A COLOUR RETINAL IMAGE SCREENING FOR EYE DISEASE PREDICTION AND EVALUATION

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ABSTRACT: This paper scrutinizes distinct characteristics in the surface of fundus metaphors to distinguish among healthy and pathological patients.Local Binary Pattern (LBP) is used to carry out this work as a texture descriptor for retinal image. Primary motive of this work is to discriminate among age related macular degeneration (AMD), diabetic retinopathy (DR) and healthy images by scanning the surface of retina background and eliminate any earlier lesion segmentation state. The results of this work shows that the technique used in this paper is vigorous for description of optic disk image and perhaps worthwhile in determination ofretinal ailment examine.

***IndexTerms* - Age-related macular degeneration (AMD), Diabetic retinopathy (DR), Local Binary Pattern (LBP), retinal image, fundus image.**

I. INTRODUCTION

The survey of WHO(World Health Organization)found that the reasons of impaired vision is a major possibility due to the changes in the life styles millions of human beings [1]. During 2010, WHO investigated that there are 285 million human beings are visually impaired [1]. WHO identify globally that 80% of the situation of blindness are avoidable or cure eye diseases [1].In recent times, the common source of the sightlessness and visually impaired is due to Diabetic Retinopathy and Age related Macular Degeneration. Further, this sickness growth will increase in future due to increase in diabetes prevalence and ageing in population. Hence, their early diagnosis allows the necessity for automatic screening system.

This paper explores distinct characteristics in the surface of fundus to discriminate among normal person and pathological patients. Here, the work is concentrate on inspect of the performance of Local Binary Pattern as a texture descriptor for retinal images.The paper aim is to differentiate among Age related macular degeneration, diabetic retinopathy and healthy pictures on the same time by eliminating any earlier retinal lesion segmentation. For this, LBP is used to examine the surface of retina background and only these statistics are used to distinguish healthy patient and those two pathological patients' images. This method is conflicting from earlier works which use LBP and provide better performance.

II. RELATED WORK

M. Mookiah et al. [2] proposed a screening system which is automatically identifiesordinary and DR phases (NPDR and PDR). For preprocessing of retinal digital images they used innovative image processing and machine learning algorithm that citation the features then categorize the retinal image to healthy, Proliferate Diabetes Retinopathy and Non-Proliferate Diabetes Retinopathy (NPDR)classes. The result shows that their presented approach produces with the correctness of 96.15% specificity of 96.08% and sensitivity of 96.27%. They mentioned that they used Probabilistic Neural Network classifier that produces higher efficiency by selecting the best model parameter. They used evolutionary algorithm (particle swam optimization and genetic algorithm) for selecting the parameters. This approach is suitable only for DR detection.

A. Laude [3] proposed a system that will automatically recognize the normal and abnormal diabetic retinopathy classes. Hence, for the identification of classes they extract the features via entropies, Local Binary Pattern (LBP) and invariant moments. Further, they describe about an integrated index called Diabetic Retinopathy Index (DRI) to diagnose the unknown class through a single number.

F. Cheriet [4] hadused multiresolution texture analysis to detect Age related Macular Degeneration (AMD) through color fundus snapshots. It was reported that they used wavelet decomposition to examine the texture at numerous scale to identify all the related surface patterns. Furthermore, at each level of decomposition they used textural pattern distribution of the wavelet coefficient images to describe the image. In order to reduce the dimension of the features they used linear discriminant analysis to eliminate the curse of image categorization and dimensionality problem.

