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A Preliminary Diagnostic Technique from Iridology for Heart and Lung Disorders

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Abstract: ***The major aim of any diagnosis method is early detection and prevention of disorders. This can be possible by several advanced methods and one such health disorder cure is using Iridology. This work can help a health practitioner to study the iris of the eye and to identify the presence of abnormalities say heart disorders, Lung disorders in a human body. This is achieved by developing image processing algorithms that includes pre processing, image segmentation, feature extraction and classification using hybrid algorithms. This work can be used as preliminary diagnosing tool to identify the abnormalities present in the body. Images are acquired using 12MP USB iroscope iris analyser model iris camera to test the developed algorithm and validated from the real time data that will be collected from health centres and hospitals.***

Keywords: ***Iridology; pre-processing; segmentation; feature extraction.***

I. INTRODUCTION:

Image processing refers to digital image processing in which the noise or irregularities present in an image are removed using a digital computer. This irregularity may enter the image either during the formation or transformation process**.** For mathematical analysis, an image can be defined as a two dimensional function f (x, y) where x and y are spatial (plane) co- ordinates, and amplitude at any pair of coordinates(x, y) at that point is referred to as intensity or gray of image level. All finite, discrete quantities are the intensity value of x, y, and intensity of f, the image is called a digital image. It is very important that a digital image consists of a finite number of elements, elements of the image, pels and pixels. You may label the elements of a digital image as pixels. Different industries have developed these days and still Digital image processing is an interesting field in which it provides enhanced pictorial knowledge for human interpretation and processing of image storage, transmission and computer perception representation. This approach primarily offers an effective way to enhance the raw images. For various applications, these raw images received from cameras sensors placed on satellites, space probes and aircraft, or images taken in normal daily life. With extended fields of science and technology this field of image processing has greatly improved.

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IMAGE PROCESSING TYPES

The image processing mainly deals with

1. Image pre-processing
2. Image enhancement
3. Image segmentation
4. Feature extraction
5. Image classification

MERITS

1. Noise removal.
2. Perfect image density and correct contrast.
3. Easily accessible to computers.
4. Black and white format, negative images are available.

DEMERITS

1. The starting price is highly depends on the system used.
2. Once the system is damaged the image will be lost.

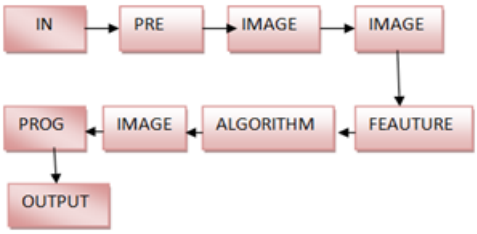
2. IRIDOLOGY

It is an art of observing the delicate iris components, the colored eye segment. The iris is linked via the brain and nervous system to all the organs and tissues inside the body. Optic nerve and spinal cord make up the connection. The link is formed by optic nerve and spinal cord. These links will enable the iris to serve as a visual monitor that can provide information about inflammation, body constitution and overall health of an individual.

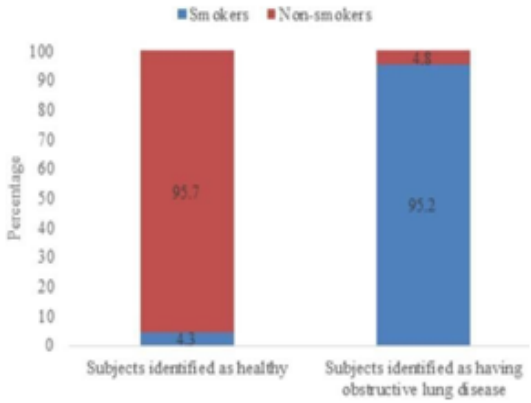
II. LITERATURE SURVEY

The Iris images are based mainly on pre-diagnostic tool to predict obstructive pulmonary diseases that have two different models. Significant features have been suggested for extraction, one using wavelets and another using Gabor filters. The filter called SVM- based classifier is primarily used to identify subjects with obstructive lung disease into safe or one. In the case of wavelet based model and Gabor filter based model, an average of 89.0 % and 88.0%was obtained with a sample size of 100, respectively. The input image is taken from either the camera or the database.

