International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 04 | April-2016 www.irjet.net p-ISSN: 2395-0072

IRIS BASED MEDICAL ANALYSIS BY GEOMETRIC DEFORMATION FEATURES

Jyoti Prasad[1], Divya Patel[2], Megha Jadhav[3], Prof. Rupali Deshmukh[4]

[1,2,3]Students, Dept of Electronics & Telecommunication, Dr. D. Y. Patil Institute of Engineering & Technology, Pimpri, Pune-411018, Maharashtra, India

[4]Assistant Professor, Dept of Electronics & Telecommunication, Dr. D. Y. Patil Institute of Engineering & Technology, Pimpri, Pune-411018, Maharashtra, India

---

Abstract - *An EYE is an important sense organ of the body and it plays a vital role in identifying various diseases. One of those diseases is "diabetes" which is identified by iris based medical analysis. Diabetic retinopathy is the most common cause of blindness, which is a complication of diabetes mellitus, so it is necessary to diagnosed early. Diabetes identification through iris image analysis is used worldwide and more effective compared with other biometric technologies. Various iris images were taken before and after the treatment of eye disease and the output shows mathematical difference obtained from treatment. Feature extraction plays a vital role to help us identify whether the iris image is diseased or disease free. Some of the features that are laid importance are texture features and colour features. Till date, only the method of identifying whether the iris image is diseased or disease free is being proposed so in this paper we are aiming to find out the* ***"level of cholesterol"*** *in our body by analysing iris image with the help of image processing [8].*

Key Words: Diabetic, feature extraction, iris, diabetic retinopathy.

1. INTRODUCTION

The iris is like a map of the body - changes in certain organs are reflected in specific parts of the iris. The right iris shows the condition of the right side of the body, while the left iris reflects the condition of left side of body. Iris diagnosis is also known as Iridology. Iridology is the branch of science that deals with the study of iris i.e., coloured part of the eye.

The Iris is the greenish yellow area surrounding the transparent pupil (showing as black). The white outer area is the sclera; the central transparent part is the cornea. The iris is actually part of the nervous system and its intricate highway of hundreds of thousands of nerve endings and nerve impulses. The iris receives its name (iris, irides,-a rainbow) from its varying colour effects. The front view of human eye is shown in figure 1.

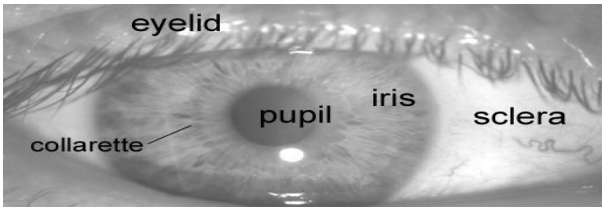

Fig -1: Front view of human eye.

Hypercholesterolemia or a high level of cholesterol in the blood poses a significant threat to person's health. Even though it is not considered as a disease, it can be secondary to a disease and can help contribute to other many forms of diseases most notable are cardiovascular diseases. Till now, only the method of finding the presence of cholesterol is being developed but in this project we are trying to introduce the "**level of cholesterol**" in the body [8].

2. BACKGROUND

This **s**ection explains the work that has been already done regarding iris image processing and disease (diabetes) diagnostic.

At ancient times, when computers were not so advanced, then detecting diseases using iridology were done manually which gave negative results and raised the claim that iridology is not useful tool. For example in 1979 Dr. Bernard Jensen, a leading American iridologist and two other iridology proponents failed to establish the basis of their practice when they examined photographs of the eyes of 143 patients in an attempt to determine which ones had kidney impairments. Of the patients, forty-eight had been diagnosed with kidney disease, and the rest had normal kidney function. Based on their analysis of the patient's irises, the three iridologists could not detect which patients had kidney disease and which did not. The reason for this can only be explained as the imperfection of human eye in observing some of the eye features such as broken tissues, colour pattern. However these challenges can be minimized using computer vision technology with specific algorithms. After the computer being advanced, it became easy to analyse iris image to detect diseases and gave more accurate observation. For example Ma and Li (2008) suggested texture feature extraction and classification for

iris diagnosis. They proposed an iridology model that consists of the iris image pre-processing, texture feature analysis and disease classification. Their experimental result shows that the proposed iridology diagnosis model is quite effective and promising for medical diagnosis and health surveillance for both hospital and public use. The proposed tool for diabetes diagnosis is non-contact, real time, portable and more convenient as it does not involve skin puncturing and it can be used both in the hospital and at home for self-diagnosis.

