# The Various Methods on Early Stage Detection of Diabetic Retinopathy

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*Abstract: The leading cause for the blindness in the diabetic patients is due to the Diabetic Retinopathy. According to the recent statistics from the US centre for Disease and prevention estimates tat 29.11 million people have the diabetic disease in the United states of America, when it comes to the world population it number goes to the 340 million. The diabetic eye disease will leads to blindness which can be caused by rapid changes in blood vessels. There are many features present in the retina which can act as primary signs of diabetic which can be prevented by this process. This paper Provides you the various techniques and algorithms which helps in diagnosis the effected retina images. This paper also compare the algorithm, reviews, classifiers and techniques of previously proposed in order to develop the efficient algorithms.*

*Keywords: Diabetic Retinopathy, Retinal Blood vessels, images.*

## I. INTRODUCTION

The Diabetic retinopathy (DR) which is having complication of diabetes mellitus which can lead for the cause of blindness in young generation in various countries. According to the Vision 2020 report, there have been forty five million cases of sightlessness by 1996, out of that 15% of these were because of diabetic retinopathy or glaucoma1. The Diabetic retinopathy may be a condition that may cause injury to the blood vessels within the attention so resulting in sightlessness. it's a most critical retina disease, which may be considered manifestation of polygenic disorder on the retina2. Early detection, timely treatment and correct methodology of screening of this malady are shown to forestall visual loss and sightlessness in patients with diabetes3. DR is classed into 2 types as Proliferative diabetic retinopathy (PDR) and Non-proliferative diabetic retinopathy (NDPR). The NDPR is that the early stage of the malady and weakened into 3 stages i.e. mild, moderate or severe with completely different signs of symptoms in every stage and therefore the malady continues to be treatable at now. The Diabetic retinopathy in Type 1 diabetes (TID) shown higher in the individuals when it is compared to the Type 2 diabetes (T2D) with earlier study of

report around 97.5% of DR with 15 years of Type 1 Diabetic. The PDR is that the advance stage of disease and therefore the patient is at high risk of losing vision. The types of DR as shown below in fig 1.
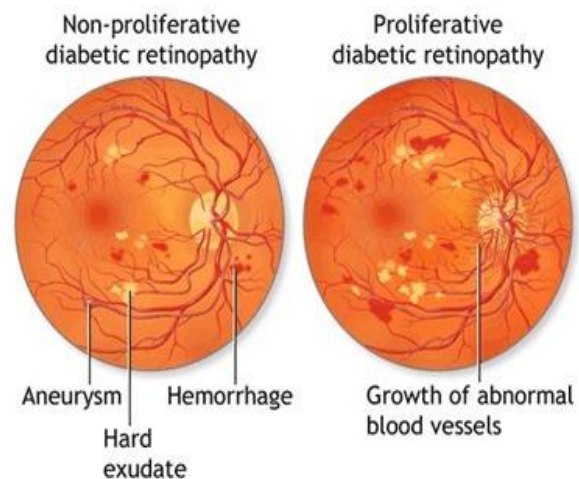


**Fig 1 : Proliferative diabetic retinopathy (NDPR) and Proliferative diabetic retinopathy (PDR)**

The retina fundus image which involves various blood vessels and an optic disc. Thus the first stage of Diabetic retinopathy is Nonproliferative (aforetime termed "background") Diabetic Retinopathy (NPDR) which can be relegated to mild.

In the first stage , the various blood vessels in the retina become thin which can lead to the microaneurysm and hemorrhage. It can exudates if there is a protein leakage. Usually the microaneurysm and hemorrhage both are red in colour where as exudates are in yellow color. The Proliferative Diabetic Retinopathy (PDR) which can be relegated to advance.

In this stage of DR, The blood vessels receive insufficient quantity of oxygen causing the blood vessels to maintain sufficient oxygen level.

## II. REVIEW OF METHODS

The Paper [1] gives the information of the RGB to grey scale image conversion with preprocessing and morphological operations which can be applied on images for feature detection and segmentation. Here the Machine Learning Classifier (SVM) is used to evaluate set of training data to find classified images into various cases. In this paper the evaluation is carried out by using set of 5 images which is captured by the fundus camera.

*Retrieval Number: C5830098319/2019©BEIESP*
*DOI:10.35940/ijrte.C5830.118419*
*Journal Website: www.ijrte.org*

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The paper [2] described algorithms like Decision tree algorithm and Random tree algorithm which are collectively used for the comparative classification. By using these algorithms they shown the accuracy of about 72.5% and 655 in Decision tree algorithm and random tree algorithm respectively.

The paper[3] shown in identifying the red and bright lesions in retinal images which is effected by the Diabetic retinopathy. They used the approach which requires pinpointing for the location of lesion to evaluate the specific part of the image where it can further classified into normal or Diabetic retinopathy based on their experiments. The result which is achieved for White and Red lesion detection is about 95.3% and 93.3% respectively by using fivefold cross validation.

The paper[4] have proposed a new image processing techniques like the image enhancement, texture analysis and the morphological image analysis. SVM Classifier is used for the classification of the images which can gives accuracy of 89% as well as specificity of 95%. They worked on the accuracy of classifier using DirectDB dataset of fundus images.

The Paper [5] uses filter banks for the early detection of Mas. It can extract all possible regions for Mas which is present. It depends on the some of the properties like like shape, intensity to classify candidate region as Ma and non-Ma. The only way to visualize and measure the choroid in the some various diseases including the Diabetic retinopathy by using enhanced dept imaging spectral domain optical coherence tomography (EDI-OCT) [6-10]. The researchers shows the inconsistent results [10-16] on the the data which can have relationship between choroidal thickness and DR.

The outcomes were divergent in non-diabetic retinopathy and moderate non proliferative diabetic retinopathy. The previous research gives the information about choroidal thickness which is associated with the age [17-19]. Even some of the researchers observed diumal variations [20-22]. The study was to eplore changes in CTs and their association with NDR and moderate NPDR. The Vascular complications of diabetes are one of serious disease. Diabetic Rethinopathy(DR) is one most common microvascular complications of diabetes where the symptoms are minimal until the structural abnormalities. During the early stages of Diabetic Retinopathy Microaneurysms and pericyte loss can be found.

In the field of automated Diabetic retinopathy screening we have a various detection approaches which can be able to discover bright lesions, optic Disk. The Optic Disk localization which can be done when blood vessels are segmented. In order to analyze the background of the retina image we need to discard the red lesions detection and the pixels of the image to bright lesions.

**2.1 Optic Disc Localization**

Optic Disc together with the vasculature and the fovea, is one of the most important anatomical landmarks present in retinal Examinations. It is helpful to findout the color similarity with bright lesions which can be helpful for automated systems. Hence the approach have some assumptions about the default localization structure which can be defined as the distance at a given location to object can be predicted based on the set of features measured at location by using the KNN regressor.

## III. DISCUSSION AND RESULTS

From the above various paper, we can able to analyze that most of the methods can be used to detect the diabetic retinopathy but having less efficiency as seen in some of the papers. From these we can able to do the automatic detection of diabetic retinopathy which can be the most efficient approach which can help the patients in the future by getting blind.

## IV. CONCLUSION

The Various different types of Performance analysis and Classifier have been analyzed for the automated diagnosis of the diabetic retinopathy. This Survey paper can act as a resource for future researchers who are working in the automated detection of various abnormal retina which is affected by diabetic in order to develop more efficient algorithms.

## ACKNOWLEDGMENT

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*Retrieval Number: C5830098319/2019©BEIESP*
*DOI:10.35940/ijrte.C5830.118419*
*Journal Website: www.ijrte.org*

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