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AUTOMATIC DETECTION OF DIABETIC RETINOPATHY IN RETINAL IMAGES USING CLASSIFICATION AND SOFT COMPUTING OPTIMIZATION TECHNIQUES

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ABSTRACT

Insulin-dependent mortals are attributed by blemished metabolism of glycogen that leads to long lasting dysfunction and damage of an organ. The most prosaic obstacle of diabetes is Diabetic Retinopathy, which is one of the predominant roots of visual death and visual impairment in middle aged patient. The expeditious mutation of diabetes patient thrust the limitations of the present Diabetic Retinopathy Screening potential for which the digital visualize of eye ball fundus can provide a potential solution by an automated image analysis algorithm. The present learning focus is developing the extraction of normal and isolated characteristics or marks in color retinal images. The adaptive filters are tuned to match the lump of vessel to be extracted in green channel images. To classify the pixels into vessels and non-vessels the Biogeography Based Optimization Algorithm is applied.

KEYWORDS: Diabetic Retinopathy, ANN, SIFT, Micro Aneurysms.

1. INTRODUCTION

The retina has multi-blanket layer fashion of neurons, photoreceptors and bedding cells. But when abnormalities occur in the fundus of an eye may leads to casualty. Fundus is positioned in the innermost facial of an eye, corresponding to the lens which carries retina, optic disk, macula and fovea and posterior pole. Physiologically the optic disk represents the blind spot.

There are several related diseases of an eye such as Glaucoma, Cataract and Diabetic Retinopathy which organizes the damages in the fundus.

2. RELATED WORKS

Retinopathy Processing

Diabetic Retinopathy Screening is to determine whether the patient is desired for outlying rehabilitation or not. Screening is essential as frequent humans do not evidence of Diabetic retinopathy until leading grade of disease. Diabetic Retinopathy scaling is test threat for computational systems as well as medical practice. Self-regulated blood vessel diagnosis in the fundus images can increase rapidity and boost the analyzing. Different algorithms have been developed for retinal imagining.

Filtering Based Extraction Techniques

An adaptive histogram equalization technique which is available in Mat lab Toolbox is used in this work. Since an inbuilt command is used in this work, generalization is very difficult. The techniques such as homomorphism filtering, morphological filtering, etc. are analyzed in this report.

Optimization Technique

The presence of insignificant features reduces the output accuracy besides increasing the computational time period. This technique of selecting an optimal feature set is called as feature selection. It is an optional step; many earlier works reported the usage of feature selection techniques to enhance the quality of the output.

3. System Analysis and Design Existing System

Diabetic Retinopathy risk increases by age as middle and older level and it is non-communicable disease. The expeditious mutation of diabetes patient thrust the limitations of the Diabetic Retinopathy Screening potential for which the digital visualize of eye ball fundus can provide a potential solution by an automated image analysis algorithm. The present learning focus is developing the extraction of normal and isolated characteristics or marks in color retinal images.

Drawbacks

- To finding the solution for Diabetic Retinopathy is unable analyzes.
- The parameter will not be used to select image region.

- Prediction of measure only the Biogeography Based Optimization Algorithm.

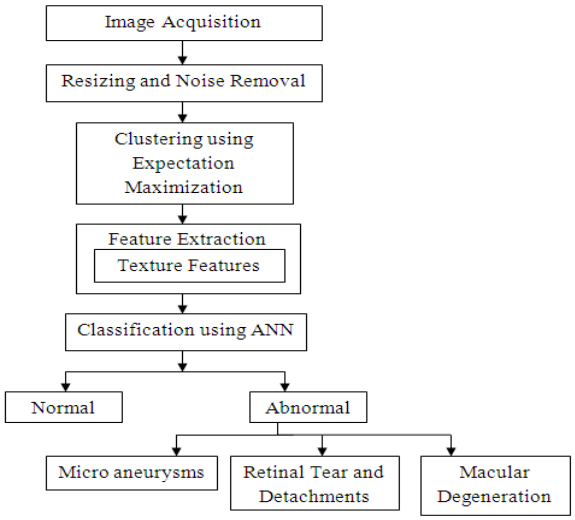
Proposed System

It can detect the lesions by using morphological techniques. Detection of lesions is more help full to identify the retinopathy stage. In our proposed work we have to detect the type of disease present in the Fundus image. To detect the disease affected region, segment the image using Expectation Maximization Segmentation and different types of features are extracted like Statistical and texture Features. Finally different types of diseases like Micro aneurysms, Retinal Detachment and Macular Degeneration are classified using ANN.

Advantages

- Expectation Maximization is used for the classification technique.
- Segmentation done by ANN algorithm.
- Detect more number of diseases.

4. System Design Architecture



5. RESULT AND DISCUSSION

Image Acquisition & Preprocessing

The preprocessing stage is crucial due to the intrinsic characteristics of retinal images. Retinal images often have poor and varying contrasts due to many factors including the noises introduced during the imaging acquisition process and the improper reflection of camera flash and retinal pigmentation.

