

Criminalistics 2

Using Statistical Analysis to Assist with Writer Identification

Mr. Michael Wakshull, Q9 Consulting, Inc, United States

Abstract: Identification of handwriting relies on the document examiner's ability to discover the variability of the subject's known writing. Although qualitative assessment is prone to judgment error by the document examiner, variability in forensic document examination is often presented in qualitative rather than quantitative terms. Qualitative analysis is typically neither repeatable nor reproducible. A quantitative approach to writer identification can and should be used to reduce bias and errors in document examiners' opinions.

Literature shows that variability of the proportions of height of a person's written letters remains stable within common cause variability across writing sessions. This presentation applies aspects of statistical process control to determine whether a writer of a known document is a potential author of a questioned document, based on such variability.

For example: The ratio of the height of lower case letters extending into the upper zone and height of lower case letters remaining in the middle zone is calculated. The ratios of the length of lower case descenders to the height of middle zone letters are calculated. For each calculated ratio a run chart is created for the ratios of the known writing. The same is performed for the slant angle of a given letter.

The standard deviation of the ratios or angles are computed to one, two, and three sigma. These measurements are plotted to create a control chart.

The measurement of the angle or ratio of the questioned writing is plotted on the control chart to determine how the questioned writing compares to the known writing with respect to the variability of the known writing. The number of standard deviations from the mean of the known writing is explored to determine writer identification.

The null hypothesis is if the ratio of the given letters in the questioned writing falls beyond 2.5 standard deviations from the mean the questioned writing may have been written by a person other than the known writer. The result is an indicator of authorship rather than a conclusive determination.