RETINAL FUNDUS IMAGE ANALYSIS FOR DIAGNOSIS OF GLAUCOMA

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Abstract-*The glaucoma disease is characterized by change in the structure of nerve fibers and optic disc parameters such as diameter, volume, and area This project deals with the detection of glaucoma to prevent the vision loss. Glaucoma is one among the leading causes of vision loss. This is caused due to the increased fluid pressure and improper drainage of fluid in the eye. Diagnosis of glaucoma is mainly based on the Intra Ocular Pressure (IOP), medical history of patient's family, and change in optic disc structure. Glaucoma suspect will have IOP more than 21 mmHg. Glaucoma is an ocular disorder caused thanks to increased fluid pressure within the nervus opticus. It damages the optic nerve subsequently causes loss of vision. The available scanning methods are Heidelberg Retinal Tomography (HRT), Scanning Laser Polarimetry (SLP) and Optical Coherence Tomography (OCT). These methods are expensive and need experienced glaucoma detection.*

Keywords: Glaucoma, Filtering, Segmentation, Enhancement, MATLAB

1. INTRODUCTION

Glaucoma is one among the common causes of blindness with about 79 million within the world likely to be afflicted by the year 2020. The progressive degeneration of nervus opticus fiber is one among the way of characterizing glaucoma. This causes structural changes of the nervus opticus head (optic disk) and fiber layer, and results in failure of the field of vision the first detection of glaucoma and ensuring essential treatment can prevent permanent vision loss. The pressure of the non glaucomatous should be 21 mm of Hg, if it increases the nervus opticus are going to be damaged causing permanent vision loss. There are two main sorts of Glaucoma (i) Primary Open Angle Glaucoma (POAG) and (ii) Angle Closure Glaucoma (ACG). POAG is that the commonest sort of Glaucoma accounting for a minimum of 90%of all Glaucoma cases. The Intra-Ocular Pressure (IOP), which maintains a permanent shape of the human eye and protects it from deformation, rises because the right amount of fluid cannot drain out of the attention. With POAG, the entrances to the drainage canals work properly but a clogging problem occurs inside the drainage canals. This sort of Glaucoma develops slowly and sometimes without noticeable sight loss for several years. It are often treated with medications if diagnosed at the sooner stage. ACG happens when the drainage canals get blocked. The iris isn't as wide and open a sin the traditional case. The fringes of the iris bunches up over the drainage canals, when the pupil enlarges an excessive amount of or too quickly.

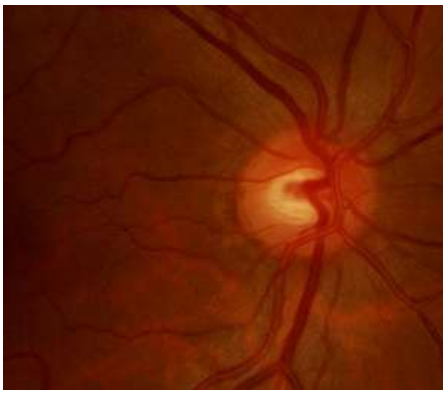

Fig 1: Glaucoma Image

2. LITERATURE SURVEY

In [1] Anupama B C The main objective of this work is to extract differing types of features from fundus images so as to return out with best suitable set of features which will help in automated detection of Glaucoma and evaluate it using learning algorithm. Different combinations of those features are given to Support Vector Machine (SVM) and KNN to classify the pictures as normal and glaucomatous. A tenfold cross validation is performed using the extracted features and a comparative study has been administered in terms of Accuracy, Sensitivity, Specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV) Performance evaluation has been through with and without applying feature reduction techniques.

In [2] Qaisar Abbas to guage the performance of Glaucoma-Deep system, the sensitivity (SE), specificity (SP), accuracy (ACC), and exactness (PRC) applied mathematics measures were utilised. On average, the SE of 84.50%, SP of 98.01%, command of ninety nine and Asian country of 84 values were achieved. examination to progressive systems, the Nodular-Deep system accomplished vital higher results. Consequently, the Glaucoma-Deep system will simply acknowledge the eye disease disease to resolve the matter of clinical specialists throughout eye-screening method on large-scale environments.

In [3] A.Padma The eye diseases may be detected by locating the optic disk. Many methodologies are followed

to diagnose the optic disk. Some eye diseases cause visual impairment with none vital symptoms. The progression of this eye impairment may be prevented by early diagnosing. The most aim of this survey is to research numerous approaches enforced for optic disk detection.

