

Wavelet analysis of resultant velocity belonging to genuine and forged signatures

ABSTRACT

This study presents a wavelet analysis of resultant velocity features belonging to genuine and forged groups of signature sample. Signatures of individuals were initially classified based on visual human perceptions of their relative sizes, complexities, and legibilities of the genuine counterparts. Then, the resultant velocity was extracted and modeled through wavelet analysis from each sample. The wavelet signal was decomposed into several layers based on maximum overlap discrete wavelet transform (MODWT). Next, the zero crossing rate features were calculated from all the high wavelet sub-bands. A total of seven hypotheses were then tested using a two-way ANOVA testing methodology. Of these, four hypotheses were conducted to test for significance differences between distributions. In addition, three hypotheses were run to provide test for interaction between two factors of signature authentication versus perceived classification. The results demonstrated that both feature distributions belonging to genuine and forged groups of samples cannot be distinguished by themselves. Instead, they were significantly different under the influence of two other inherent factors, namely perceived size and legibility. Such new findings are useful information particularly in providing bases for forensic justifications in establishing the authenticity of handwritten signature specimens.

Keyword: Forensic science; Maximal overlapped discrete wavelet transform; Resultant velocity; Signature examination; Statistical hypothesis testing; Two-way ANOVA