AUTOMATIC DETECTION OF AGE RELATED MACULAR DEGENERATION USING RETINAL COLOUR IMAGES

Poonam Bhosale, Pradnya Kulkarni,Sarita Bobde

P.G Student, Department of computer Engineering, M.I.T, Maharashtra, India.
Assistant Professor, Department of computer Engineering, M.I.T, Maharashtra, India.
Assistant Professor, Department of computer Engineering, M.I.T, Maharashtra, India

ABSTRACT

Age-related Macular Degeneration (AMD) is a common eye condition and a leading cause of vision loss among people age 50 and older. It causes damage to the macula, a small spot near the center of the retina and the part of the eye needed for sharp and central vision. AMD is the fourth leading cause of blindness around the world. If it is not detected in early stages it causes loss of eye sight. There are two types of AMD'S dry and wet AMD'S. The people with macular degeneration are mostly affected by dry AMD. Early symptoms of AMD are formation of drusen and yellow pigmentation. Digital colour retinal fundus images are widely used to detect AMD.We are using STARE database which contains colour fundus image data of 50 healthy persons.This automated AMD detection system can be used for mass fundus image screening.

Keyword : Age-related Macular Degeneration, drusen, macula, retinal fundus image.

1. INTRODUCTION

In the field of medicines, medical image processing plays a vital role to detect the abnormalities of eye or eye diseases. Macular degeneration is the most common retinal diseases in India. AMD is the fourth leading cause of blindness around the world. If it is not detected in early stages it causes loss of eye sight. AMD is a common eye condition and a leading cause of vision loss among people age 50 and older. It causes damage to the macula, a small spot near the center of the retina and the part of the eye needed for sharp, central vision. AMD affects the macula, the part of the eye that allows you to see fine detail.The macula is made up of millions of light-sensing cells that provide sharp, central vision. When the macula is damaged, the center of your field of view may appear blurry, distorted, or dark.

There are two types of AMD, wet and Dry and wet macular degeneration affects the retina due to filling of fluid under the retina .it leads to bleeding and scarring causing loss of vision. In Dry macular degeneration initial symptoms are the presence of fatty deposits called drusen on the retina.Most of the people with macular degeneration are affected by the 'dry' type. AMD by itself does not lead to complete blindness. However, the loss of central vision in AMD can interfere with activities, such as the ability to see faces, drive, read, write.

2. RELATED WORK

A large number of image processing techniques and algorithms have been published to detect AMD using colour retinal images. Muthu Rama Krishnan proposed a system which is having less testing time. and furthermore it is used as an adjancent tool for mass screening of eye to dignose dry AMD cases. These lesions are identified by manual inspection of fundus images by the ophthalmologists [1] Rashid Jalal Qureshi proposed an algorithm to detect macula using algorithm based on temporal arcade. [2] R..manjusha developed a novel algorithm for automatic

detection of AMD using image processing techniques.[6] In this paper, we introduced an automated system to the detect of AMD using colour fundus images.