III. METHODOLOGY

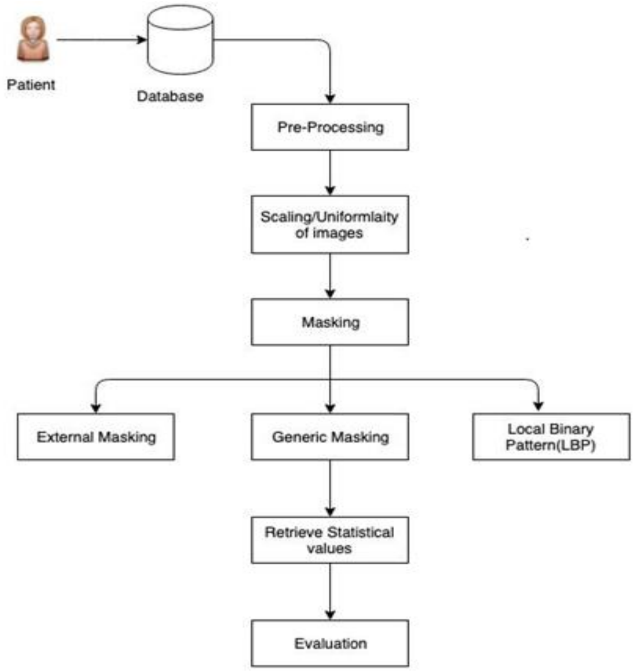

Fig 1: System Architecture

A. Pre-processing

The dataset consist of various images that are in different resolutions. Once the original image is considered it undergoes rescaling. As the LBP measures correspond to the neighbor radius, images should be rescaled to standard dimension to accomplish texture descriptor. Rescaling is a concept of minimizing and maximizing the image to constant value in a sense one image is 20*20; one is 50*50 etc. Bring all images to standardization. Once it is rescaled then we go for main stream structure segmentation to check whether complete disk is available or not. Because we are considering entire retina. If entire retina disk is available we go for feature extraction.

B. Feature Extraction

Features are excerpt through the pre-processed image and it is a main phase in evaluation (classification) procedure. For this purpose, LBP is used to extricate the features in each R, G, and B channel independently. Extract the texture features for each LBP image channel. Consequently, take an average of all channel characteristics to build the final feature set such as normal deviation, median and entropy.Brief description of LBP is explained in the subsequent sector.

- **Local Binary Pattern**

LBP is a kind of optical descriptor used in various PC vision appliances due to its computingease.LBP isan easy yet effective texture operator which first labels the each pixel of an image where the label is created centered on the pixels of native neighborhood that is describe by number of points P and radius R. Each pixels of the neighboring are threshold in regard to the gray statistics of the middle pixel of the neighborhood producing binary numeral.

LBP is evaluate as

$$LBP_{P,R} = \sum_{P=0}^{P-1} S(g_{p-}g_c) * 2^P$$

Where $S(y) = \begin{cases} 1, & y \geq 0 \\ 0, & else \end{cases}$

g_p And g_c represent the gray measurements of neighbor nodes and centroid pixel. Each neighborhood produces 2^P different binary strings.

C. Classification

The classification method is done through extraction of final feature set. The key innovation here is the adoption of Gaussian. Gaussian classifier is applied over the features and the classification is completed.

IV. RESULTS

- **Preprocessing**

Fig 2. Shows that the images are selected for preprocessing.

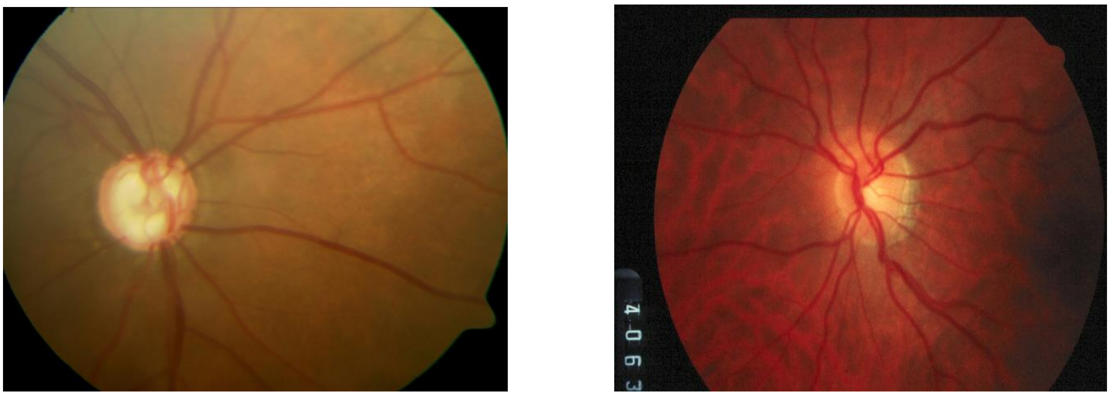

Fig 2: Select the image for preprocessing

- **External Masking**

Fig 3: shows the external masking. In external masking, we are masking outside apart from retina part.

Fig 3: External Masking

- **Generic Masking**

Fig 4 shows the generic mapping using blue scale. It is used because intensity of white ratio is very close to blue.