3. EXISTING SYSTEM

The body structure pictures are used for the designation of eye disease and diabetic retinopathy. Harm to cranial nerve fiber is detected victimisation the morphological options of body structure pictures. Morphological options like the magnitude relation of space of blood vessels in inferior-superior aspect to the nasal-temporal aspect, and magnitude relation of distance between the optic disk center and cranial nerve head to diameter of the optic disk are wont to find eye disease. In morphological ways, selecting structural parts is tough which cannot yield high classification accuracy. Image segmentation primarily based techniques are used for eye disease detection. This segmentation has shortcomings like localization, thresholding or demarcation which can cause unacceptable results and inescapable errors in eye disease designation.

4. PROPOSED SYSTEM

In this project we have a tendency to propose blind spot and calculus segmentation mistreatment super element classification for eye disease screening. In blind spot segmentation, histograms, and center surround statistics are wont to classify every super element as disc or non-disc. The results additionally show a rise in overlapping error because the responsibleness score is reduced, that justifies the effectiveness of the self-assessment. The segmental blind spot and calculus are then wont to reckon the cup to disc magnitude relation for eye disease screening.

5. BLOCK DIAGRAM

A. MATLAB Unit

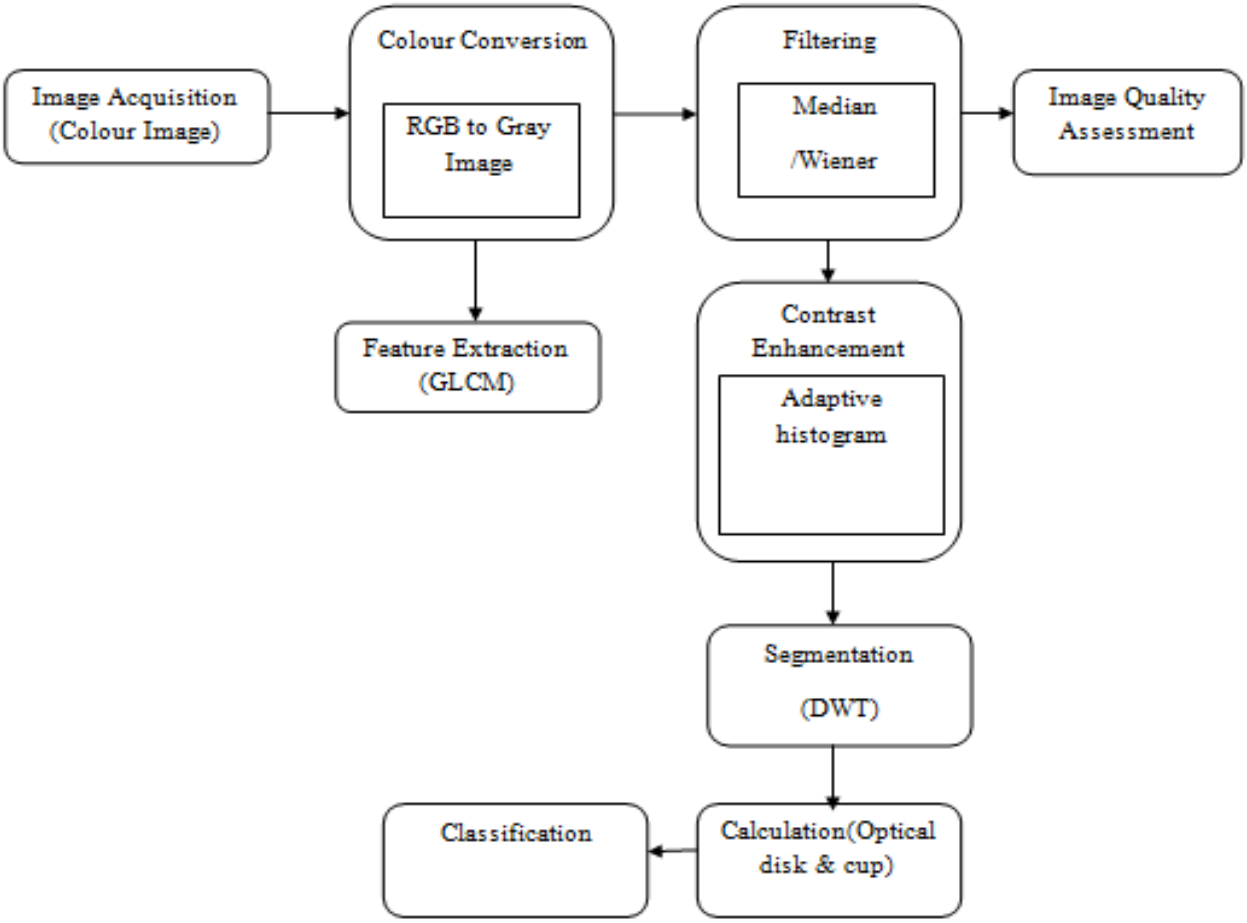

Fig 2:MATLAB unit

6. MODULE DESCRIPTION

A. *Input Image*

The first stage of any vision system is that the image acquisition stage. Once the image has been obtained, varied strategies of process will be applied to the image to perform the various completely different vision tasks needed these days. However, if the image has not been non heritable satisfactorily then the supposed tasks might not be accomplishable, even with the help of some type of image improvement. Digital imaging or digital image acquisition is that the creation of a digitally encoded illustration of the visual characteristics of AN object, like a physical scene or the inside structure of an object.