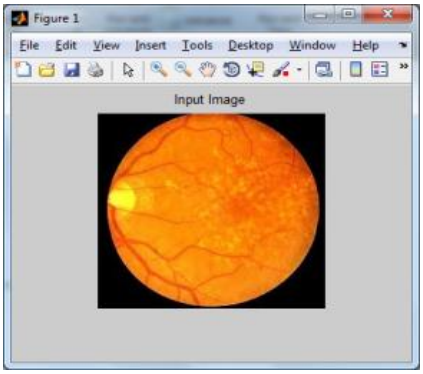
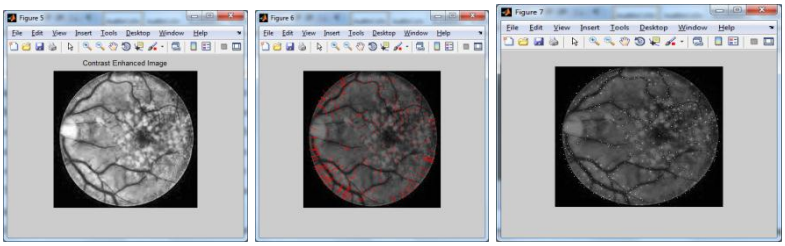


Fig. 1: Image Acquisition and Preprocessing input image.

Sift For Vessel Keypoint Estimation

SIFT key points of objects are first extracted from a set of reference images and stored in a database. An object is recognized in a new image by individually comparing each feature from the new image to this database. Finding candidate matching features based on Euclidean distance of their feature vectors. From the full set of matches, subsets of key points that agree on the object and its location, scale, and orientation in the new image are identified to filter out good matches.

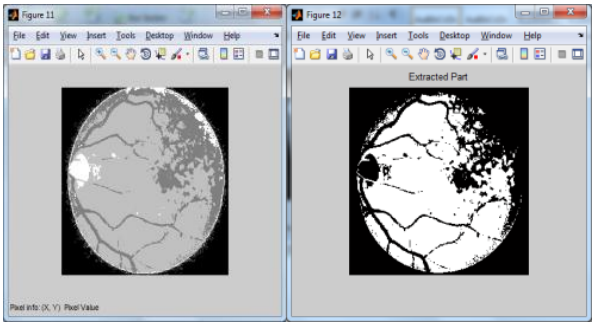


a) Contrast enhanced image b) & c) key points or key region identification using SIFT

Fig. 5.2: SIFT Vessel key points or Region identification Images.

Segmentation Using Expectation and Maximization

The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze. Image segmentation is typically used to locate objects and boundaries in images. Image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain characteristics. The result of image segmentation is a set of segments that collectively cover the entire image, or a set of contours extracted from the image.



d) EM Segmentation e) Segmentation Result

Fig. 5.3 EM Segmentation and Result.

Feature Evaluation

Morphological operations rely just around the comparative placing our order regarding pixel values, not really on their statistical values, along with therefore are especially suitable for our finalizing regarding binary images. Morphological operations may also be placed on grayscale images so that the gentle exchange functions are usually unknown and therefore the complete pixel values are usually regarding no or maybe modest attention.

6. CONCLUSION AND FUTURE ENHANCEMENT

The proposed developed system could be a benchmark for the development of other retinopathy signs detection systems, such as for Micro aneurysms, Retinal Detachment and Macular Degeneration. The Maximization Segmentation employing the image processing can help produce a more reliable screening system. In addition, it helps achieve the overall aim of the screening, which is to detect earlier the sight threatening diseases and to ensure a timely treatment in order to prevent vision loss. Future work will address improvement of the performance of this system by finding more specific characteristics of exudates which could distinguish them from other features more effectively.

REFERENCES

1. Janaki Sathya D, Geetha K. Enhanced CAE system for detection of exaudates and diagnosis of diabetic retinopathy stages in fundus retinal images using soft computing techniques, 2019; 25.
2. N. A. Prabhu, D.V. Bhoir, U. Rao, “Template matching technique for Optic Disc localization in Fundus Image”, IEEE fifth Intl Conf. on Computing for Sustainable Global Development, BVICAM, India, 1143-114.
3. Akande, N.O., O.C. Abikoye, P. Ayegba, B. Gbadamosi and A.A. Adegun, Segmented

retinal blood vessels of healthy and diabetic retinopathy individual. J. Eng. Applied Sci., 2018; 22.

4. W. Kusakunniran, Q. Wu, P. Ritthipravat, and J. Zhang, "Hard exudates segmentation based on learned initial seeds and iterative graph cut," Computer Methods and Programs in Biomedicine, 2017; 158: 173– 183.
5. Bharkad, S. Automatic segmentation of blood vessels in retinal image using morphological filters, 2017; 132– 136.
6. Sheng, B.; Riccardo et al.; Mo, S.; Li, H.; Hou, X., R.; Feng, D.D. Retinal Vessel Segmentation Using Minimum Spanning Super pixel Tree Detector, 2018; 1–13.
7. April et al., Roychowdhury S, Koozekanani DD. DREAM: Diabetic retinopathy analysis using machine learning, 2018; 1717-1728.
8. Bharkad, Thibault G, Decenciere E, Sekhar et al. Exudate Detection in Color Retinal Images for Mass Screening of Diabetic Retinopathy. Medical Image Analysis, 2018; 18(7): 1026-1043.
9. Gbadamosi B, Raja SS, Vasuki S. Screening diabetic retinopathy in developing countries using retinal images. Appl Med Inform, 2018; 36(1): 13-22.
10. O. C. Jayne , N. A. Prabhu, D.V. Bhoir, U. Rao, "Template matching technique for Optic Disc localization in Fundus Image", IEEE fifth Intl Conf. on Computing for Sustainable Global Development, 2017; 1143-114.