ABSTRACT

Glaucoma is a disease that attacks the sense of sight and can lead to

permanent blindness. Although this disease cannot be cured, the symptoms of the

damage can be minimized by early detection. Glaucoma detection can be performed

manually by an ophthalmologist, but this method is somewhat subjective because

the results of the observations depend on the domain of the doctor's knowledge,

whereas on the other hand, modern medical imaging techniques, such as Optical

Coherence Tomography (OCT), Confocal Scanning Laser Ophthalmoscopy

(CSLO) and Heidelberg Retinal Tomography (HRT), are high in cost and the

availability of devices is relatively limited.

This research proposed a machine learning-based system to detect glaucoma

based on retinal fundus images through digital image processing. The process of

system design consists of two stages, i.e. training and testing. The retina fundus

image, which divided into train and test image, is preprocessed to obtain an optimal

composition image. Furthermore, this image goes through feature extraction

process using Local Binary Pattern. Then, the feature vectors obtained from the

previous process are used as input in the classification stage using Support Vector

Machine.

The performance of the system was tested using k-fold cross validation

(k = 10) on 485 images consisting of two classes, i.e. normal and glaucoma. By

using the proposed method, the system provide the best accuracy rate at 88.45%,

sensitivity 80.81%, and specificity 92.65%. This result is achieved on a system

model with a number of parameters: LBP uniform pattern (u2), radius size R=3,

number of pixel points P = 8, and 3^{rd} order polynomial kernel.

Keyword: Glaucoma, Local Binary Pattern, Support Vector Machine

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