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DETECTION OF DIABETIC RETINOPATHY

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Abstract—The effect of diabetes on eve is called Diabetic Retinopathy which can lead to partial or even complete loss of vision if left undiagnosed at the initial stage. It is a major cause of blindness in middle as well as older age groups. That is the reason for which efforts that has been undertaken in last few years in developing tools to assist diagnosis of Diabetic Retinopathy. Since the ratio of people afflicted with the disease to the number of eye specialist who can screen these patients is very high, there is a need of automated diagnostic system for Diabetic Retinopathy changes in the eye so that only diseased persons can be referred to the specialist for further intervention and treatment. Image analysis tools can be used for automated detection of various features and stages of Diabetic Retinopathy and can be referred to the specialist accordingly for intervention.

Keywords—Diabetic Retinopathy

1. INTRODUCTION

Diabetic Retinopathy, also known as diabetic eye disease, is when damage occurs to the retina due to diabetes. It eventually leads to blindness. It is a systemic disease, which affects up to 80% of all patients how has had diabetes for 10 years or more. Despite these intimidating statistics, research indicates that at least 90% of these new cases could be reduced if there were proper and vigilant treatment and monitoring eyes. The longer a person has diabetes, the higher his or her chances of developing diabetic retinopathy.

Diabetic Retinopathy often has no early warning signs. In general, the person is likely to have blurred vision, making it hard to do things like read or drive. In some cases, the vision will get better or worse during day. These compilations if not dealt with on time can lead to lot of disability on the part of the part of the patient and huge cost and work load on the specialists and the government. Hence there is a need to develop an automated diagnostic system for diabetic retinopathy.

However, the efficient therapies do exist. An accurate and early detection and correct application of treatment can prevent blindness in more than 50% of all cases. It is shown that early diagnosis and timely treatment could efficiently prevent visual loss. It is a major cause of blindness in both middle and

advance age groups. According to the national diabetic information data (US), Diabetic Retinopathy (damage to the retina) cause by complications of diabetic. Below is the picture of eye affected by diabetic retinopathy.



Fig 1.1 Digital RGB Retinal Image

This project aims to develop automatic detection system for detection of diabetic retinopathy. It includes processing image of retina. Our objective is to process the image of diabetic eyes, to detect weather they are affected by diabetic retinopathy and at what level. It includes detection of Micro aneurysm and blood vessels using cropping, thresholding, segmentation, morphological, etc. algorithms, to make it fully automatic system.

2. SYSTEM ARCHITECTURE

Figure below shows the block diagram of system.



Fig 2.1 Block Diagram

Two images of fundus one normal image and other effected image are taken for comparison. These images undergo through following stages:

2.1. PRE-PROCESSING:

2.1.1. Read the images: Retina image is read in program.

2.1.2. *Color Plane:* Color plane is decided i.e. as sample images are color (RGB) images they are converted into red plane, green plane and blue plane images. Then by observing those images it will help

us to choose better image, we will choose the image which will show the features of image clearly for future process. The green plane exhibits the best contrast between the vessels and background while the red and blue ones tends to be more noisy. Hence intensity conversion of image is done using green channel.

2.2. FEATURE EXTRACTION:

2.2.1. Image Enhancement: Image enhancement is one of the first technique in image processing. The original image is processed so that the resultant image is more suitable than original for specific application i.e. the image is enhanced. Image enhancement is a purely subjective processing technique. By subjective we mean that the desired result varies from person to person. Image enhancement does not add any extra information to the original image. It merely improves the subjective quality of the images by working with the existing data.

2.2.2. *Contrast Stretching:* The idea behind contrast stretching is to increase the construct of images by making the dark portions darker and bright portions brighter. We are using histogram method for contrast stretching. Histogram is a graph of gray level verses number of pixels.

2.2.3. *Thresholding:* Thresholding is one of the most important techniques for segmentation.

2.2.4. Segmentation: Segmentation, as name suggests, subdivides (segments) an image into its constituent regions or objects. Image is converted into binary form.

2.3. CLASSIFICATION:

After processing images here we classify images into different levels of diabetics:

- Normal
- Medium
- Moderate
- sever

We use Rule Base Method for classification.

3. PROJECT SPECIFICATIONS

Automatic system of diabetic retinopathy detection is designed to offer substantial improvements over its predecessors in terms of speed, accuracy and early detection and correct application of treatment can prevent blindness in more than 50% of all cases.

Software Specifications:

MATLAB (R2008a)

Version 7.6.0.324

February 10, 2008

License Number: 161051

4. ALGORITHM

- 1. Start.
- 2. Read retinal image.
- 3. Display retinal image.
- 4. Green Plane Conversion.
- 5. Gray scale conversion.
- 6. Contrast Stretching (Histogram).
- 7. Blood vessel extraction.
- 8. Micro aneurysm extraction.
- 9. Segmentation using morphological operation.

10. To identify which retina is infected or normal.

- 11. Disease severity analysis.
- 12. Stop.

5. FLOW OF PROJECT



Fig 5.1 Flow Chart

4. ADVANTAGES

- 1) Early detection of diabetic retinopathy prevents visual blindness.
- 2) As system is automated, human interference is not required.
- 3) Accurate results.
- 4) Time saver.

6. **DISADVANTAGES**

If system breaks down, then expert is required to setup the problem.

7. APPLICATIONS

As our project is application oriented, it has only one application i.e. detection of diabetic retinopathy.

8. FUTURE SCOPE

We can implement it on processor for high speed.

9. CONCLUSION

It was concluded from the study that the effect of diabetes Retinopathy which can lead to partial or even complete loss of vision if left undiagnosed at the initial stage. It is a major cause of blindness in middle as well as older age groups. Image analysis tools can be used for automated detection of various features and stages of Diabetic Retinopathy and can be referred to the specialist accordingly for intervention.

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