Offline Signature Verification Using Similarity Measure for Skeletons

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Digital signature becomes more common for author identification, however handwritten signature still plays an important role in several aspects of life, e.g., business and bank sector. Offline signature verification methods analyse the images and shapes of the signatures. The main challenge in offline (and online) signature verification is the intra-class variability of the signatures: it is a known fact that every individual has variations in his or her own signatures. It means if someone writes two signatures after each other they will never be the same. Over a longer period of time the writing style may vary even more.

In this paper we present an offline signature verification method. Signature verification methods consist of preprocessing, feature extraction, and classification steps. As preprocessing segmentation was applied on each signature images to produce binarized signature image. In the feature extraction step the centerline was extracted for each signature images.

For pairwise comparison centerlines were normalized and registered to each other. As similarity measure we used one that Lee, Lam, and Suen proposed for quantitative comparison of 2D centerlines [1]. This measure has a value in range $[0, 1]$, where higher value represents higher similarity.

In the classification phase for each author the reference signatures are compared pairwise. One reference distance $\mathcal{R}_i$ is calculated for author i, based on statistical values (i.e., mean and variance) of the pairwise distances. Then, each questioned signature of author i is compared to each reference signature. A questioned signature is accepted as genuine if its similarity is above $c \cdot \mathcal{R}_i$, otherwise it is rejected (considered as forged). For evaluation of the proposed method the multiplier c is varied in a range and false acceptance and false rejection rates are calculated as a function of this multiplier.

The proposed method has been evaluated on the publicly available SigComp2011 database and the results are competitive to the systems submitted to the concerning competition.

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References

[1] S.-W. Lee, L. Lam, and C. Y. Suen, "A systematic evaluation of skeletonization algorithms," *Thinning Methodologies for Pattern Recognition*, vol. 8, pp. 239–261, 1994.