

## ABSTRACT

*Fingerprint is one of the biometrics in humans that can be used for human identification. Fingerprint formula in humans can be made using Henry Classification Formula. Conventional fingerprint formula creation is considered less effective and relatively requires a longer time. This certainly presents its own challenges in the design of the system maker automatic fingerprint formula.*

*Final Project is designing a fingerprint formula system automatically using deep learning using VGG19 and Inception v3 methods. Input in the form of a fingerprint image in RGB format. The image is obtained from <https://www.nist.gov> there are 2000 images. 2000 fingerprint images Only 1499 images are used where the selected image is an image that has good pattern characteristics. Then do the Image Preprocessing there are several processes contained in the image preprocessing some of the processes include converting RGB to grayscale images, image resizing, and edge detection. Reconfigure the VGG19 architecture and Inception v3 to get a good level of accuracy. After reconfiguring the process, the next is training dataset. From the training process will be obtained the level of accuracy which will then be used to calculate the value of Henry Primary.*

*In this Final Project, the Classification is divided into five classes, namely Whorl, Arch, Tentarch, Right Loops, and Left Loops. The number of train dataset and validation train is 1499 then the test dataset used is 66 to determine system performance. Training dataset using VGG19 and Inception v3, has obtained parameter values in the training process with an accuracy validation value of 97.8% for the VGG19 method and 74.8% for Inception v3, the best optimizer in the RMSprop Optimizer for both architectures, Validation Split on VGG19 is 0.18% and 0.26% for Inception v3, Epoch is 50 and Batch Size is 64 for both architectures. The best architectural model is VGG19 with a valuation accuracy of 97.8% of system parameter values when tested using the Fingerprint Image Enhancement test dataset as follows: Accuracy 84%, Precision 81%, Recall 77%, Specificity 95%, F1 Score 78%, and Geometric mean 86%.*

**Keywords :** *Convolutional Neural Network, Fingerprint Classification, Deep Learning.*