**LITERATURE SURVEY**

**1) Automated detection of diabetic retinopathy using SVM**

**AUTHORS:**  E. V. Carrera, A. Gonz´alez and R. Carrera

Diabetic retinopathy is a common eye disease in diabetic patients and is the main cause of blindness in the population. Early detection of diabetic retinopathy protects patients from losing their vision. Thus, this paper proposes a computer-assisted diagnosis based on the digital processing of retinal images in order to help people detecting diabetic retinopathy in advance. The main goal is to automatically classify the grade of non-proliferative diabetic retinopathy at any retinal image. For that, an initial image processing stage isolates blood vessels, microaneurysms and hard exudates in order to extract features that can be used by a support vector machine to figure out the retinopathy grade of each retinal image. This proposal has been tested on a database of 400 retinal images labeled according to a 4-grade scale of non-proliferative diabetic retinopathy. As a result, we obtained a maximum sensitivity of 95% and a predictive capacity of 94%. Robustness with respect to changes in the parameters of the algorithm has also been evaluated.

**2) Diabetic Retinopathy Detection Using Machine Learning and Texture Features**

**AUTHORS:** M. Chetoui, M. A. Akhloufi and M. Kardouchi

Diabetic retinopathy (DR) is a medical condition due to diabetes mellitus that can damage the patient retina and cause blood leaks. This condition can cause different symptoms from mild vision problems to complete blindness if it is not timely treated. Hemorrhages, hard Exudates, and Micro-aneurysms (HEM) that appear in the retina are the early signs of DR. Early diagnosis of HEM is crucial to prevent blindness. Textures features such as LBP have been widely used in the past as a technique for DR detection. In this work, we introduce the use of different texture features for DR, mainly Local Ternary Pattern (LTP) and Local Energy-based Shape Histogram (LESH). We show that they outperform LBP extracted features. Support Vector Machines (SVM) are used for the classification of the extracted histogram. A histogram binning scheme for features representation is proposed. The experimental results show that LESH is the best performing technique with an obtained accuracy of 0.904 using SVM with a Radial Basis Function kernel (SVM-RBF). Similarly, the analysis of the ROC curve shows that LESH with SVM-RBF gives the best AUC (Area Under Curve) performance with 0.931.

**3) Retinal vessel segmentation using deep neural networks**

**AUTHORS:** Martina Melinscak, Pavle Prentasic, and Sven Loncaric

Retinal vessel segmentation and extracting features such as tortuosity, width, length related to those vessels can be used in diagnosis, treatment and screening of many diseases such as retinopathy of prematurity, hypertension and diabetes. Therefore, automatic segmentation of vessels by computers will make the analysis of those diseases easier and will help during the screening, diagnosis and treatment processes. In this study, a solution based on convolutional neural networks (CNN) is proposed for automatic segmentation of retinal vessels. The proposed CNN model is tested on DRIVE dataset and a better performance than literature is achieved.

**4) Diabetic Retinopathy Detection by Extracting Area and Number of Microaneurysm from Colour Fundus Image**

**AUTHORS:** S. Kumar and B. Kumar

This paper presents an improved diabetic retinopathy detection scheme by extracting accurate area and ate number of microaneurysm from color fundus images. Regular screening of eye is crucial for detection and dealing with diabetic retinopathy. Diabetic retinopathy (DR) is an eye disease which occurs due to damage of retina as a result of long illness of diabetic mellitus. Microaneurysms (MA) are tiny red spots on retina, shaped by inflating out of fragile part of the blood vessels. The recognition of MA at primary stage is very crucial and it is the first step in inhibiting DR. A variety of methods have been proposed for detection and diagnosis of DR. In this paper, there are two features namely; number and area of MA have been determined. Initially, pre-processing techniques like green channel extraction, histogram equalization and morphological process have been used. For detection of microaneurysms, principal component analysis (PCA), contrast limited adaptive histogram equalization (CLAHE), morphological process, averaging filtering have been used. Classification of DR has been done by linear Support vector machine (SVM). The sensitivity and specificity of DR detection system are observed as 96% and 92% respectively.

**5) Survey of Diabetic Retinopathy Screening Methods**

**AUTHORS:** M. Manjramkar

This electronic document iDiabetic retinopathy is an abnormality which involves the small blood vessels that targets the central region like macula. It is a progressive disease and main reason that causes loss in vision. Diabetic retinopathy is a vascular illness of the retina which influences patients with diabetes. This harms the retina of eye and leads to visual impairment if level of diabetes is very high. Diabetic retinopathy has no early signs. In some cases vision will get better or worse during the day. So the importance of automatic assessment of macular enema increased. In this paper we have done a survey on the different techniques used for detection diabetic retinopathy. Diabetic retinopathy is composed of a characteristic group of lesions found in the retina of one having diabetes for several years. Detecting the exudates in early stage can prevent vision loss.