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Online signature verification modeled by stability oriented reference signatures

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Abstract

Signature verification is widely used in the fields of finance, access control and security. However, one of the biggest problems associated with signature verification is its instability. This instability may concern specific fragments of a signature or its entirety. The location of the unstable fragments in a signature depends on individual writing styles, which makes the signature verification more difficult, resulting in a negative impact on recognition effectiveness.

In this paper the authors propose a new method of signature verification. The key stage of this approach is the determination of reference signature stability. The proposed signature stability measure, based on fuzzy set theory, is a biometric strategy that has never been used before. The fragments of one reference signature that differ from the corresponding fragments of the remaining reference signatures of the same person are treated as unstable fragments and will not be taken into consideration when comparing the reference sample with the signature being verified. The proposed method employs fuzzy sets to extract a signature's stable fragments.

To test the proposed method's performance, seven different classifiers were used: PSO oriented, k -Nearest-Neighbor, Naive Bayes, Random Forest, RIDOR, Support Vector Machine and J48. Experiments conducted on the two independent datasets demonstrated that the method proposed here returns highly satisfactory results, outperforming the other state-of-the-art methods.

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