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Off-line signature verification system using artificial neural networks.

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Handwritten signature recognition method is the most popular recognition method of a personal identity. But it is easy to misuse that the signature forgery has become a great threat to the accuracy of the documentary. In this paper, we present an off-line signature recognition method using an Artificial Neural Network (ANN) created using *Matlab* (Matrix Laboratory). A signature dataset consisting of 248 signatures (both genuine and forged) of three different owners, used to train the network. First, the signatures were preprocessed enabling extracting their features. Then some geometrical features were extracted from each signature to feed as the inputs to the neural network. Each image was converted to a binary image and after identifying the geometric center, the image was divided into four segments. Again identifying the geometric center of each segment, each segment was divided again into four segments. Geometrical features from each segment were extracted and used as inputs to feed the network. A single neural network was created to execute both authentication and verification steps of the signature recognition. The network topology is optimized to the given dataset. Supplying corresponding target values, the network was trained. The Mean Squared Error (MSE) function was used to determine the performance of the network. Changing the parameters, the network was trained until it gets a favorable output. It showed a favorable performance value of 0.164 and an accuracy greater than 72% for all three subsets: training, validation and test sets in the training dataset. Then the network was tested on an untrained dataset of the same owners. For this untrained dataset, a favorable result was gained with an accuracy of 0.6129 and performance value of 0.3226. The lower the performance value, the better the network. It is assumed that high variability, too simplicity, and consistency of the data affected the results of the network. It is proposed to consider a larger dataset and improve the algorithm to be more sensitive to the above mentioned misleading factors. Although the performance is greater for the testing dataset than for the training dataset, it is concluded that the created network can be enhanced and developed to be applied in practical situations.

Keywords: Artificial neural network, feature extraction, signature verification