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MULTIDISEASE DETECTION USING IRIDOLOGY TECHNIQUE AND FLOW METER

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ABSTRACT

Analysis of iris images is one of the most advance and effective method of diagnosing healthiness of various organs. Hence, need of correct time to time diagnosis is difficult, but essential requirement in field of medical. From the literature survey, it is found that advance technology also has failure in detecting diseases correctly. Various attempts are being made to explore and correct area of diagnosis from different ways. Irido- diagnosis is another branch of medical field used for various purposes of diagnosis. To begin with different images of eyes are collected and database is created for diagnosis of diabetes disease.

The different algorithms are made for image quality enhancement, segmentation, normalization of iris and classification of features for diagnosis of diabetes and asthma. The artificial neural network is also used for classification and feature extraction purpose. The whole process shows that accuracy of 90-92 percent between diabetic and non-diabetic patients. A new approach is made for classification purpose over the existing approaches. This approach will be very useful in the disease diagnosis field which is user friendly, and less time consuming and faster.

The peak flow meter is easy to use tool and simple to use that measures peak air flow while exhalation process and detects air flow limits. Compared to conventional spirometry technique, peak air flow measurements are not dependent on trained manpower, less time consuming, easy for patients to detect disease and have less cost.

KEYWORDS: Iris, Normalization, Spirometry, Segmentation, Neural.

I. INTRODUCTION

Iridology is the study of the iris. The intention of iridology, gain information about underlying diseases. The iris of an eye has very small nerve filaments and these filaments are connected to optic nerve and therefore optic nerve is connected to spinal cord. This spinal cord is located at vertebral column of human body and receives sensations from every nerve in the body. The minute blood vessels, nerve filaments and muscle fibers are connected to different areas of iris producing the changing situations in the corresponding organs. Here, the clinical information is extracted by various signs, marks, abnormal colours or discolorations in the iris. These signs, marks, abnormal colours or discolorations in the iris make known acute and chronic inflammatory or local lesions, catarrhal conditions, destruction of tissues, various drug poisons and changes in structures and tissues caused by accidental injury or by surgical mutilations. Abnormalities in the iris are suggested to represent abnormalities in the respective organ. Colours, marks, textures, fibers and pigmentation changes in the iris, as well as in the pupil and sclera, may be studied. These signs are correlate with disease. Different colours or rings within the iris are believed to represent different aspects of health and to play a role in diagnosis.

The existing research is mainly focused on cholesterol detection, atomic nerve wreath and texture feature extraction. Paul Knipschild described the gall bladder diseases by looking at patient's iris.

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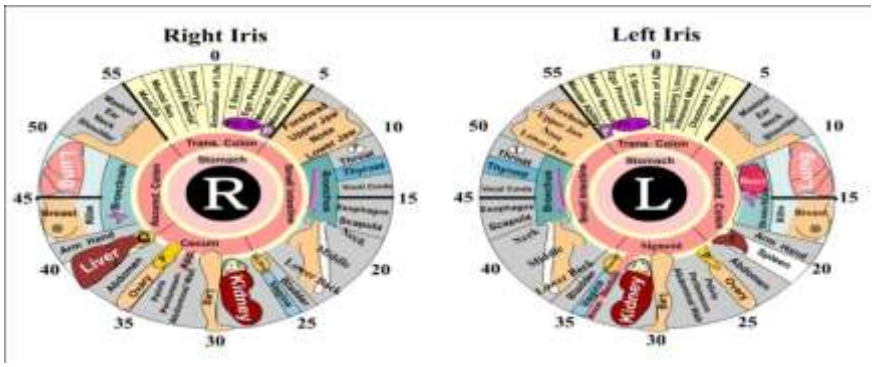

Fig-1: Iridology Chart

Asthma and chronic obstructive pulmonary disease (COPD) present in various forms and usually have undefined symptoms, signs and marks leads to misdiagnosis of diseases. Around 70% of asthma patients in the world population have age more than 40 years remain undiagnosed and around 30% of patients diagnosed to have asthma but in reality they do not have asthma. In India, greater than 95% of patients undiagnosed and around 50% of patients diagnosed may not necessarily have COPD. The most commonly used objective tool to diagnose asthma and COPD uses spirometry. However, spirometry is used in India in less proportion and reasons including cost, lack of time, lack of knowledge and lack of availability. There have been several attempts made to develop simpler diagnostic tools with reasonable sensitivity and specificity that can help detect asthma and COPD.

