Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320–088X

IJCSMC, Vol. 4, Issue. 11, November 2015, pg.102 – 107

RESEARCH ARTICLE

A Radial Segmented Feature Based PNN Model for Retinal Disease

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Abstract: Retinal disease is of different type which can be identified as the diabetic inflicted blindness. The feature extraction methods are required to identify the regions. In this work, a three stage analytical model is presented for disease identification. In the first stage of this model, the feature improvement and effective region extraction process are defined. In the second stage, the feature extraction using the radial method is defined and described. In the final stage of this model, the probabilistic neural network is applied for disease detection. The work is applied on authenticated dataset. The results obtained for different sample sets show the work provided the significant results.

Keywords: Medical Image, Segmentation, DWT, Tumor Detection.

I. INTRODUCTION

Diabetic retinopathy is one of the major image processing areas for retinal disease prediction. It is able to identify the reason of blindness or partial blindness based on the vision feature analysis. The retinal fundus analysis and the critical feature identification and be applied for generating the feature formed analysis. This analysis is based on the blood vessels, optical disc, five, exudates etc. All these featured regions are used individually or in combination to identify the abnormality of disease. A sample blood vessel retinal image is shown in figure 1. The figure shows the main optic region as well as the connected blood vessels. Author provided at work on blood vessel analysis and optical retinal region analysis for disease region identification. The bright part of this image is identified as the fundus. The red and brown lines are the retinal curve. The disc printer, position and the brightest are the feature which can be used to identify the diabetic criticality. The mass screening and assessing can be quantified for disease feature generation.

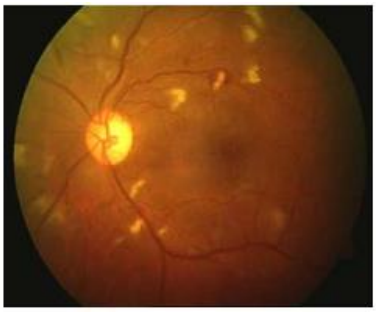

Fig 1 : Retinal Structured Image

The optical properties of eye image can be formed as the inspection constraint to identify the retinal criticality. The image level transformation and the retinal surface depiction can be applied to identify the focused radical region so that the inverse transformation can be applied for disease identification. The critical core region of the eye can be obtained with different feature methods. These features can be applied to shine the region key area with angle specific retinal extraction. Author provided the invention to the critical region based on the frequency of critical intensity points. Diabetic Retinography generally affects the retina and increases the complications which can be identified as the change in red cells. The feature analysis and the optical disc are with central vision can be extracted for disease prediction. Different researchers provided different detection and feature extraction methods. These method basically separate different feature constraints to generate the structure and the disc area. The threshold based subtraction can be enforced to produce the edge or the curve area as the mask to the image. The decomposition can be applied on blood vessels for extraction of critical eye region. Some researchers used the clustering method to identify the separate regions so that the region will be separated and more accurate decision will be taken.

In this paper, a feature based intelligent model is provided for retinal disease detection. The method first identified the feature curve using radial analysis. Later on a probabilistic neural network is applied for disease identification. In this section, a study of retinal disease is presented. Author identified different featured region on the image so that disease classification will be done. In section II, the work defined by earlier researchers is presented. In section III, the proposed research model is described with the algorithm. In section IV, the results obtained from work are presented. In section V, the conclusion of work is presented.