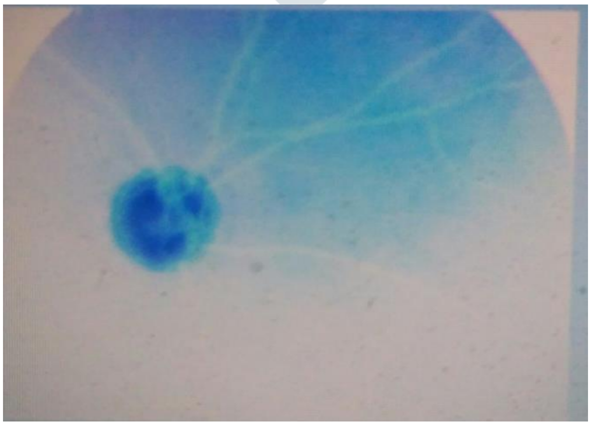

Fig 4: Generic Masking

- **LBP Masking**

Fig 5 shows the LBP Masking.. The image demonstrates a clear code of line from the angle of separation to that of the color intensity in previous figure.

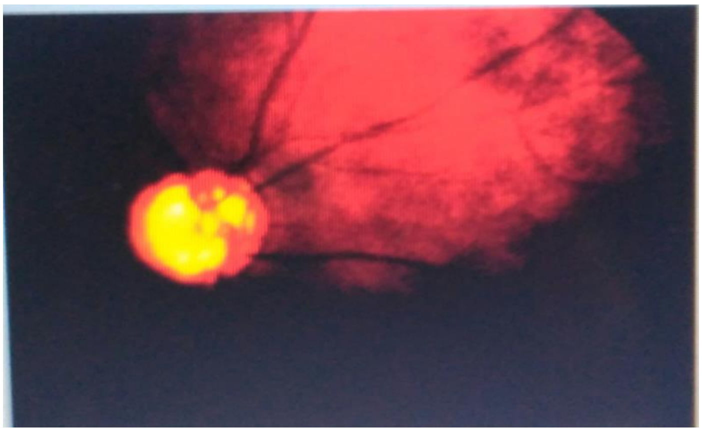

Fig 5: LBP Masking

- **Diagnosed cataract pattern (AMD)**

Fig 6 demonstrates a core processing of dataset via interconnecting the intensities ofeach processed images. The circular or partially circularprediction demonstrates a reason outcome for age factor.

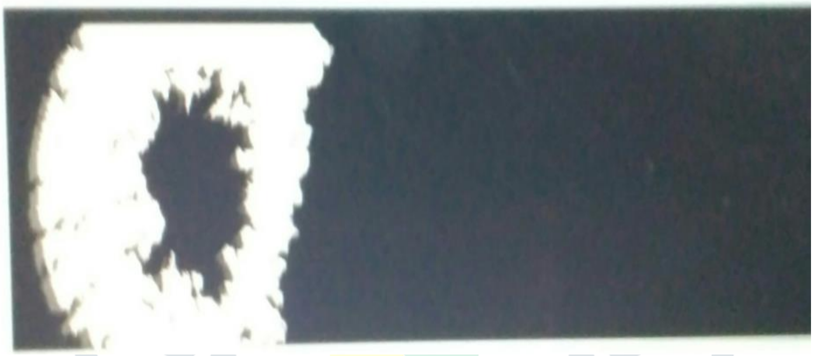

Fig 6: Diagnosed cataract pattern (AMD)

- **Diagnosed cataract pattern (DR)**

Fig 7 shows that diagnosed pattern is semi structured so it is due to diabetes.

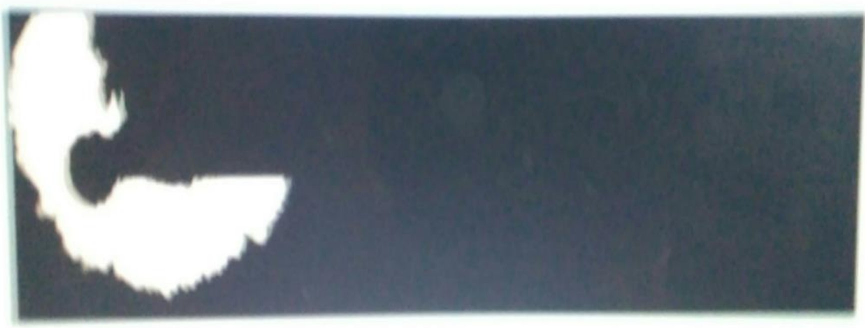

Fig 7: Diagnosed cataract pattern (DR)

V. CONCLUSION

This paper presents a novel way for the diagnosis of AMD and DR. In order to distinguish healthy person from AMD and DR patients we apply texture differentiation capabilities in fundus. The most important role of this paper is to distinguish the classes centered on examine the texture of retina lesion. This kind of algorithm is time consuming and might not be exact. Hence, eliminate the segmentation. The results illustrate that the LBP used as a texture descriptor provide necessary features for scanning the retinal disorder.

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