Many more work and research were done to find out diabetic iris using image processing technology, but level of cholesterol is still a question mark in these researches. So we are trying to come up with the approximate level of cholesterol in the body.

3. PROPOSED SYSTEM

The main purpose of this research is to apply image processing algorithms via computer using MATLAB code to the iris images and find out the level of cholesterol in the body. The diagram below shows the required approach to get the output of the system:

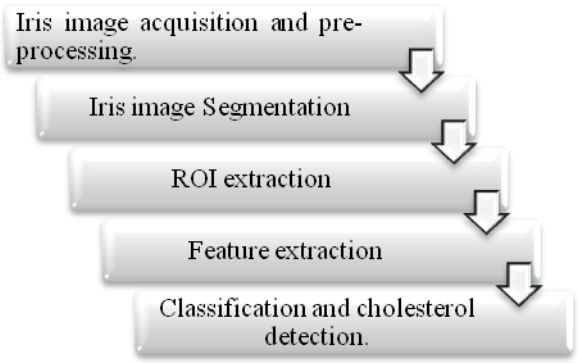

Fig 2: Block diagram of proposed approach

3.1 Iris Image acquisition: The image for analysis is taken from the database which contains both the normal eye image and diabetic eye image. Iris images from database looks like the image given in fig. 3.

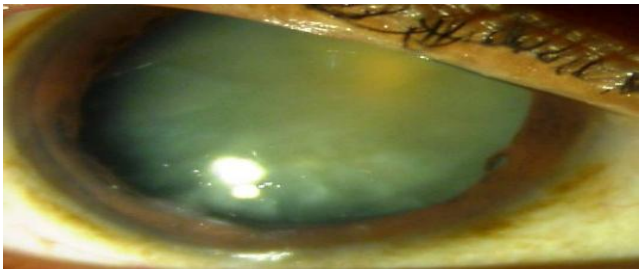

Fig 3. Captured image

3.1.1 Iris image pre-processing: In pre-processing the image is resized as well as enhanced and the noise is removed. This makes image more accurate for the further process to be carried hence this step is necessarily to be followed. The image from the database is colour image so it can be converted into gray using MATLAB command (*rgb2gray*).

3.2 Iris image segmentation: For detecting the boundaries we have to use segmentation. Segmentation is carried out to locate inner and outer boundaries of the iris. Once the boundaries are found, the ring shaped iris is detected by using subtraction method.

3.3 ROI Extraction: ROI means region of interest. This is done to crop the portion of the normalised iris image. Cropping is done according to the iris chart shown below.

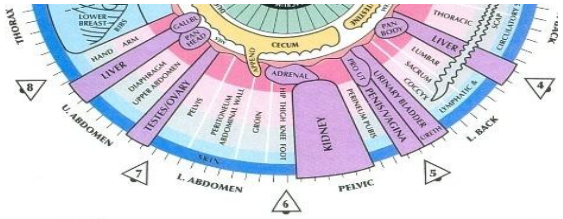

Fig 4: Iridology chart

3.4 Feature Classification: There are many features which can be considered for diagnosis but only the one from which we get accurate results are taken into account. We are taking colour moments and texture features for the diagnosis.

3.4.1 Gabor filter: Gabor filter algorithm is used in the feature extraction technique. Gabor filter named after Dennis Gabor, is a linear filter used for edge detection. In the spatial domain, a 2D Gabor filter is a Gaussian kernel function modulated by a sinusoidal plane wave. The equation for gabor filter used for extracting features:

$$g(x, y, \emptyset) = \left(\frac{\exp(-x'^2 + y'^2)}{\sigma^2} \exp\left((2\pi\theta i\,(x\cos\emptyset + y\sin\emptyset))\right)\right)$$

Here in this equation,
$\boldsymbol{\theta}$*=spatial frequency (units of cycles per millimetre),*
$\boldsymbol{\Phi}$*= orientation= (6π/8),*
$\boldsymbol{\sigma}$*= standard deviation,*

3.4.2 Colour Moments: In this we use "*hue saturation value*" algorithm. HSV describes colours (hue or tint) in terms of their shade (saturation or amount of gray) and their brightness (value or luminance).

- **Hue** is expressed as a number from 0 to 360 degrees representing hues of red (starts at 0), yellow (starts at 60), green (starts at 120), cyan (starts at 180), blue (starts at 240), and magenta (starts at 360).
- **Saturation** is the amount of gray (0% to 100%) in the colour.

