CLASSIFYING DIABETIC RETINOPATHY PATIENT USING SUPPORT VECTOR MACHINES (SVM) BASED ON MICRONEURYSM, HEMORRHAGES, AND EXUDATE FEATURE

Name : Muhammad Faisal
Student ID : 2207301705
Promotor : Prof. Dr. Ir. Mauridhi Hery Purnomo, M.Eng.
Co-Promotor : Mochamad Hariadi, S.T., M.Eng., Ph.D.
I Ketut Eddy Purnama, ST., MT., Ph.D.

ABSTRACT

Diabetic Retinopathy is a micro vascular complications in diabetics which is characterized by several changes in retina. The changes occur in blood vessel diameter, microaneurysm, hemorrhage exudate, and growth of new blood vessels. This diabetic retinopathy symptoms should be detected as soon as possible for deciding effective treatments and medications.

Laser therapy is a common treatment for diabetic retinopathy patient. The laser therapy is a manual examination of fundus retinal image scanning by ophtalmologist. The manual examination could generate imperfect results. For instance, it could generate different interpretation of the image because ophtalmologists may have different analysis of the same image. A special computer software can be developed to analyse the retinal fundus image and to generate more accurate result.

Several stages of research is required for developing the computer software that can assist in analyzing eye fundus image. The study was begun by preprocessing eye fundus image, eliminating the eye fundus optic disc and separating the vascular tissue from the damaged area of the retina. The damaged area of the retina consists of dark lesion and bright lesion. Mathematical morphology method was used to detect dark lesion. Bright lesion was detected by combination method: mathematical morphology, background estimation, colour analysis, Max-tree and attribute filters (by utilizing a branch filtering approach). Based on microneurysm and exudate feature, the segmentation result of the fundus image was extracted and classified using Support Vector Machines (SVM). The result of the retinal fundus image classification consist of Normal, Mild Non Proliferative Diabetic Retinopathy, Moderate Non Proliferative Diabetic Retinopathy and Severe Non Proliferative Diabetic Retinopathy.

Classifying patients with diabetic retinopathy experiments obtained the degree of sensitivity, specificity and positif predictive value above 90%. This means that the computer software can effectively assist ophthalmologist in analysing retina patient with Diabetic Retinopathy. The results sensitivity 98,4%, specificity 100%, positif predictive value 100%, and AUC 0,992%.

Keyword : fundus image, Diabetic Retinopathy, Classification, SVM