ABSTRACT

Fingerprint recognition is a part of biometric technology that is still used today to identify unique characteristics in humans. In the fingerprint data storage, Henry's formulation system is used for police purposes until now. However, the formulation of fingerprints in Indonesia is still done by experts who are not time-efficient and their accuracy cannot be accounted for because the conditions of the experts are not the same every day. This triggers an automatic fingerprint formulation system.

In this Final Project, an automatic fingerprint formulation system is designed using the Convolutional Neural Network (CNN) method with the ResNet-18 and ResNet-50 architecture based on the Henry classification system. The dataset used was obtained from the National Institutes of Standards and Technology (NIST) website in the form of 2,100 8-bit grayscale fingerprint images. To optimize the accuracy of the system, preprocessing is performed on the input image in the form of canny edge detection, Contrast Limited Adaptive Histogram Equalization (CLAHE), Sobel edge detection, and Gabor filter. Then enter the training stage will use three optimization algorithms namely Stochastic Gradient Descent (SGD), Root Mean Square Propagation (RMSProp), and Adaptive moment (Adam). The dataset classification process will be mapped into five classes namely arch (A), tented arch (T), left loop (L), right loop (R), and whorl (W). Finally, make the fingerprint primary formula based on the Henry classification system.

The scenarios of this research are testing preprocessing, optimization functions, the effect of the number of epochs, and performance comparison. Performance parameters to be analyzed based on the level of accuracy and loss function. The final result shows the best model for fingerprint pattern classification is ResNet-18 with SGD optimization using a Gabor filter image which has an accuracy value of 95.05%.

Keywords: CNN, fingerprint, Henry classification system, resnet.