- **Value (or brightness)** works in conjunction with saturation and describes the brightness or intensity of the colour from 0% to 100%.

Mean and standard deviation is calculated of the values got from all the three planes (H, U, E) in second dimension. Mean is calculated to determine the overall performance of the image and standard deviation is calculated to show the deviation of the reference value from actual value.
Features like skew , robustness are not taken into account since they are not as accurate as these are.

3.4.3 Texture features: Texture is property of images. Texture is one of the important characteristics which is used to find similarities between images in database. Texture means repeating arrangements of the constituents of image. In texture feature we consider *energy features, entropy and homogeneity.*
For calculating all the three we take into account GLCM algorithm which means gray level co-occurring matrix.

3.5 Classification: Support vector machine (SVM) is a supervised learning mode that can analyse data and recognize patterns which are then used for regression analysis and classification. The SVM classifier is widely used in bioinformatics (and other disciplines) due to its high accuracy. SVM belongs to the category of kernel methods. This kernel method is an algorithm which depends on data specifically through dot-product. In this case, a kernel function can replace this dot product and it will compute the dot product in some high dimensional feature space possibly. SVM method is used in many real time applications like text (and hypertext categorization), image classification, bioinformatics (Protein and Cancer classification) - character recognition. Finally, after all these algorithms cholesterol detection is done.

4. EXPECTED RESULT

Overall procedure is carried out to get the correct estimation of disease through iris image analysis. Gabor filter algorithm plays a vital role in feature extraction step. All the features needed for classification should be extracted and examined properly. This process has more accurate approach for identifying eye disease through iris image analysis. The comparison between the images of diseased eye and normal eye will let us know about were the abnormalities that were present in the diseased eye. It has an accuracy of about 95-96%.

