ORIGINAL RESEARCH PAPER

Engineering

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FEATURES EXTRACTION OF EYES USING ARTIFICIAL NEURAL NETWORK(ANN)

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ABSTRACT

Diabetic retinopathy is the most common diabetic eye disease and a leading cause of blindness in the world. Diagnosis of diabetic retinopathy at an early stage can be done through the segmentation of blood vessels of the retina. In this work, the performance of descriptive statistical features in retinal vessel cellular division is evaluated by using an artificial neural network classifier (ANN). Early diagnosis is crucial in Diabetic Retinopathy (DR), to avoid further complications. The disease can be classified into one of two stages (an early stage of no proliferative and a later stage of proliferative diabetic retinopathy), diagnosed based on existence and quantity of a characteristic set of lesion in Eye Fundus Images (EFI). It is therefore important to segment sufficient regions of potential lesions, to highlight and classify the lesions and the degree of DR. Density clustering methods are favorable candidates to isolate individual lesions, and should be used together with effective techniques for vascular tree removal, feature extraction and classification. The experimental results confirmed that the descriptive statistical features can be employed in retinal vessel segmentation and can be used in rule-based and supervised classifiers.

INTRODUCTION

Diabetic retinopathy (DR) is a noteworthy reason for visual inability, and is the main source of visual deficiency around the globe [1]. The quantity of individuals recognized with this infection is quickly expanding. DR is named a vascular issue since the majority of the clinically noticeable injuries of DR are vascular in nature. Retinopathy has two phases: An early, non-proliferative stage and a progressed, proliferative or neo-vascular stage. The early, non-proliferative phase of retinopathy is distinguished by harmed little retinal veins and once in a while has clinical centrality yet the sum and seriousness of the adjustments in this stage gives pieces of information about the advancement toward the development phase of the sickness [5]. It is accounted for that patients with early DR normally have retinal smaller scale aneurysms, which are swelled harmed veins. Miniaturized scale aneurysms show up as red specks on widened fundus-scopic examination. These small scale aneurysms may release liquid prompting swelling, dying, and in the long run vision misfortune. The progressed, neo-vascular phase of retinopathy is described by retinal neo-vascular occasions and hindrance of vision. DR starts from the outcomes of high sugar level in blood (hyperglycemia). Individuals with diabetes mellitus have a high danger of vision misfortune since DR harms retinal vessel. DR invigorates ischemia that causes a development of fresh recruits vessels that may along these lines drain or cause retinal separation, and breakdown of the blood-retinal obstruction that may prompt liquid misfortune, diabetic macular edema, and harm to photoreceptors. Age-related macular degeneration is another primary wellspring of irreversible visual misfortune in the focal point of the visual field. It is generally found in senior individuals [2].

RELATED WORK

A wide range of methodologies for CAD system helped vessel division have been proposed in the writing. They can be separated into two gatherings. The primary gathering comprises of principle based strategies including vessel following, coordinated separating, scientific morphology, multi-edge testing, or morphology-based strategy [1]. The second gathering comprises of managed techniques that depend on pixel characterization and require physically named pictures for preparing stage.

Concerning based strategies and vessel following techniques endeavor to get the vasculature structure by following vessel focus lines. Beginning from an underlying arrangement of focuses built up naturally or by manual marking vessels are followed by choosing from nearby data the most suitable hopeful pixel from those near that at present under assessment. Different strategies utilize numerical morphology to profit by from the earlier known vasculature shape highlights for example being piecewise direct and associated [9]. At that point by applying morphological administrators the vasculature is separated from the foundation for definite division. coordinated sifting methods more often than not utilize a 2-D direct basic component with a Gaussian cross-profile segment expelled or turned into three measurements for vein cross-profile recognizable proof normally a Gaussian or Gaussian-subsidiary profile the piece is turned into a wide range of introductions normally 8 or on the other hand 12 to fit into vessels of various setup. The picture is then threshold to remove the vessel outline from the foundation. With respect to based locally versatile thresholding a general system dependent on a confirmation based multithreshold examining improved this conventional technique by joining applicable data identified with retinal vessels into the check procedure with the point of empowering its application to retinal pictures [3].

In existing theories, morphological, surface, spatial, optical, and otherworldly highlights are created and utilized notwithstanding vessel following calculations to section vessel structure in retinal fundus pictures. The extraction of these highlights and the usage of following techniques require advanced calculations. The announced generally grouping correctnesses of these examinations run from 87.73% to 95.95%. The fundamental commitment of our investigation is to age and assessment of eight clear measurable highlights to fragment retinal vessels. The proposed highlights are effectively determined, do not require refined calculations, all things considered accomplishes 94.2% generally speaking order exactness.

OUR APPROACH

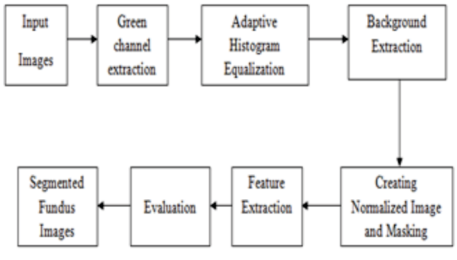

Fig 1: Block diagram of Proposed System

The composition of the proposed model, given in Fig. 1 incorporates four fundamental stages which are (1) pre-handling that incorporates green channel extraction, versatile histogram balance (AHE), back-ground extraction, and concealing; (2) highlight extraction; (3) order (ANN classifier) and (4) post-preparing, which is thresholding and expelling leftover [6].