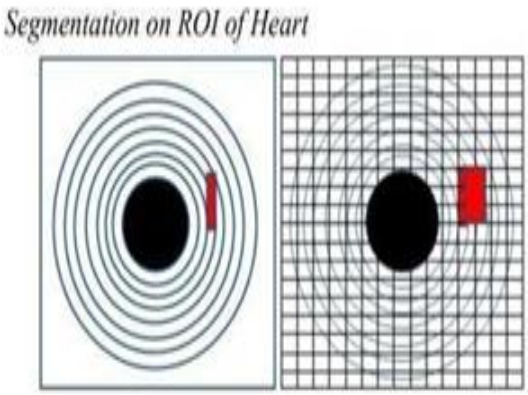
Pupil and iris localization is recognised and the region of interest is segmented using the watershed transform algorithm. It will detect the presence of greyish line which is Arcus senilis and it is a sign of coronary heart disease. The condition is marked, and irregular compared to the normal eye. The area of interest isdefined and segment using water shed transformation algorithm.



HEALTH DISORDERS



Detecting heart abnormalities through iris by using 40 datasets of normal and abnormal patients helps determine their application system's effectiveness. Our heart defect detection system contributes to the patient with 86.4% accuracy.



In this case, Gabor filter is used several times from different angles to create a continuous redundant image representation by combining all the collected images into the superposition in order to gain more specificity. Our goal is to build a high precision hybrid algorithm. This tool can be used as a preliminary tool for diagnosing the abnormalities present in the body.

IMAGE PRE-PROCESSING

Pre-processing image, sensor image data are stored in satellite restrain errors with respect to the pixel geometry and brightness values. Correction of minute errors can be done by mathematical models which are either definite or statistical models. It mostly assists in image enhancement. The brightness is improved in its visual impact by changing the pixel values. The enhancement of image requires a group of techniques that are used to improve an image's visual structure or to transform the image into a form that is easily understandable for human or machine learning. While capturing the image, there are certain limitations of imaging sub-systems and lighting conditions Satellite images and traditional digital cameras are always lacking in contrast and brightness. Photos can be of various noise types. The ultimate aim is to draw focus on those image characteristics for subsequent analysis or display of images. Several instances include improvement of edge and contrast, pseudo- coloring, noise filtering, magnification and sharpening. It is predominantly essential for extraction of features, image analysis and display of images. This enhancement technique and the entire thing itself do not increase the data value inherent in the information. It simply underlines those characteristics of the specified image. Those Algorithms for Enhancement are usually interactive and based on application. The enhancement techniques are:

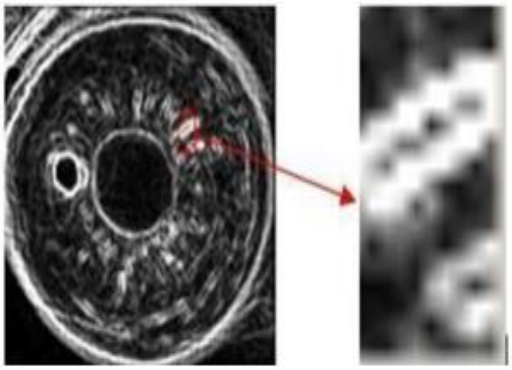
- Noise filtering
- Histogram modification