II. PROBLEM STATEMENT

Diabetic retinopathy, glaucoma, hypertension and macular degeneration are common causes of visual impairment and blindness. Early diagnosis for treatment of different diseases can prevent visual loss. More than 80% of global visual impairment and blindness is avoidable and 98% in case of diabetes disease. All of these diseases can be prevented through a direct and regular ophthalmologic examination of patients. However, aging, population growth, rising levels of obesity and physical inactivity are factors to the increase risk of disease, which causes more number of ophthalmologists and medical practitioner needed for evaluation by direct examination and this is limiting factor.

III. OBJECTIVE AND SCOPE OF PROJECT

To find new approach of diagnosis of various diseases in human body. This new approach is combination of advance technology with some previous methods. By changing region of interest in eye image, we detect any disease in human body.

Peak flow measurement is not depending on trained manpower because anyone use it very easily. Also, it is less time consuming process because we get results in couple of seconds. So, no need to wait for hours to get reports from pathology and very important it is less costly.

IV. PROPOSED METHODOLOGY

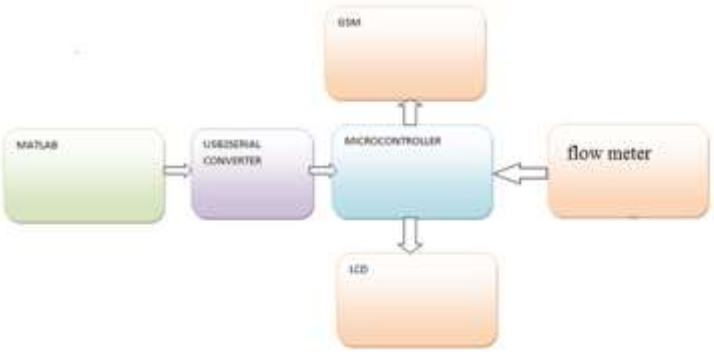

Fig-2: Block Diagram

Acquisition of image

First we collected different eye images with help of professional cameras and database is created. Database contains normal iris images as well as diabetic eye images. One of image is shown below.

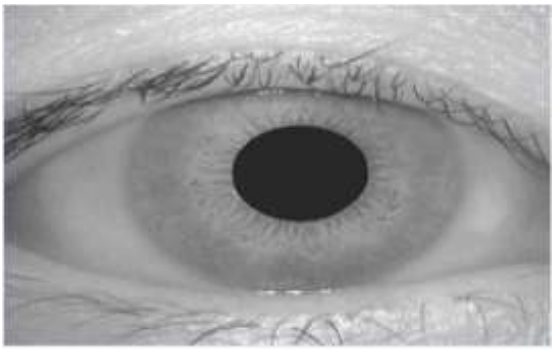

Fig-3: Eye Image Acquisition

Eye Image preprocessing

The eye image preprocessing is used to reduce presence of noise in image and enhancement is done for more suitable results than original images. Also, it gives detail information of hidden features in original image.

Eye image Segmentation

Eye image segmentation is used for finding inner and outer boundaries if iris of eye. Iris part of an eye is captured by eliminating pupil from sclera. Once iris is segmented from an eye, the next step is to convert the iris region into fixed dimensions. After eliminating, we will get the iris region into circular shape.

Image Normalization

To get rectangular shape region of equivalent circular shape region for ease of programming purpose normalization is done.

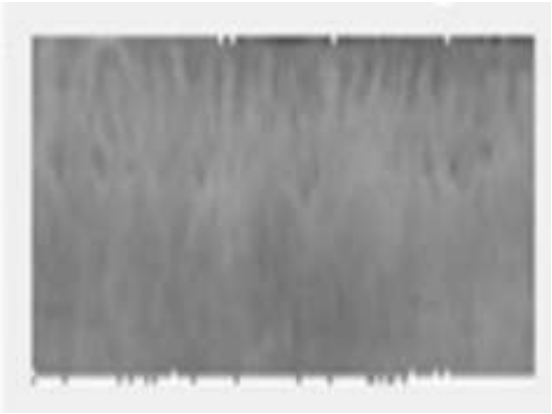

Fig-4: Normalization

ROI extraction

After image normalization, next step is region of interest extraction. It is done for the purpose of cropping only interested region according to "Irido-chart".

