

Fingerprint Classification Using a Simplified Rule-Set Based on Directional Patterns and Singularity Features

Kribashnee Dorasamy^{1,2}, Leandra Webb¹, Prof. Jules Tapamo², Nontokozo P. Khanyile¹
¹CSIR Modelling and Digital Science, P.O. Box 395, Building 17B, Pretoria, 0001, South Africa
²School of Engineering, Howard College Campus, UKZN, King George V Avenue, Durban, 4041, South Africa
KDorasamy@csir.co.za, LWebb@csir.co.za, tapamoj@ukzn.ac.za, PKhanyile@csir.co.za

Abstract

The use of directional patterns has recently received more attention in fingerprint classification. It provides a global representation of a fingerprint, by dividing it into homogeneous orientation partitions. With this technique, the challenge in previous works has been the complexity of the pattern templates used for classification. In addition, incomplete fingerprints are often not accounted for. A rule-based technique using simplified rules is proposed to overcome the challenges faced by previous pattern templates. Two features, namely directional patterns and singular points (SPs), are combined to categorise six fingerprint classes: namely Whorl (W); Right Loop (RL); Left Loop (LL); Tented Arch (TA); Plain Arch (PA); and Unclassifiable (U). The proposed technique achieves an accuracy of 92.87% and 92.20% on the FVC 2002 and 2004 DB1, respectively. Analysing the global representation of the fingerprint has proved to be advantageous, as the rules are invariant to rotation and have the potential to address issues of incomplete fingerprints.