

## ABSTRACT

Diabetic Retinopathy (DR) is a disorder of the blood vessels in retina of Diabetes mellitus (DM) patients. DR can be happen on a patient because of high blood sugar levels that flowing an oxygen to the eyes. High blood sugar levels causing a damage on a fine blood vessels that located in cornea. If the thing continues without a medical support, it will cause a blindness on DR patients. Medical check up on the DR patients is done by an observation by an ophthalmologists on retina image of patients that taken using a fundus camera. Early DR detection can prevent blindness out of the patients. Unfortunately, direct observations by ophthalmologists have the drawback of accurately diagnosing DR because the characteristics of DR in fundus images having a disguise. Based on that information, this research will develop a software that can detect and diagnose a DR severity level.

This research will use Convolutional Neural Network (CNN) method with inception resnet V2 network architecture to classify DR severity level. On this thesis, fundus retina image will be done with a pre-processing, hoped that it will increase the accuracy. This final project uses a *dataset* that is resized to  $256 \times 256$  and pre-processing that is used is divided into 2 namely Clahe + Sharpening (ClSh) and Grayscale + Clahe (GrayCl). The result of the fundus image that done with the pre-processing will be a system input and the output from the system are 4 classification class of DR severity level.

In this Final Project, the DR is classified into four classes, namely No DR, mild, moderate, and severe proliferative. The amount of data used is 4000 fundus images. The best results in this Final Project is an validation accuracy of 98% with a sensitivity 98.69%, specifisity of 98.93%, specifisity 93.75%, precission 98,67%, F1Score 98.17% and G-mean 98.61% in the SGD optimizer configuration and using the Clahe Sharpening (ClSh) dataset.

**Keywords:** *Diabetic Retinopathy, Convolutional Neural Network, Inception*