Feature Extraction

Feature extraction is used for finding similarities in images of iris. Feature extraction means finding statistical texture features in an image. These texture features provides information about the properties of the intensity level distribution in terms of gray levels in the image like flatness, uniformity, smoothness and contrast. The statistical texture features of mean, kurtosis, standard deviation, skewness, energy, entropy and smoothness are calculated by using the probability distribution of the intensity levels in terms of gray levels in the histogram bins of the histograms H_{DC}, H_{AC1}, H_{AC2}, and H_{AC3}. Let P(b) is the distribution of probability of bin b in four histograms each using equations 7 to 10 with L levels; it is defined as:

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$$H(b)= P(b) /M$$

1. Mean

The mean is the statistical texture feature that represents about the brightness of the image i.e. intensity of images and gray level of pixels. The mean is calculated by taking average values of the intensity levels or gray levels. If the mean value is high, then it means that the image is bright and if mean value is low, then the image is dark. The mean can be calculated as:

$$\text{Mean} = \sum_{b=1}^{L} bP(b)$$

2. Entropy

The entropy calculates the randomness of the distribution of the coefficients values over the intensity levels. If the distribution is among more intensity levels in the image then value of entropy is high. Entropy measurement is the inverse of energy calculated. A complex image has high entropy while simple image has low entropy. Entropy can be calculated as:

$$\text{Entropy}=-\sum_{b=1}^{L} P(b)\log P(b)$$

3. Standard Deviation

The standard deviation shows the contrast of gray level intensities and it is second order moment. The high value of standard deviation shows the high contrast of the image while low value of the standard deviation indicates low contrast of image. This can be calculated as:

$$\text{Std dev}=\sqrt{\sum_{b=1}^{L}(b-mean)^2 P(b)}$$

4. Smoothness

The smoothness texture is measured by using the standard deviation value. It can be defined as:

$$\text{Smoothness}=1-(1/1+(std\ dev)^2)$$

5. Kurtosis

Kurtosis is used to measure the peak value of the distribution of the intensity values or gray values around the mean. The high value of the kurtosis indicates that the tail is longer and fat and peak of the distribution is sharp. The low value of the kurtosis indicates that the tail is shorter and thinner and the peak of the distribution is rounded. Kurtosis can be calculated as:

$$\text{Kurtosis}=1/(std\ dev)^4 \sum_{b=1}^{L}(b-mean)^4 P(b)$$

6. Variance

The Variance is defined as the average of the squared differences from the Mean.

As shown in Figure:2 GSM module is been used to send reports of patients directly using SMS.

For screening of asthma and chronic obstructive pulmonary disease (COPD), peak flow meter with mini-spirometer are considered as alternative tools to spirometry. However, the accuracy of these tools together, in clinical settings for disease diagnosis, has not been studied.

