J16 Preliminary Trends in Frequency Occurrence of Handwriting and Hand Printing Characteristics

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After attending this presentation, attendees will have an understanding of how the results of this project will benefit their daily work and court presentations. The objective of this presentation is to provide a pilot preview of early results of a frequency occurrence study. In addition, attendees will receive a brief tutorial of the use of the database system used for characteristics classification.

This presentation will impact the forensic science community by putting the judiciary and critic communities on notice as to the advancements of strengthening the statistical basis of handwriting conclusions used in court.

In 2010, the National Institute of Justice (NIJ) awarded a research grant for the study of the frequency occurrence of selected handwriting and hand printing characteristics. This study is a statistic-driven project requiring exacting methodological precision that will withstand an expected onslaught of criticism from those who have created a cottage industry out of such attacks.

The NIJ study is designed to classify approximately 2,000 handwriting or hand printing characteristics of approximately 5,000 writers. The population sampling is being collected using a stratified sampling representative of the population within the United States and taking into account instrinsic and extrinsic factors that may affect handwriting as described in *Handwriting Identification: Facts and Fundamentals* by Huber and Headrick.[1] Factors considered include age, ethnicity, sex, handedness, region of early elementary education, and location of collection. The percentages of each factor must fall within a range (such as plus or minus five percentage points) of what is recognized as the makeup of the United States population. For example, if twelve percent of the United States population is left-handed, then the stratified sampling must be within a range of seven to seventeen percent.

The handwriting specimens form content is a modified version of the specimen form used by Dr. Sargur Srihari in earlier published studies of handwriting and pattern recognition.

The handwriting characteristics have been selected and tested for objectivity and repetitiveness of results in order to avoid unnecessary integral error rate increase. Each feature has undergone, among other tests, an Attribute Agreement Assessment study in which multiple examiners have classified the same handwriting forms and have themselves classified the same handwriting forms more than once. Characteristics that are found to bear variances of results, either from the multiple forensic document examiners or by the same examiner in two different classification exercises, is either modified to eliminate the issue causing the confusion or has been excluded from the study as being unnecessarily subjective.

A database system has been specially developed for this project. Every feature bears a brief description with most accompanied by an image illustration. By design, a classifier need only click their computer mouse in the check box in order to note the presence of a denoted feature. The database will automatically record the result. Multiple handwriting specimens can be recorded on a database and the results will then be sent to the database specialist who will integrate all databases and submit the results to the statisticians for analysis. It should be noted here that the forensic document examiners have no part in this portion of the study and this is by design. The project is a statistical study and is driven by statistical methodologies. Any decisions as to procedures in this study are the sole responsibility of the statisticians.

Trained forensic document examiners are used for the purposes of classification in the database. The reason for this is that it will be forensic document examiners who will be the end users of the project as they will be able to enter features from writings in question in actual casework and collect frequency results to their case-specific entries. As part of the presentation, attendees will be guided through a tutorial on the use of the database as volunteer classifiers are an essential need of this project and will be solicited from amongst the attendees who are practicing forensic document examiners with documented training meeting the ASTM training guideline.

As part of the pilot projects, the statisticians have arranged for a pilot study of a small number of writers in order to test the complete system for seamless integration. Since the pilot study will also yield actual results, it is the purpose of this presentation to present the results along with presenting idiosyncrasies that have thus far been observed during the study.

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Reference:

1. *Handwriting Identification: Facts and Fundamentals*, Roy A. Hueburn and A.M. Headrick (1999), CRC Press, Boca Raton, FL, ISBN O-8493-12895-X

Statistics, Handwriting, Frequency

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