isolating particular words, reducing image noise, and removing unwanted artifacts. The standard FDE procedure for handwriting can then be cast in computational terms, and used to systematize and validate expert human procedures. Automation tools are available to perform many of the steps. The findings for the particular ransom note case using the tools are given. Observations are made for developing a more fully automated approach to FDE.

Handwriting, Automation, Computer