II. RELATED WORK

Medical image processing is one of the important research areas processed by different researchers. A lot of researchers provided the work for retinal disease identification. These diseases include glaucoma detection, diabetic detection, etc. Some of the contributions of earlier researchers are discussed in this section. Author[1] provided at work on human eye absorption property analysis for disease identification. Author absorb the internal tissues and evaluate them for lasers in ophthalmology. Author provided the effect analysis in terms of photo disruptive and photochemical mechanism. Author provided the clinical and research operations to identify the eye disease. Author [2] provided the work on retinal blood evaluation for the eye. Author generated the curve formation as the internal structure to identify the hemoglobin signatures. Author generated the retinal artery and vein curve analysis with optic disk and macular area identification. Author provided the oxygen dependent change analysis for disease identification. Author[3] provided at work on a feature based analysis to identify the abnormality in the eyes. Author generated the featured images to classify the optic area, exudates and blood vessels. Author identified the optic disk center and generated the brightest part feature for disease identification and transformation. Author [4] provided at work on retinal region localization and glaucoma disease identification. Author identified the circular region for disease region extraction using mathematical operators. The circular framing is applied using Hough transformation. The extracted region processing is done for disease identification. Zhuo Zhang [5] provided at work on Glaucoma disease identification for disease region identification. Author provided the online access and request processing for truth images for disease identification. Author classified the critical region for disease recognition among available images. Author[6] defined an image analysis model for retinal disease identification. Author provided the work on region assessment in terms of the retinal vasculature, retinal lesion, assessment of optical region, curve region identification for actual disease identification. Author [7] provided work on wavelet based filtration modeling for optic disc analysis. Author defined the modeling on disc based analysis, which include edge detection, texture analysis and intensity analysis for disease identification and prediction.

Author[8] provided work on Gabor filter based modeling using segmentation and Tophat transformation method for disease identification. Author defined a retinal blood vessel based method for identification of disease and to generate the p-tile thresholding

for disease identification. Author generated the segment driven retinal analysis for feature estimation and disease prediction. Author [9] definitely a work on Macula detection in retinal images. Author provided a localization method for disc center identification and blood vessel curve generation. Author provided a distance based analysis for center of blood cell. The threshold based specification is derived for critical area localization and to generate the blood vessel. Later on, these blood vessels are used for disease prediction and classification. Author[10] defined the elliptic curve generation and structure formulation method for disease identification. Author provided the abnormality identification based on the diabetic patient characterization. Author generated the vessel and abnormality analysis for diabetic patient identification and classification. Nilan jan Dey[11] provided a work feature generation and disease prediction using Harris corner method. Author generated the eye and the structure formed features for disease identification and prediction. Author[12] presented a computation oriented work on disease detection and abnormality estimation. Author provided the disease characterization and mining method for diabetic disease detection. Author generated the feature class for disease prediction. Author[13] described a work on disease prediction and classification modeling using vessel based analysis. Author provided the segmentation with cross point estimation for neighboring pixels. Author generated the segmentation modeling for disease prediction and classification. Author[14] provided the scheme driven modeling for neighbor pixel analysis and modeling for disease identification and modeling. Author provided the vessel driven analysis for disease feature analysis and modeling so that more critical information identification is possible for disease prediction.

III. RESEARCH METHODOLOGY

As discussed in an earlier section, retinal disease can be applied using feature based analysis for disease region identification and disease criticality prediction. Based on this, a more intelligent and feature driven model is provided. This automated model is divided into multiple layers. At the early stage of this model, the image filtration and segmentation is applied to identify the effective image region. This stage is defined to separate the background region and to identify the core image area of the image.

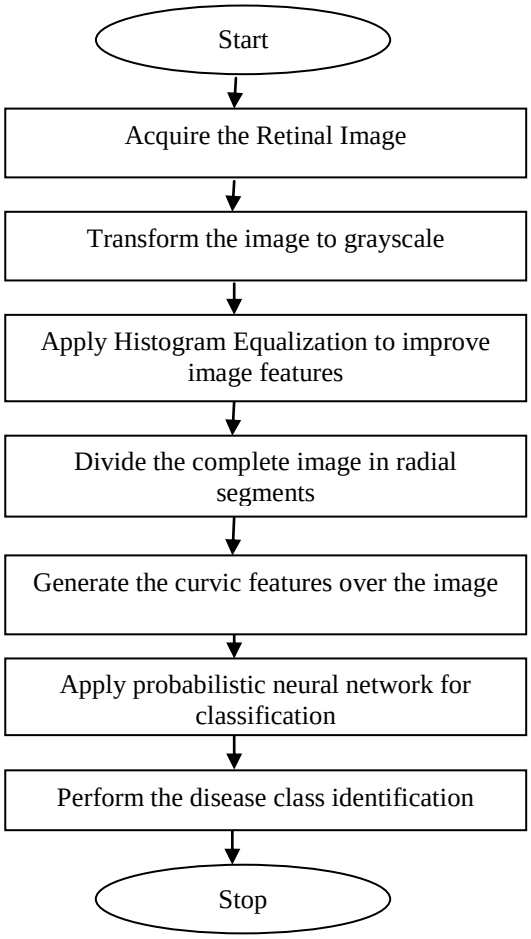

Fig 2 : Proposed Model

Once the effective area is identified, the feature extraction phase is applied. In this stage, image features are extracted using the radial extraction method. In this stage mathematical filter and the window based radial analysis is applied to generate the feature curve. Once the features are generated, the probabilistic neural network is applied to perform disease detection and classification. The algorithmic model of this work is shown in figure 2.

