ABSTRACT

Biometric technology is a feature-based identification system. This technology is specified its field on the identification of who is the person than what is used by those person (card, PIN, and password). The fingerprint-based identification is one of them. The individuality of fingerprint gives its owner a specific identity.

Rolled-ink and dab acquisition method gives the poor quality on the fingerprint images. The enhancement algorithm based on *Gabor 2D* filter is implemented to enhance the quality of fingerprint image. *Gabor 2D* filter is also implemented in the feature extraction process. As classifier, *Adaptive Resonance Theory 2 (ART 2)* neural network is used. Its plasticity and stability characteristic is the excess of this classifier.

Fingerprint rotation and dilatation frequently become the reason why the identification fails. The Algorithm on this final project is designed to handle this problem. The rotation handled, focused on the range of -30° until 30°.

The best accuration achieved is 79.30 % for the image with enhancement, 58.60 % for the image with no enhancement, 13.30 % for the core-shifted image, and 91.11 % for the image with no rotation; while *False Rejection Rate* (FRR) is 20.70 % for the image with enhancement, 6.66 % for the image with no enhancement, 33.33 % for the core-shifted image, and 0 % for the image with no rotation. Meanwhile, the *False Acceptance Rate* (FAR) is 6.66 % for the image with enhancement, 41.40 % for the image with no enhancement, 86.66 % for the core-shifted image, and 8.88 % for the image with no rotation. This system is able to handle rotation until $\pm 45^{o}$; while small FAR shows that it could become the alternative of data security.

Keywords: *Adaptive Resonance Theory 2 (ART 2),* Biometric, classifier, core, dab, dilatation, enhancement, *Gabor 2D,* identification, rotation, *False Acceptance Rate (FAR), False Rejection Rate (FRR),* rolled-ink