Development of Neural Network Techniques for Finger-Vein Pattern Classification

Wu, Jian-Da; Liu, Chiung-Tsiung; Tsai, Yi-Jang; Liu, Jun-Ching; Chang, Ya-Wen

Abstract

A personal identification system using finger-vein patterns and neural network techniques is proposed in the presentstudy. In the proposed system, the finger-vein patterns are captured by a device that can transmit near infraredthrough the finger and record the patterns for signal analysis and classification. The biometric system for verificationconsists of a combination of feature extraction using principal component analysis and pattern classification usingboth back-propagation network and adaptive neuro-fuzzy inference systems. Finger-vein features are first extractedby principal component analysis method to reduce the computational burden and removes noise residing in thediscarded dimensions. The features are then used in pattern classification and identification. To verify the effect ofthe proposed adaptive neuro-fuzzy inference system in the pattern classification, the back-propagation network iscompared with the proposed system. The experimental results indicated the proposed system using adaptiveneuro-fuzzy inference system demonstrated a better performance than the back-propagation network for personalidentification using the finger-vein patterns.

Key words：Adaptive neuro-fuzzy; Finger-vein pattern classification; Neural network