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AUTOMATIC LOCALIZATION OF OPTIC DISC AND BLOOD VESSELS USING SELFISH GENE ALGORITHM

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Abstract

Automated fundus image investigation plays an for most position in the computer aided diagnosis of ophthalmologic disorders. Many major eye diseases also standard diseases manifest themselves in the retina. While a number of other anatomical structures contribute to the process of vision, this project focuses on retinal image analysis and their clinical implications. The most prevalent causes of blindness in the industrialized world are age-related macular degeneration, diabetic retinopathy, and glaucoma. Nowadays, the digital retinal image is frequently used to follow-up and diagnoses eye diseases. Glaucoma is a group of eye diseases characterized by damage to the optic nerve usually due to excessively high intraocular pressure (IOP).The aim of this project is to find the glaucoma disease by segmentation of optic disc and blood vessels using selfish gene algorithm. By comparing the normal image and extracted image features like size, color and shape, the optic disc and blood vessels can be identified accurately. The area of glaucoma can be measured and from that the stage of Glaucoma is provided Segmentation of optic disc and blood vessels are done by using selfish gene algorithm. The features like size, color, shape etc., are used to find the affected image accurately.

Keywords: Blood vessels, CDR, Level of glaucoma, Optic disc, Optic cup.

Introduction

Retinal blood vessel (vasculature) segmentation applying fundus photographs has showed a vital role in assessing the severity of retinal genetics that can lead to acquired blindness such as retinopathy of prematurity , glaucoma, vein occlusions and diabetic retinopathy (DR). According to research statistics in the year 2011, retinal genetics such as DR affect over 4.2 million Americans each year, while glaucoma affects about 2.3 million Americans annually. Automated

blood vessel segmentation algorithms can be very useful in screening patients that are affected by such retinal complications and require follow-up. Also, automated blood vessel segmentation systems can be useful in determining variations in the blood vessels based on the vessel branching patterns, vessel width, tortuosity and vessel density as the pathology progresses in patients. Such evaluations will help to enhance the resourcefulness of the present-day retinal therapeutics and guide research towards analyzing patients for hypertension and variability in retinal vessel diameters due to a history of cold hands and feet, and flicker responses. All algorithms for automated segmentation of blood vessels using fundus images can be broadly categorized as supervised and unsupervised methods. A comprehensive survey on existing retinal vessel segmentation algorithms and publicly available data sets has been presented in. Also, a comparative analysis of the two categories of vessel segmentation algorithms out dated presented. In the supervised category of algorithms, classifiers such as the k-Nearest Neighbor, Gaussian Mixture Model (GMM), support vector machine (SVM) , neural networks , decision trees and Ada Boost have been applied to classify vessel pixels from the non-vessels. The unsupervised algorithms mostly apply matched filtering, line detectors, morphological transformations, model-based methods, or multi-scale vessel segmentation methods. While most supervised vessel classification methods are dependent on the training data and sensitive to false edges, the existing unsupervised methods are computationally complex and hence they are not viable for real-time portable DR screening systems such as. Most of the for real-time portable DR screening systems such as. Most of the existing approaches such as the ones in and perform well on healthy retinal images but have low segmentation accuracy in images with pathology.

Glaucoma Definition

Glaucoma is a eye disease cause for irreversible blindness. Detected only at the advanced stage. Called as "silent theft of sight". insincerity be cured currently but can be slowed down. Screening at the early stage of glaucoma is necessary. Clinically, air puff intraocular pressure(IOP) measurement, visual field test and optic nerve head(ONH)assessment. Automated CDR assessment required for early screening of Glaucoma.

General Terminology

Selfish Gene Algorithm: No explicit population in algorithm. Individuals are created and destroyed only temporary for comparison of their genomes. New solutions is generated according to their gene frequency in population. It act selfishly of selecting genes.

Cup to Disc Ratio: The cup-to-disc ratio compares the diameter of the "cup" portion of the optic disc with the total diameter of the optic disc

Levels of Glaucoma: It as three levels they are

- Glaucoma - CRT < 1
- middle (1 < CRT)&&

(CRT < 1.002)

- starting- (CRT > 1.002)

Related Work

Segmentation of blood vessels and optic disc in retinal images in this subdivision of blood vessels and location of optic disc is done by using Markov Random Field Image Reconstruction method and Compensation Factor method[1] The images are obtained using fundus camera and are adapted in Matlab. A number of diagnosied operations are used for this purpose. First the images are cropped colletively to select the required disc-cup area. All further processes are done on the cropped image.

Lighter objects on the edge are interrupted and the generated image is then converted into grey scale. On the resulting grey scale image morphological operations are executed. Mathematical morphology is an approach to image analysis based on set theory [4] computer aided detection of eye diseases (called CatEye). It is a database driven framework to process, analyze and allocate retina images. Existing practical from tools, such as the ITK image processing toolkit [6] or Matlab can be easily accommadated while the C++ structure provides image (and derived) data access (read and write) to the retina database.

There are incorporate to equipment image processing filters or methods to compute classification features. Programs can be reasonably easily established to procedure large image sets from the database by applying certain filters or to visualize results [2] On the other hand, blood vessels introduce a high variation in retina images which seems to be a occupy feature when analysis glaucoma.

In our study, blood vessels are removed by computing a vessel mask and include the missing element values by morphological in painting [5]This paper proposed the segmentation of blood vessels and optic cup, optic disc and also to find the level of glaucoma with high accuracy.

