



Criminalistics Section – 2007

B165 Fractal Analysis of Fingerprints: A New Approach

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After attending this presentation, attendees will learn of a new approach to the analysis of fingerprints.

This presentation will impact the forensic community and/or humanity by demonstrating the analysis of fingerprints is not restricted to fingerprints but rather can be applied to the characterization of patterns in general, the implication for the forensic community are very broad.

The traditional approach to the analysis of fingerprints is local in the sense that relative positions of individual features, the minutiae, are measured and recorded. Subsequently, in the matching process, such a list is compared to other similar lists. This approach has a number of serious failings. First, this approach is qualitative and not quantitative. Secondly, efforts to automate the process have not been overly successful, for example, if the fingerprint is not properly aligned (i.e., rotated by a handful of degrees) the analysis will fail. Thirdly, if only partial fingerprints exist the local approach will also fail.

A global approach to the analysis of fingerprints is being developed. In this approach points in the fingerprint are randomly sampled and these random samplings are used to construct a unique fractal. In turn this fractal is analyzed using traditional mathematical techniques. As a consequence, this approach allows for quantitative comparisons of fingerprints. Moreover, the random sampling of the fingerprint is accomplished in a manner that is independent of the orientation of fingerprint and thus the difficulty associate with the orientation of the fingerprints is avoided. Due to the global nature of the method of analysis, partial prints can also yield results that are useful in effort of matching prints.

This presentation will outline this approach and introduce the Scale Spectrum of a fingerprint. This spectrum, which measures the scale of features within the fingerprint, is central to this method. It is a measure of global properties of the fingerprint and consequently can be constructed from partial prints. In addition it is defined do as to be independent of orientation.

Fingerprints, Fractals, Pattern Analysis