3. PROPOSED METHODOLOGY

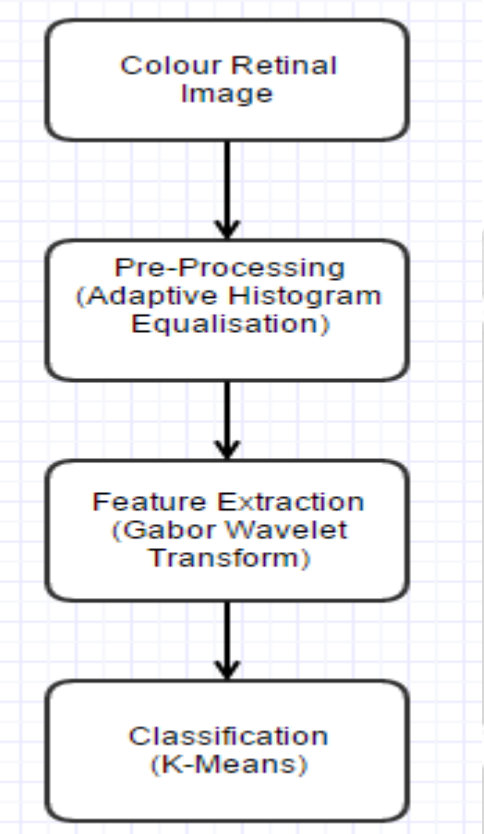

Fig -1: Techniques used for disease detection

3.1 Pre-Processing: Adaptive histrogram equalization is a computer image processing technique used to improve contrast in images. It is suitable for improving the local contrast and enhancing the definitions of edges in each region of an image. Ordinary histogram equalization uses the same transformation derived from the image histogram to transform all pixels. This works well when the distribution of pixel values is similar throughout the image. However, when the image contains regions that are significantly lighter or darker than most of the image, the contrast in those regions will not be sufficiently enhanced. Adaptive histogram equalization (AHE) improves on this by transforming each pixel with a transformation function derived from a neighbourhood region.

3.2 Feature Extraction*:* Wavelet transform is the process of extracting significant information from an image. Features of the retinal images are extracted from the transformed coefficients. The wavelet transform is a powerful and versatile tool that has been applied to many different image processing problems, such as image coding, texture analysis and shape analysis. Continuous Wavelet Transform (CWT) in two or more dimension is a very efficient and flexible tool in image analysis.

3.3 Classification: K-NN is stands for "K-Nearest Neighbors algorithm". It is one of the simple and widely used machine learning algorithms. Here, an object is classified by the "distance" from its neighbors, with the object being

assigned to the class which is most common among its k distance-nearest neighbors (K is a positive integer, typically small). If K = 1, then the object is simply assigned to the class of that single nearest neighbor. In this paper, K=1 is considered for classification of retinal image. The advantage of using K-NN classifier is, it's easy to implement.

4. CONCLUSIONS

Regular eye screening will help to diagnose dry AMD and may avoid the loss of vision in old aged subjects.In this work, an automated dry AMD screening system using fundus images is proposed. The non-linear feature extracted using HOS and Gabor wavelet are able to identify the abrupt changes in the normal and dry AMD images. The testing time of the proposed system is less, hence this system can be used as an adjunct tool for mass screening of eye to diagnose dry AMD cases. In future, main focus will be on improving the performance of the method to pick out individual regions of drusen by applying image segmentation technique and to execute that method on a large data set. Successful implementation of the method will be used as a clinical tool for AMD screening. We will expand the algorithm to be applicable to image modalities rather than standard fundus images.

5. REFERENCES

[1].M.Mookiah ,U.Acharya ,V.Chandran."Automated diagnosis of Age-related Macular Degeneration using greyscale features from digital fundus images ",Computers in Biology and Medicine 2014.
[2]. Qureshi , L.Kovacs , B.Harangi , "Combining algorithms for automatic detection of optic disc and macula in fundus images" Computer Vision and Image Understanding 2012.
[3]. P.Rani, J. Kaleka."Macular Degeneration Detection in Retinal Fundus Images using Differential Algorithm" IJIRSET Vol. 4, Issue 8, August 2015.
[4]. Y. Kanagasingam , A. Bhuiyan ."Progress on retinal image analysis for age related macular Degeneration" Progress in Retinal and Eye Research 38 ,2014.
[5]. Y. Kanagasingam , A. Bhuiyan ."Progress on retinal image analysis for age related macular Degeneration" Progress in Retinal and Eye Research 38 ,2014.
[6]. R. Manjula Sri,Ch.Madhubabu, K.M.M.Rao ."Automatic Detection of Age-related Macular Degeneration from Retinal Images." International Journal of Computing Science and Communication Technologies, VOL.5 NO. 2, Jan 2013.