ABSTRACT

Diabetes Retinopathy (DR) is a major cause of blindness experienced by diabetics. This disease attacks blood vessels in the eye. To detect this disease requires the ability of an expert or ophthalmologist (Ophthalmologist). The process of detecting DR disease, if done manually will take considerable time and costs. Therefore, to save time and money in this Final Project, it is proposed to model the detection of DR disease based on Deep Learning with Visual Geometry Group architecture (VGG) 19. VGG 19 is a transfer learning model that has a layer depth of 19. The existing filters on VGG are 3x3 filter with only one stride. But the accuracy of this VGG has the same level as a 7x7 filter and four strides.

Detection of DR using deep learning uses fundus imagery as its system input. Fundus image will be processed with the image pre-processing process before it becomes the system input. Image pre-processing consists of changing the RGB image to grayscale image, Contrast Limited Adaptive Histogram Equalization (CLAHE), sharpen and normalizing the image size to 256 × 256 pixels. The results of the image pre-processing will be input to the VGG 19 system.

In this Final Project classification is divided into four classes, namely No DR, mild, moderate, and severe. The amount of data set used is 4000 fundus images divided into 3200 test data and 800 test data. The parameters used are accuracy, loss, sensitivity, specificity and speed of computing time. The model designed in the Final Project produces parameter validation values when tested using the CLAHE + sharpen data set and SGD optimizer and pre-trained weight as weights as follows: validation accuracy 99%, loss validation 0.04, sensitivity 99%, sensitivity 99%, precision of 99%, F1score of 99%, G-mean of 99%, and computing time of 46 seconds per epoch.

Keywords: *Deep Learning, VGG19, Image pre-processing, Retinopathy Diabetes.*