Input Image is a Retinal Fundus pictures may have poor distinction and uproarious back-grounds. Hence, the photos ought to be updated previously any segmentation method. Here, the pre-preparing stage performs green channel extraction and adaptable histogram evening out (AHE) to improve the distinction dimension of the picture by reliably spreading the image control levels [9] [11]. After that we have done the Green Channel Extraction which gives more subtleties about the vessel structure. The red and blue channels don't give as clear pictures of veins as the green channel and this is a result of low separation and poor unique range. In this manner, the green channel of the Fundus picture is used.

AHE is associated with the enhancement of the green direct picture remembering the ultimate objective to overhaul the contrast. The improvement comes to shape for each one of these territories only when the AHE frames on close to nothing regions instead of the entire picture [7].

After histogram it is necessary to extract the background assignments that can be extracted using Morphological assignments to make a uniform establishment picture [4].

Making Normalized Image and Masking which makes the establishment advanced toward getting to be non-uniform after the AHE sort out while the vessel structure appeared indications of progress separate. The most crucial morphological exercises are breaking down and extension. Trimming of pixels on inquiry limits, while expansion adds pixels to the furthest reaches of things in the mechanized pictures [5] [8]. The amount of pixels cut from or on the other hand added to objects in the image depends upon a sorting out part. The sorting out segment is known as a system with qualities 1 and 0 just, and takes particular shapes and sizes concerning the application [3].

In this examination, feature extraction is done with the help of mean and median of the pixel power that esteems are determined in four different ways: level, vertical, up slanting, and down corner to corner as highlights.

At the conclusion it yields of all of the ten standards are joined by using max administrator. Since the yield is as however a fluffy set, it is defuzzified into a crisp yield by using the centroid technique. The centroid methodology is a champion among the most generally used defuzzification techniques furthermore, restores the point of convergence of the territory under the yield fluffy set [10].

SIMULATION RESULTS

Fig 1: Input Image

Fig 2: Green channel extraction

Fig 1 indicates the input image which is a fundus image and fig 2 shows the green channel extraction of input image because green channel gives more prominent vessels in the image.

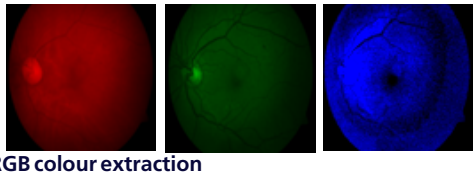

Fig 3: RGB colour extraction

Fig 3 shows the RGB colour extraction of input image.

Fig 4: Masked image

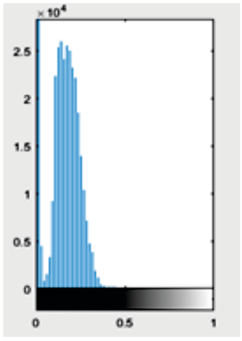

Fig 5: AHE

Fig 4 shows the masked image which is used for background extraction and fig 5 improves the contrast in the image.

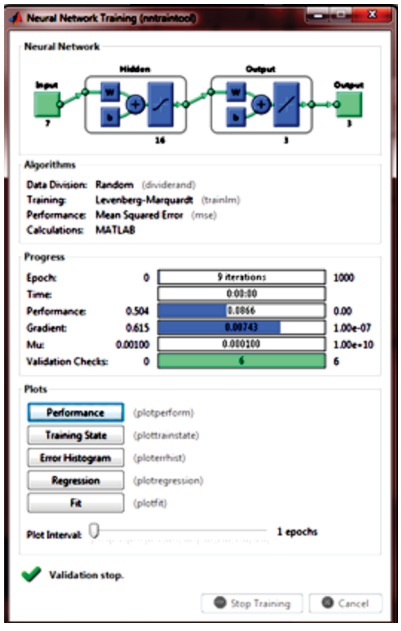

Fig 6: Neural network training

Fig 6 gives the training process of artificial neural network which gives the functional fitting with the help of input layer hidden layer and output layer and with some predictive values.

CONCLUSIONS

Computer-aided retinal blood vessel classification is important for early diabetic retinopathy detection, glaucoma, and age-related macular degeneration which are known as the most prevalent causes of blindness in the world. This study proposed newly constructed descriptive statistical features to segment retinal vessel structure. The features are formed by means and medians of the image pixels' intensity values in four directions. The performance evaluation of the features is performed by an ANN. We designed an enhanced Artificial Neural Network (ANN) classification algorithm based on segmented features to classify different stages of diabetic retinopathy into normal, moderate, severe non-proliferative diabetic retinopathy (NPDR) and proliferative diabetic retinopathy (PDR). Based on the experimental results, it is validated that the proposed statistical features hold valuable information to segment pixels that belong to retinal blood

vessels. These features can easily be combined with other features to improve the segmentation results in rule-based or supervised classifiers.

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