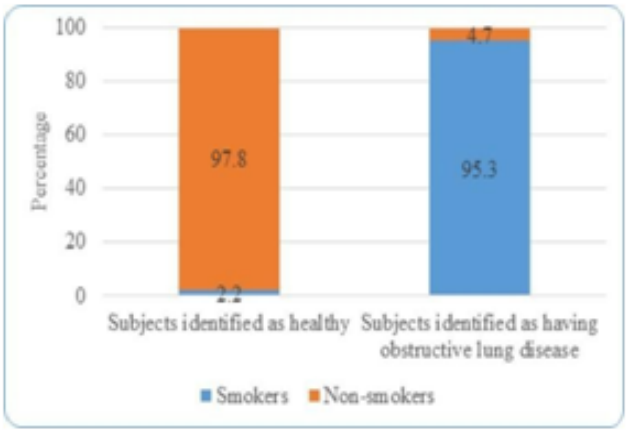
Noise filtering

Noise filtering technique is essential for extracting any images from unwanted or unnecessary material. The principal task is to segregate different types of noise from the images. This feature is mostly interactive. The commonly used filters in photographs are low pass, high pass and also the mean and median to reduce the noise. It can be identified as the sudden variation in the content of pixels induced randomly by the process of acquisition, digitization and transmission. For instance a ' noisy ' image appears in Fig. from that, the pixels are affected by noise are often seem distinctly vary from their neighboring pixels. Noise can't be extracted together and can be minimized with the help of a process called smoothing. The simple way to reduce noise and to examine a few nearest neighboring pixels is, the image we see has varying pixel's gray value and its nearest neighbors. The gray values for the pixels are important. Smoothing is often done by averaging. Here the sum of its adjacent pixels replaces every pixel. Alternative way for noise reduction with the help of median filtering is replacing each pixel with its median of its neighbor pixels.

a. Histogram

An iris histogram normally refers to a pixel intensity histogram. There are 256 different possible intensity values for an 8-bit grayscale image. A first order consisting of all the gray levels in the horizontal axis, and pixels representing each level on the vertical axis of the image.





These Gray Level images consist of always 256 levels, so the histogram's horizontal axis runs from 0 to 255.

The difference in size on its vertical axis depends on the number of pixels in the image and the gray-level distribution. A series of techniques called gray level histogram adjustments that are used to improvement of picture quality and appearance. The techniques are based on the gray levels remapped within an image by applying a transformation function either linear or nonlinear functions. The brightness of an image can be adjusted by implementing the following function:

$$g(x, y) = f(x, y) + C$$

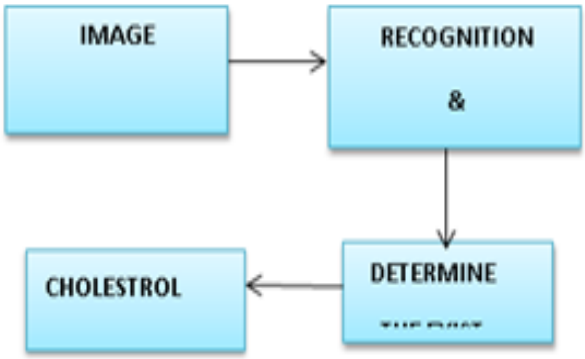
Where C is a constant. When C > 0 the image at the output will be brighter and when C < 0 the image at the output will be darker. For instance the application of such a transformation (C = 125) to the image, all the gray levels in the original histogram are shifted to the right by 125, but the histogram still has the same shape. The contrast of an image can be varied by implementing the following transformation function: $g(x, y) = K \cdot f(x, y)$ Where K is a constant. Here, if K > 1 then the image

obtained at the output has greater contrast comparing to the original image. Whereas, if K < 1 then the image at the output has lower contrast. Finally, the transformation function is given as follows:

$g(x, y) = K \cdot f(x, y) + C.$

Here the variables K and C are used to adjust the contrast and the brightness of the image. This method is called as auto scaling. Using several values of K and C the transformation curves obtained are different. If the transformed gray level values exceed the acceptable gray level range (usually from 0 to 255) the output gray levels are set to the minimal and maximal allowable gray levels. The maximum ranges of potential levels are used, but most levels are identified with just a few pixels. The histogram equalization is often applied for enhancing the visual ' efficiency ' of such images. The gray level values are converted relatively to each other with the output of making the resulting gray level histogram ' as flat as possible ' and spacing all gray levels evenly across the range of peaks. The following transformation method can be used to do the equalization of the histogram Where m is the total number of gray levels in the original image f, nj is the number of pixels having specific gray level j. Several descriptions of other histogram transformations are found in the literature [1.4.1- 1.4.8]. For instance, a histogram linearization is achieved with the aim to 'linearize' the histogram of transformed image.

