An Effective Retinal Image Analysis To Diagnose Stargardt Disease Using Automated Algorithm

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Abstract: **Stargardt disease is an inherited eye condition that affects the macula, which is a tiny part of the retina, it is the light sensitive film at the back of our eye. This disease causes change in the macula area of retina. The characteristic of Stargardt disease is which cause yellowish flecks often surrounds the macula. As the macula becomes damage there is also an oval lesion referred to beaten bronze appearance within macular area. This tends to change over time and reflect damage to macula. The Lab VIEW GUI scans the retina of eye and compare with the stored database of the affected eyes using "Edge patterning technique". This technique is the replacement of the line sensor process. In this proposed system, we enforce automated algorithm for segmentation process to provide high accuracy and for easy implementation. Quantitative evaluations on synthetic and real data sets show the performance of our framework.**

Index Terms: Retinal image analysis, pattern matching, automated algorithm, detection.

I. INTRODUCTION

Adaptive models for medical image processing are crucial in computer aided diagnostic process. Especially, when modeling disease structures in medical image space high variability, artifacts and noise affect image quality and introduce data ambiguity making robust processing and analyzing. Clinical medical retinal research in particular and visual science in humans, in general is based on minimally invasive testing with imaging serving as the surrogate for biopsy. Given the transparency of ocular tissue, retinal images are able to provide large amounts of valuable information. Image analysis of the retina can be performed in a variety of settings ranging from the standard digital fundus photograph to auto florescence imaging and optical coherence tomography, all of which provide unique information to the viewer. Combined analysis of imaging data from multiple methods can reveal heretofore- unexpected relationships.

Stargardt disease affects 1 in 10,000 people in the United States. It was named for the German ophthalmologist Karl Stargardt and may also be called the fundus flavimaculatus.This condition affects the retina, which lines the back of the eye and is composed of many layers. One layer of the retina is the retinal pigment epithelium (RPE).

In people with Stargardt disease the RPE collects a substance called lipofuscin, which can lead to vision problems. Vision loss in Stargardt disease is most intense in the macula which is in the center of the retina. Stargardt disease is part of a group of diseases affecting the macular region of the retina, called macular degenerations. Stargardt disease is sometimes called a juvenile macular degeneration because it often appears at an early age. Here, we summarize the development and application of several digital tools for retinal image analysis, particularly the images of age related macular degeneration (AMD) and its juvenile form, stargardt disease (STDG).
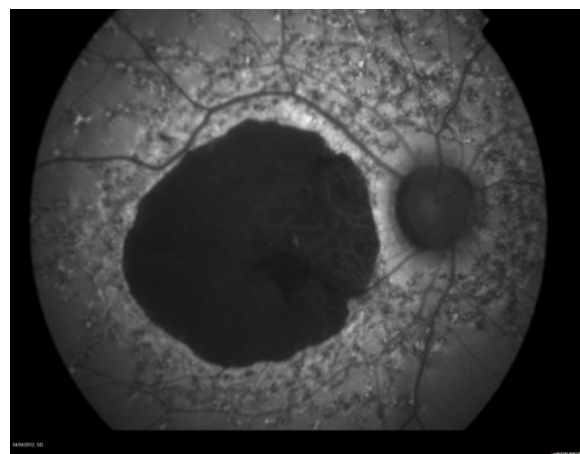

Fig 1: Normal Eye

Fig 2: Highly affected Eye

II. EXISTING SYSTEMS

In this the identification of fundus is carried out by using imaging techniques such as FAF –Fundus Auto Fluorescence, OCT-Optical Coherence Tomography. The

affected portion density can be calculated only through formulas that is wavelet transform. Manual testing is only available in this system. In this technique fundus can be identified only at advance stage. At this stage the possibility of vision loss is high.

III. PROPOSED SYSTEM

The processing techniques are done automatically by Lab VIEW without using any formulas. This work is mainly focused on the identifying the fundus image at the initial stage.

To facilitate segmentation process, specialized diffusion method to enhance the contrast, reduce the discontinuity and eliminate edge artifacts. With this project we can create awareness among the people about this unidentified genetic eye disease and to provide care for the upcoming defects. Using Lab VIEW for this work is mainly depends only on its advantage.
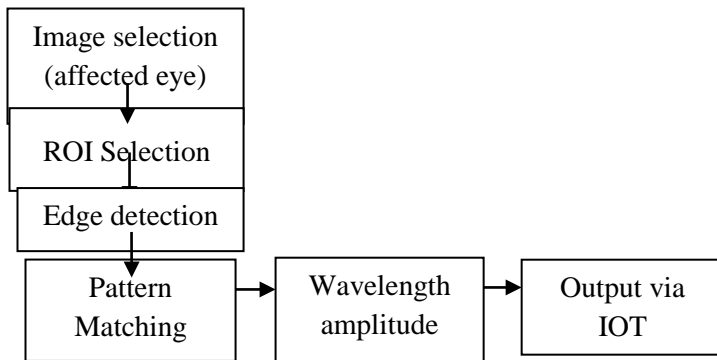
IV. BLOCK DIAGRAM

Fig 3: Block diagram of proposed system

V. ALGORITHM

Step 1: Image acquisition of the scanned image is through browsing.