A. Radial Feature Extraction Model

The segmentation adaptive curvic analysis is applied in this work to extract the retinal features. This feature adaptive model is applied to divide the complete image in smaller segments and for each segment the high intensity region is identified. This region is then mapped over the dataset to perform the recognition or classification of the image. This model is applied to the dataset images to perform the recognition or classification of the image.

B Probabilistic Neural Network

The method uses the probabilistic analysis in an integrated way. The probability density function is defined on the population set to specification of unknown data vectors and class specification. Other then these parameters, the prior probability vector is defined to generate the particular population vector. From this probabilistic analysis the ratio of known and unknown classification can be obtained. The Baye's effective decision rule vector is here applied to perform the classification. The pattern layer is able to identify the class based patterns. The input layer is transformed to the rules based on which the patterns are obtained. Based on these pattern specifications, the pattern layer is formed. In third layer, the aggregate operation is applied on the basis of pattern analysis. The summation layer includes the decision level derivation based on the summation value applied in the form of aggregation. The fourth layer is the target layer or the output layer used to perform the class identification.

IV. RESULTS

In this paper, a feature based probabilistic model is presented for retinal disease identification. The implementation of model is applied in matlab environment on authenticated dataset. The dataset is collected from web and features of this dataset are shown in table 1.

Table 1 : Dataset Features

Properties	Values
Database Name	High-Resolution Fundus (HRF)
Url	https://www5.cs.fau.de/research/data/fundus-images/
Number of Healthy Person Images	15
Retinal Disease Images	15
Resolution	3504x2336
Type of Image	Color
Format	JPG

To analyze the efficiency of work, the model is applied on multiple sample sets. The analysis results obtained from the work are shown in figure 3.

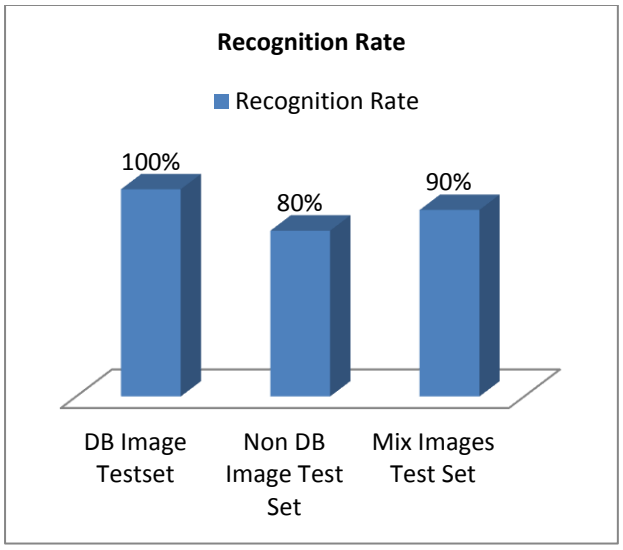

Fig 3 : Recognition Analysis

Here figure 3 is showing the recognition rate analysis obtained from the work. The figure is shown the recognition rate obtained from the work. The figure shows that the DB image set provided the 100% recognition rate, whereas the non DB image set provided the lower recognition rate. The mix image set provided the accurate recognition over the dataset.

V. CONCLUSION

In this paper, a radial feature based probabilistic method is provided for retinal disease identification. The method is defined as a layered model. In the first layer of this method, the feature improvement and the effective area extraction method are defined. In the second stage, the radial method is applied for feature extraction and generation. On the final stage, the probabilistic neural network classifier is applied to disease identification. In this stage, the retinal disease is identified. The work is applied on an authenticated dataset with different test cases. The results show that the model provided the highly accurate results.

ACKNOWLEDGEMENT

I am extremely grateful to my family and friends for their constant support.

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