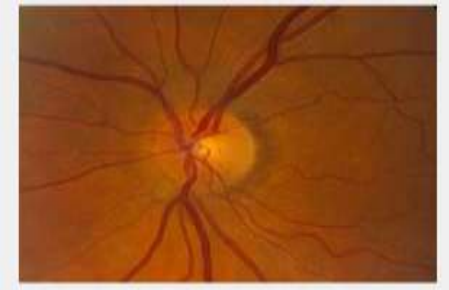

Fig 3:Input Image

B. *Gray Image*

In photography and computing technology, a grayscale or greyscale digital image is an image conversion types in which the value of each pixel is a single sample, that is, it carries only intensity values information. Images of this sort, also known as black and white, are combined exclusively of shades of gray, varying from black at the lowest intensity to white at the strongest.

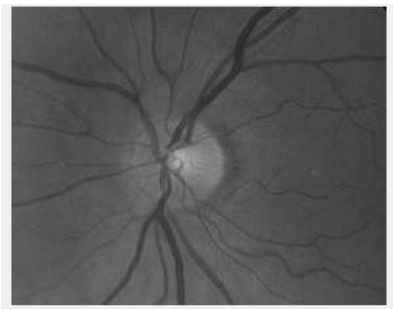

Fig 3: Gray Image

C. *Filtering*

In signal process, the Wiener filter may be a filter accustomed turn out Associate in Nursing estimate of a desired or target random method by linear time-invariant (LTI) filtering of Associate in Nursing determined shrie method, assumptive glorious stationary signal and noise spectra, and additive noise. The Wiener filter minimizes the mean sq. error between the calculable random method and also the desired method.

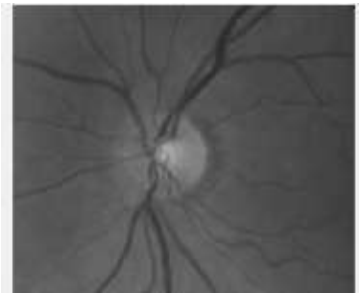

Fig 4:Wiener Filter

The Median Filter could be a nonlinear digital filtering technique, usually accustomed take away noise from a picture or signal. Such noise reduction could be a typical pre-processing step to boost the results of later process (for example, edge detection on associate degree image). Median filtering is incredibly wide employed in digital image process as a result of, below sure conditions, it preserves edges whereas removing noise (but see discussion below), additionally having applications in signal process

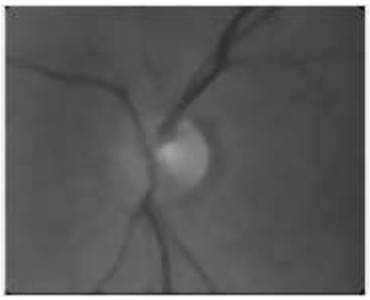

Fig 5: Median Filter

D. *Contrast Enhancement*

Adaptive histogram graph equalisation (AHE) may be a pc image process technique accustomed improve distinction in pictures. It differs from normal bar graph equalisation within the respect that the adaptive technique computes many histograms, every akin to a definite section of the image, and uses them to spread the lightness values of the image. it's thus appropriate for up the native distinction and enhancing the definitions of edges in every region of a picture.