Step 2: Setting color plane extraction as default to remove noise from browsing image.

Step 3: Selection of the region of interest to analyze the output manually.

Step 4: Edge detection technique is used as a comparison factor.

Step 5: Using Pattern matching technique the comparison process will be done and to find the depth or intensity of the edges.

Step 6: The output will be displayed in the graph as the gradient value.

Step 7: The wave amplitude of the output is calculated and compared for the testing purpose.

VI. SOFTWARE DESCRIPTION

The Lab VIEW software is used in this project. In Lab VIEW the results are accurate and if any error occurs at any step, those corresponding errors can be found at that step itself. By doing so the disease can be found at the earlier stage itself and hence we can prevent the eye from vision loss. Lab VIEW programs/subroutines are called

virtual instruments (VIs). Each VI has three components: a block diagram, a front panel, and a connector panel. The last is used to represent the VI in the block diagrams of other, calling VIs. Controls and indicators on the front panel allow an operator to input data into or extract data from a running virtual instrument.

VII. TABULATION

RESULTS	NORMAL EYE	INITIAL STAGE	SECOND STAGE	HIGHLY AFFECTED EYE
X-POSITION	214.67	26.144	10.30	35.07
Y-POSITION	106.00	101.865	134.99	389.01
DISTANCE	41.67	13.14	3.31	4.9
STRENGTH	25	10.66	13.33	16
WAVE AMPLITUDE	9.83	7.33	3.00	0.00

VIII. PROCESS

Image processing can be done in LabVIEW through advance tools VISION and MOTION. The Vision and Motion have Vision express. The Vision express consists of Vision Acquisition and Vision Assistant.The Vision Acquisition is used to acquire image through browsing from the file path.The Vision Assistant is used after getting the image specialized process like detection and matching is done.

IX. APPLICATIONS

1)Testing for stargardt disease at initial stage.
2)Analysing and detection of affected portion.
3)Used for automated testing.
4)High speed and time consumption.
5)More accuracy.

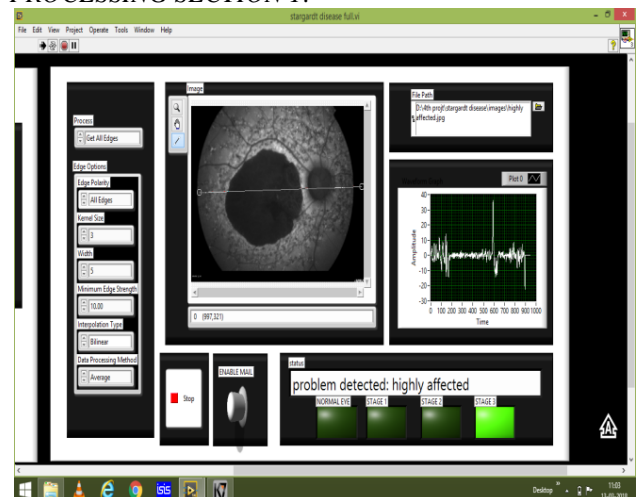### X. OUTPUTS

PROCESSING SECTION 1:

Fig 3: Highly effected eye of stargardt disease
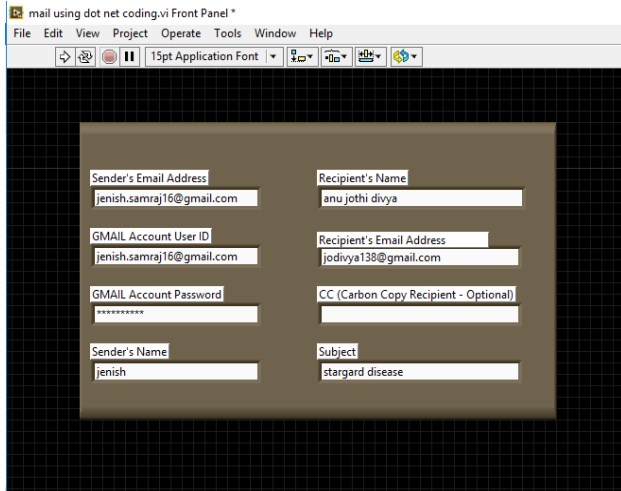
PROCESSING SECTION 2:

Fig 4: IOT Section

XI.   CONCLUSION

We have presented a coarse to fine segmentation and edge detection framework through Lab VIEW using an automated algorithm model to form a region of interest that is used to analyze the Stargardt diseases. Our studies show promising results. Future work is devoted towards extension of our framework to deal with other ring like disease phenotypes.

XII.   REFERENCES

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