

## **ABSTRACT**

*Diabetes Retinopathy (DR) is one of the complications of Diabetes Mellitus, this complication occurs in the retina of the eye. Patients will experience vision problems and if it handled late, patients will experience blindness. Manual examination by an ophthalmologist will take time and the results of the examination also depend on the doctor's expertise in diagnosing. Therefore, a digital image processing system which able diagnose quickly, accurately, and objectively, is needed.*

*Based on these problems, in this final project the author will design a system that can process digital fundus images and classify them according to the severity of DR. The severity of DR in this final assignment was divided into 4 classes, these are, normal, mild NPDR, moderate NPDR, and severe NPDR. The data used in this study are secondary data from the MESSIDOR dataset.*

*The data is processed using Statistical Region Merging (SRM) segmentation method and is classified using the Convolutional Neural Network (CNN) method. The number of data samples used in this thesis is 80 images, which consist of 20 image samples for each class. The highest accuracy value obtained from this system is 81.25% with a computational time of 14.518 seconds. The accuracy value is obtained by using a ratio of 3:2 training data and test data, the value of segmentation complexity parameters  $Q=256$ , the number of epochs=100 and the learning rate=0.0001.*

**Keyword:** DR, NPDR, SRM, CNN