V. FLOWCHART

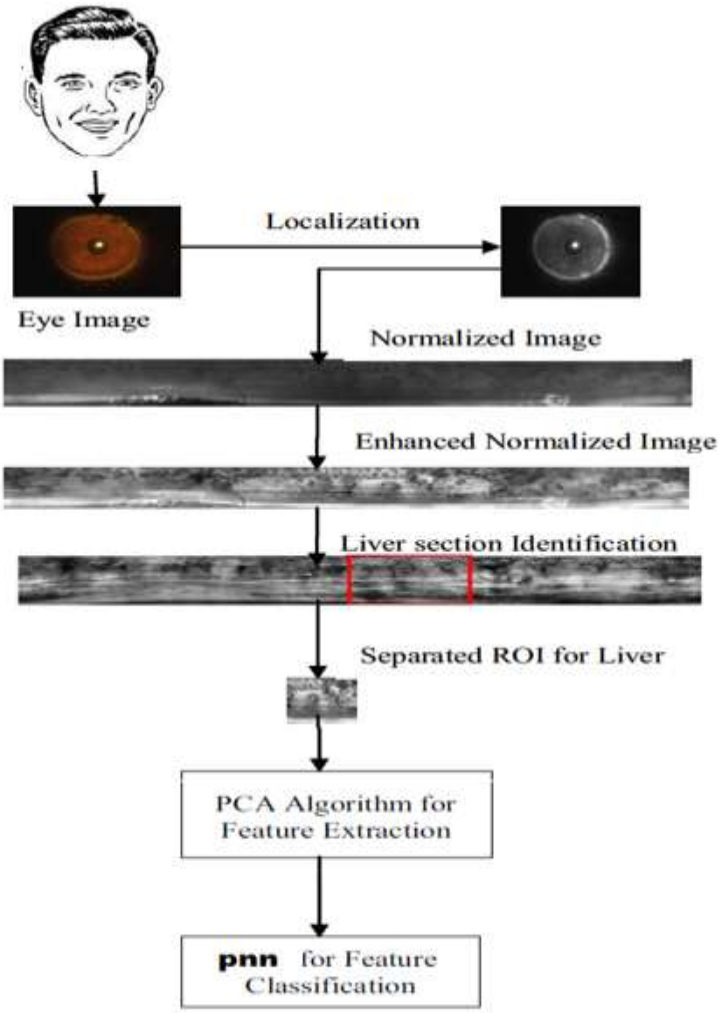

Fig-5: Flow chart

VI. TESTING AND TROUBLESHOOTING

ATMEGA16 Microcontroller:-

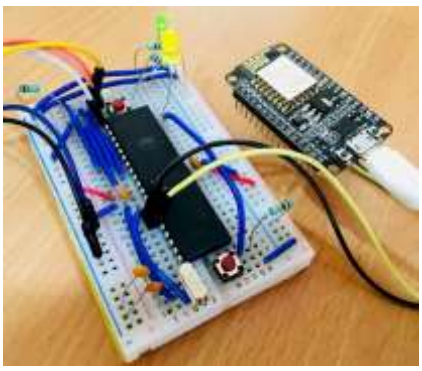

Fig-6: ATMEGA16 Microcontroller Testing

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GSM (SIM800) Module:-

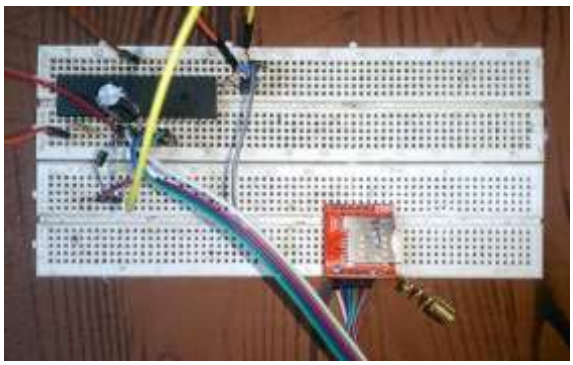

Fig-7: GSM Module(SIM800) Testing

LCD :-

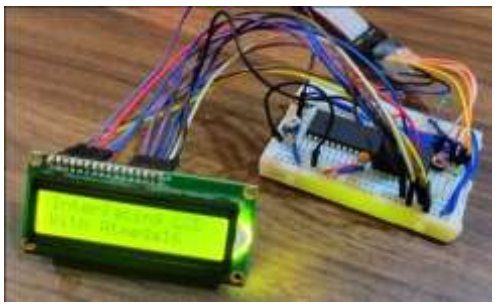

Fig-8: LCD Testing

VII. RESULTS

Schematic Result

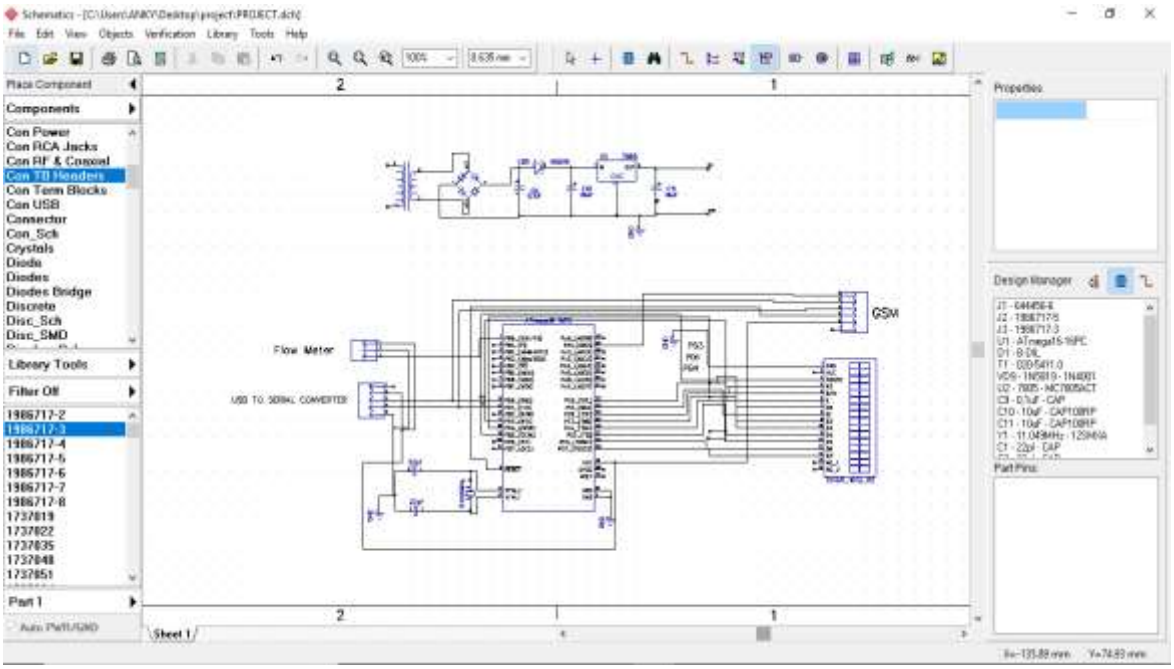

Fig-9: DIPTRACE Software Schematic Result

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Software Results

Fig-10: Normal Iris detected

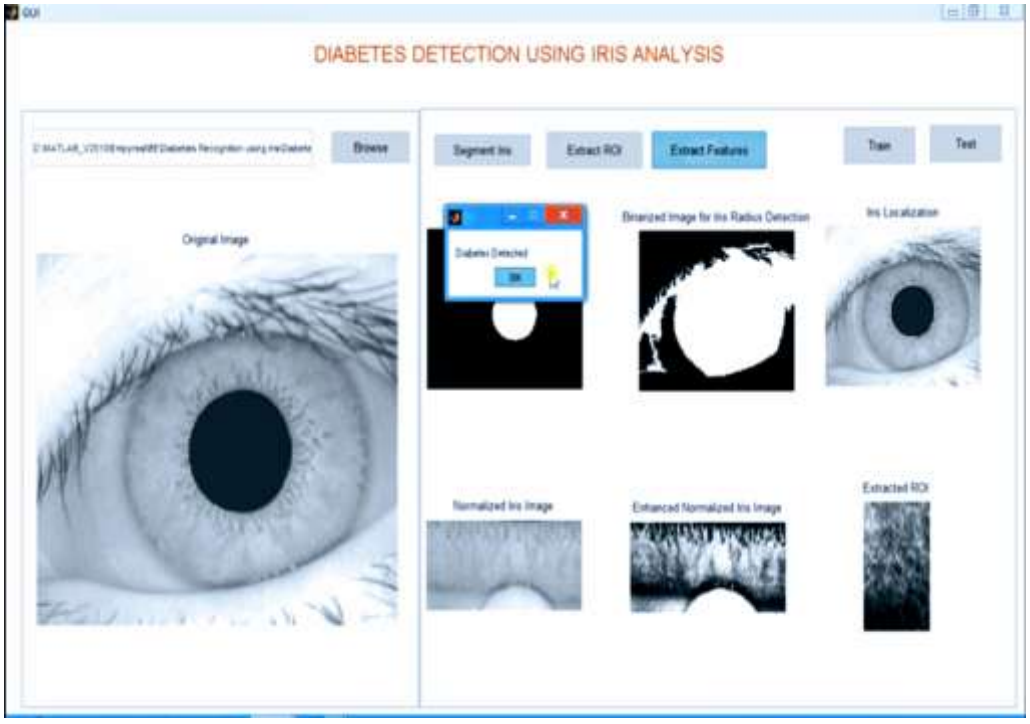

Fig-11: Diabetes detected

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Volume:02/Issue:05/May-2020 www.irjmets.com

Hardware Results

Fig-12: Flow Meter Designed For Asthma Detection

VIII. ADVANTAGES

- As per diagnosis done using iris image the further treatment of the patient can be done in early stage of diabetes.
- Unwanted health tests at pathology can be avoided.
- Any disease can be detected only by changing ROI in Iris image.
- Helps to increase health index of peoples.
- It is less costly. So, anyone can perform health prediagnosis at their own.

IX. APPLICATION

- Predict Gender using iris
- Brain tumor detection using iris
- Kidney problems detection using iris.
- Eye sight can be saved with proper treatment & medicine prescribed.
- It analyzes eye images for the purpose of medical diagnosis.
- It classifies, extract features of the image based on various diseases.
- It processes the eye image and iris for early detection or prediagnosis of diseases.

X. CONCLUSION

In this project, a new approach for the prediagnosis of diseases has been presented. Initially, it is focused on the giving input new gray image through PCA which shows most significant or principal information of three RGB components. Secondly, several operations based on mathematical equations are implemented with the aim of locating the IRIS. If it is less costly, it should be made in such a way that every common people with good knowledge of computer or laptop will perform health prediagnosis by their own. It is very helpful to take care of the people in modern life where people going through different deadly diseases and they simply ignore the health problems because of time and physical inactivity.

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XI. REFERENCES

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