Chapter 5
Optimal Feature Selection and Extraction for Eye Disease Diagnosis

Alli P.
Velammal College of Engineering and Technology, India

S. K. Somasundaram
PSNA College of Engineering and Technology, India

ABSTRACT

Ophthalmologists utilize retinal fundus images of humans for the detection, diagnosis, and prediction of many eye diseases. Automatic scrutiny of fundus images are foremost apprehension for ophthalmologists and investigators. The manual recognition of blood vessels is most deceptive because the blood vessels in a fundus image are multifaceted and with low contrast. Unearthing of blood vessels proffers information on pathological transformation and can smooth the progress of rating diseases severity or mechanically diagnosing the diseases. The manual recognition method turns out to be annoying. Consequently, the automatic recognition of blood vessels is also more significant. For extracting the vessel in fundus images unswerving and habitual methods are obligatory. The proposed methodology is designed to effectively diagnose the eye disease by performing feature extraction succeeded by feature selection and to improve the performance factors such as feature extraction ratio, feature selection time, sensitivity, and specificity when compared to the state-of-art methods.

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INTRODUCTION

Insulin resistance or its deficiency may result various complication such as diabetic mellitus (DM), Diabetic Retinopathy (DR). The DR is a diabetic eye disease, where damage occurs in the retina due to diabetes. The Retina of the human eye gets damaged owing to change in the blood vessels inside the eye. DR affects up to 80% of all diabetic patients and also usually it affects both the eyes. The fundus image of an eye gives the internal structure of the eye including the normal features like macula, fovea, blood vessels, optic disc, etc. and abnormal features like microaneurysms, hemorrhages, Hard and Soft exudates, etc. Programmed analysis of fundus images turned out to be a concern for the investigators and ophthalmologists to diagnose DR at an early stage and prevent vision loss for the patient.

DR can be classified on the damage to blood vessels as: Non-proliferative DR (NPDR) and Proliferative DR (PDR). NPDR is caused by damaged blood vessels in the retina which begins to leak addition fluid and small quantity of blood in to the internal parts of the eye. PDR Occurs when there is not enough flow of blood due to the close of blood vessels inside the retina. To supply blood, the retina automatically corrects itself by developing new blood vessels, known as neovascularization. The new blood vessels are abnormal and don't supply the retina with proper blood flow.

Ophthalmologists utilize Retinal Fundus images of humans for the detection diagnosis and prediction of many eye diseases. Automatic scrutiny of Fundus images are foremost apprehension for ophthalmologists and investigators. Most of the hemorrhage based Fundus image recognition has principally categorized the hemorrhages and microaneurysm into a cluster. The widespread technique used for recognition of hemorrhages is morphological method, which is used for mining image features by grouping of various techniques.

The manual recognition of blood vessels is most deceptive because the blood vessels in a Fundus image are multifaceted and with low contrast. Unearthing of blood vessels proffers information on pathological transformation and can smooth the progress of rating diseases severity or mechanically diagnosing the diseases. The manual recognition method turns out to be annoying. Consequently, the automatic recognition of blood vessels is also more significant. For extracting the vessel in fundus images unswerving and habitual methods are obligatory. The proposed methodology effectively diagnose DR diseases and improves the performance factors such as extraction feature ratio, feature selection time, sensitivity and specificity