Proposed Work

Segmentation of optic disc and blood vessels are done by using selfish gene algorithm. The features like size, color, shape etc are used to find the affected image accurately. Here first input image is selected and than pre processing is done with many methods like binary conversion, resizing, filtering, gray conversion and segmentation of blood vessels and gradient level segmentation and cup, disc segmentation after this algorithm is works till it gets better solution and it find the level of glaucoma with the help of CDR value.

Pre-Processing

The fundus image is preprocessed in different methods like binary conversion, resizing, filtering, gray conversion and segmentation of blood vessels The images are attain using fundus camera and are adapted in Matlab. A number of diagnosied operations are used for this purpose. First the images are clipped collectively to select the required disc-cup area. All further processes are done on the cropped image. Lighter objects on the edge are interrupted and the generated image is then converted into grey scale. On the resulting grey scale image diagnosied operations are performed. Mathematical morphology is an approach to image analysis based on set theory [6] Segmentation is the process of dividing an image into its constituent object and group of element which are consistent according to some criteria. Segmentation algorithms are area-direction instead of pixel oriented. The main dispassionate of image segmentation is to extract various features of image which can be merged or division in order to build object of passion on which analysis and interpretation can be performed. It includes clustering, thresholding [7]

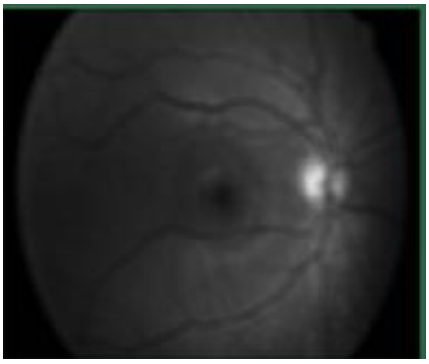

Figure 1: preprocessing of fundus image.

Blood Vessels Segmentation

Blood vessels can be seen as thin extended structures in the retina, with change in width and length. In order to segment the blood vessel from the fundus retinal image, we have executed a pre-processing technique, which consists of effective

adaptive histogram comparison (AHE) and powerful distance transform. This operation improves the robustness and the accuracy of the graph cut algorithm.

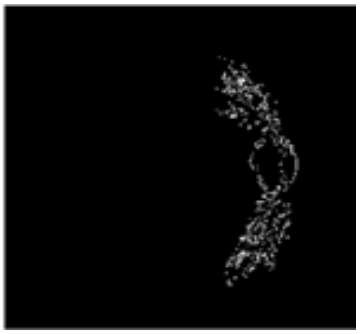

Figure 2:Blood vessels segmentation.

Optic Cup And Optic Disc Segmentation

The presence of blood vessels that run on the outline of the optic disc makes exact extraction of its outline difficult. The optic disc region tends to be similarly shiny. Thus, the close region of the optic disc was extracted by using the gradient level segmentation method on each component imageand theoptic disc region was determined by using animage combining these binary images. Then, the area of the SVM uses pixel classification for image segmentation .We implement to classify subjects into a CDR score moderate dementia using MRI scans An SVM is able to determine an optimal boundary of testing image SVM segmentation is High accuracy segmentation process especially high-dimensional images. Image segmentation is a set of segments that grouped cover the full image, or a set of contours extracted from the image. Each of the element in a region are same with respect to some characteristic or computed property, such as color, intensity, or texture.

Cup to Disc Ratio

The cup-to-disc ratio used in ophthalmology and optometry to assess the progression of glaucoma. The optic disc is the analysis location of the eye's "blind spot", the area where the optic nerve and blood vessels enter the retina. The cup-to-disc ratio compares the diameter of the "cup" portion of the optic disc with the total diameter of the optic disc by using an selfish gene algorithm by the value of CDR the ratio value is shown from that stage of glaucoma is detected and after that level of glaucoma is detected.

Result and Discussion

The result of optic disc, optic cup and blood vessels subdivision is obtained by the selfish gene algorithm the fundus image is selected to get in to the process of subdivision the image is resized,converts into binary and then gray scale

image,the segemtation of the optic disc the range of glaucoma , the level of glaucoma, type of glaucoma .The full output result with the level of glaucoma.

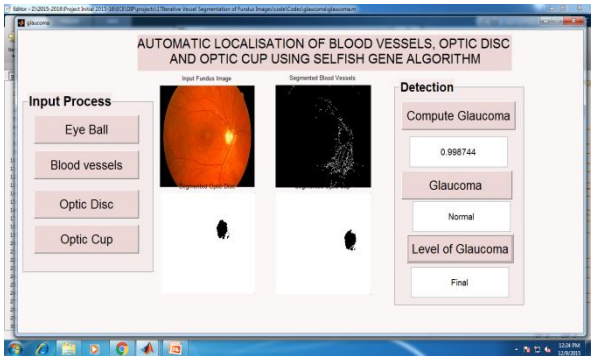

Figure 3: Result of glaucoma detection.

Conclusion and Future Wore

In this paper,simulation is carried out for extracting the features like size,area and shape of the optic disc and optic cup.The glaucoma disease for the 35 input mages is located by matching these features with the features of database images using MATLAB 2013 software.In the futureresearches they can develop the android application (app) in mobile unit and identify the presents of glaucoma in home itself.

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