

FINGERPRINT AUTHENTICATION USING ARTIFICIAL NEURAL NETWORKS

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Abstract

Automatic identification of humans based on their fingerprints is still one of the most reliable identification methods in criminal and forensic applications, and is widely applied in civil applications as well. Most automatic systems available today use distinctive fingerprint features called minutiae for fingerprint comparison. The objective of this research is to incorporate fingerprint authentication with the widely used PIN authentication scheme currently used for online transactions, to achieve a foolproof system. A complete minutiae extraction scheme for automatic fingerprint recognition systems with intelligent method is presented. A critical step is to reliably extract minutiae from the fingerprint images and process with artificial neural network method. Fingerprint minutiae enhancement techniques are employed prior to minutiae extraction to obtain a more reliable estimation of minutiae locations. In the first stage, image normalization and orientation field of the fingerprint are calculated. The local orientation of the ridges serves as the parameter for the next processing stages. Details of the adaptive morphological filtering used for ridge extraction and background noise elimination are described. Minutiae patterns of the scanned and stored fingerprints are then compared and evaluation results are obtained by processing through supervised artificial neural network. Greater security is achieved with PIN authentication.

Keywords: Fingerprint, minutiae detection, artificial neural network, back-propagation algorithm, authentication, feature extraction, biometrics