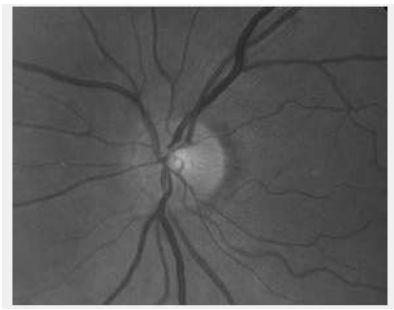

Fig 6:Adaptive Histogram Equalization

E. GLCM

In deep learning, recognition method or algorithm and in image processing, extraction methods begins from an starting set of measured data and creates feature extracted values (features) intended to be informative. Feature extraction is related to dimensionality reduction based quantitative analysis.

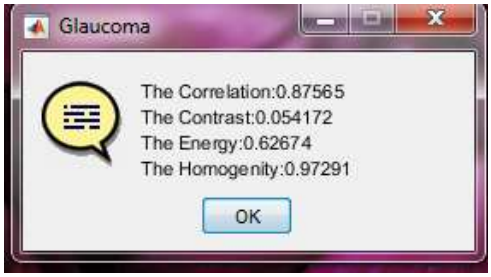

Table 1 Feature Extraction using GLCM

F. DWT

The Discrete Wavelet Transform contains a Brobdingnagian range of applications in science, engineering, arithmetic and engineering. Most notably, it's used for signal committal to writing, to represent a separate signal in an exceedingly a lot of redundant kind, typically as a preconditioning for information compression.

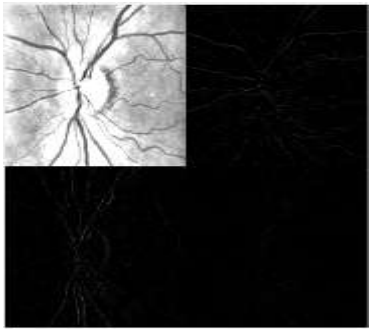

Fig 7:DWT

G. Segmentation

Optic Disc and Cup Segmentation supported Deep Learning. second cranial nerve head (ONH) assessment could be a convenient thanks to discover eye disease early and cup to disc quantitative relation (CDR) is a vital index for ONH analysis. Thus, it's a elementary task to section OD and OC from the complex body part pictures mechanically and accurately.

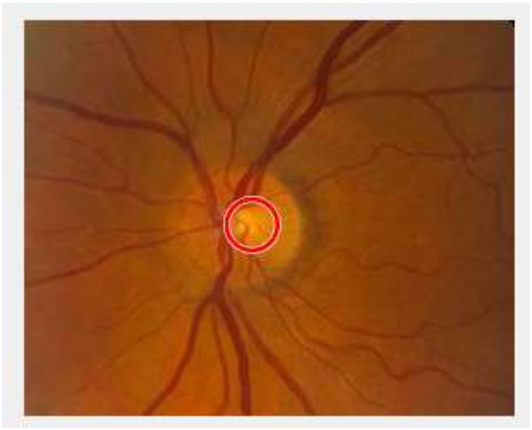

Fig 8:Segmentation

7. RESULT AND DISCUSSION

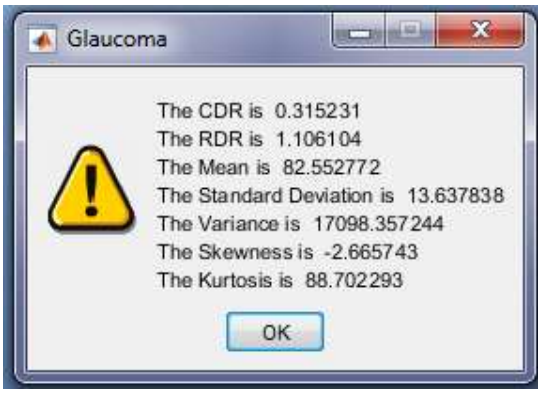

Fig 9:MATLAB Unit

Fig 10: Result

8. CONCLUSION

In this paper, we tend to designed and enforced an formula to spot eye disease. The novel technique uses Morphological techniques to extract 2 major options for detection of eye disease i.e. space quantitative relation of NRR in ISNT quadrants, Cup to Disc quantitative relation. The developed strategies were tested on 3 completely different databases i.e., DMED, FAU and, MESSIDOR. The projected technique achieves a mean accuracy of 97.5% having a mean process value of 0.8141 seconds.

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