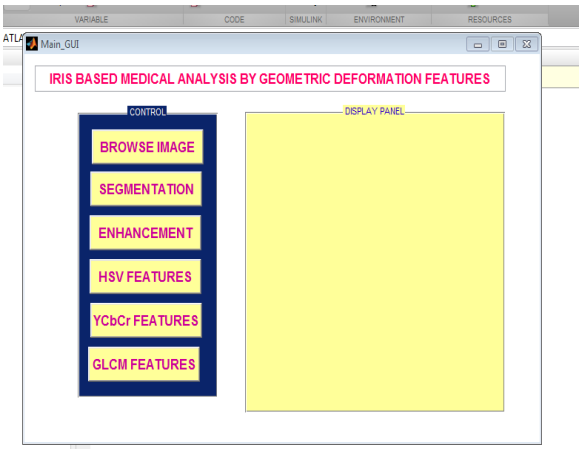

Fig 5: Flow of MATLAB code

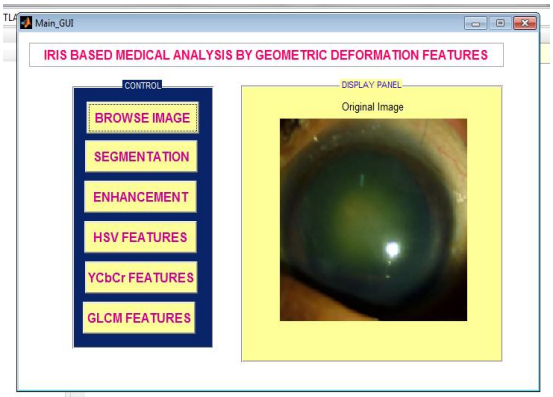

Fig 6:Original image of an eye taken from database

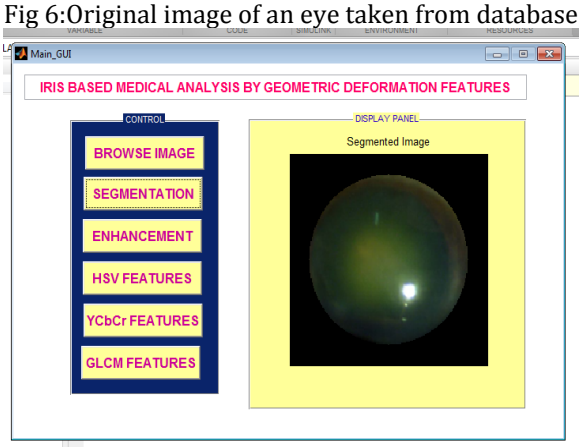

Fig 7: Segmented eye

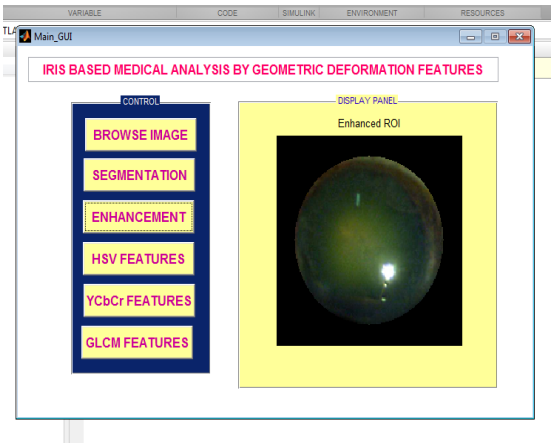

Fig 8: ROI Enhancement

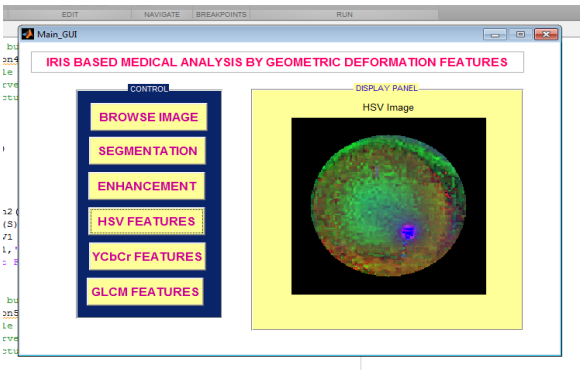

Fig 9: HSV Feature extraction

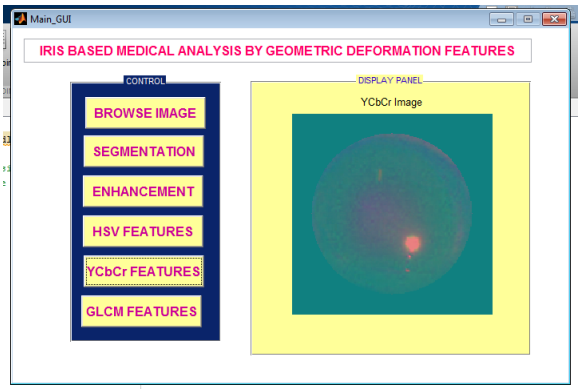

Fig 10: YCbCr Feature extraction

5. APPLICATIONS

a) It analyze iris and eye images for the purpose of medical diagnostic.
b) It classifies the image based on different diseases.
c) It processes the IRIS and eye images for early detection of diseases.

6. ACKNOWLEDGEMENT

We would like to appreciate all the facilities provided by our engineering institution, DYPIET, Pimpri Pune. Their support motivated us to complete this project successfully. Also, I would like to thank my professors for providing valuable information. I am thankful to friends and family for their relentless cooperation during the period of our Project.

7. REFERENCES

[1] Assessment of the potential iridology for diagnosing kidney disease using wavelet analysis and neural networks - www.elsevier.com/locate/bspc.

[2] Disease identification in iris using gabor filter- http://www.ijecs.in - International Journal Of Engineering And Computer Science ISSN:2319-7242 Volume 3 Issue 4 April, 2014 Page No. 5396-5399.

[3] John Daugman, "How Iris Recognition Works," in IEEE Conference on ICIP, 2002, pp. I–33 – I–36.

[4] Detection of diabetic presence from iris by using support vector machine – https://www.ijsert.in/pdf.

[5] An automated tool for non-contact, real time early detection of diabetes by computer vision - International Journal of Machine Learning and Computing, Vol. 5, No. 3, June 2015.

[6] Analysis of health condition based on iris image – Novateur Publication's International Journal of Innovation in Engineering, Research and Technology [IJIERT] ICITDCEME'15 Conference Proceedings ISSN No - 2394-3696.

[7] Automatic Extraction of Blood Vessels and Exudates Segmentation for Diabetic.Retinopathy Detection - International Journal of Innovative Research in Science, Engineering and Technology *(An ISO 3297: 2007 Certified Organization)* Vol. 4, Issue 3, March 2015.

[8] Detecting Cholesterol Presence with Iris Recognition Algorithm, Ridza Azri Ramlee, Khairul Azha and Ranjit Singh Sarban Singh University Teknikal Malaysia Melaka (UTeM), Malaysia.