EDGE DETECTION USING CANNY METHOD



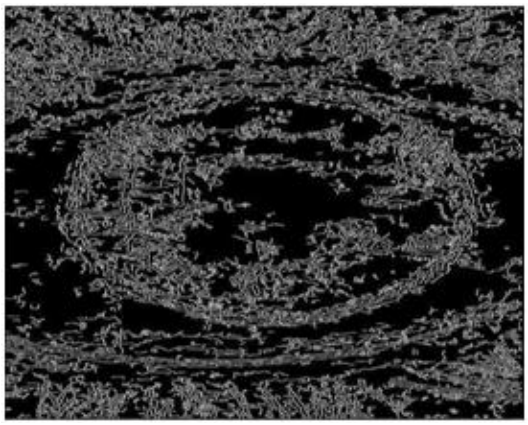
1. Input eye image from database or camera.
2. Pupil and Iris localization andsegmentation.
3. Watershed Algorithm to detect Arcus senilis
4. Output Sodium ring detected or not detected

LABVIEW RESULTS PICTURE TAKEN FROM NORMAL MOBILE CAMERA

This image of an eye is taken from iphone x camera which is 12 mega pixel camera with an image resolution of 4000×3000 pixels.

Also six element quad- lens LED "True tone" with slow synchronous and auto focus.

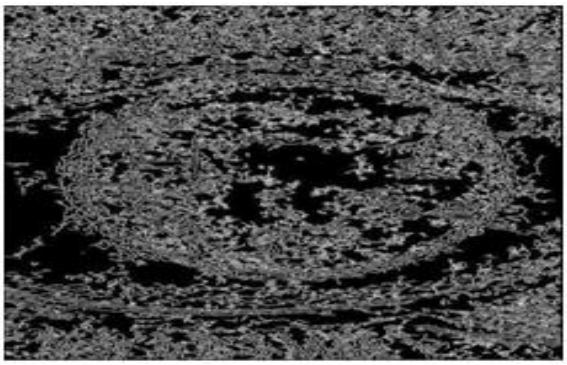
SIGMA-3
HTRESHOLD-0.70
LTHRESHOLD- 0.20



SIGMA-3
HTRESHOLD-0.80
LTHRESHOLD -
0.10

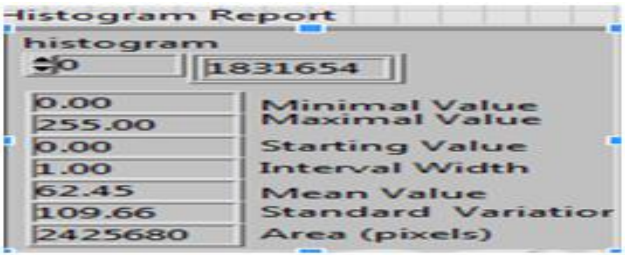
SOBEL METHOD HISTOGRAM REPORTS:

- The histogram of an iris normally refers to a pixel intensity histogram.
- There are 256 different possible intensity values for an 8-bit gray scale image.



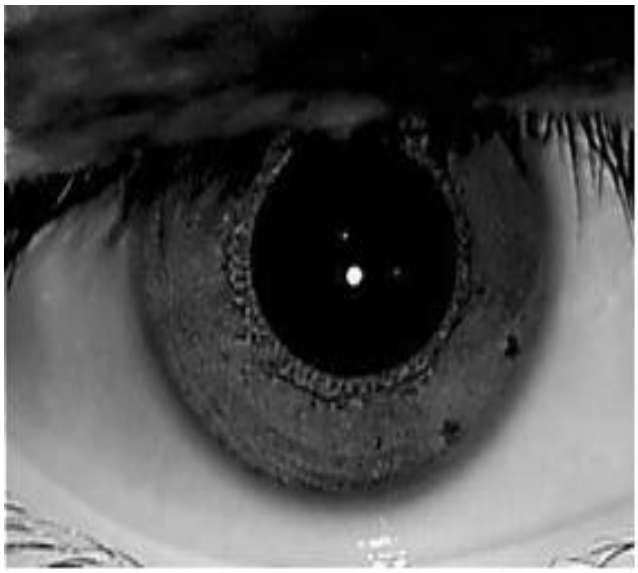
CANNY -SIGMA-3 HTRESHOLD-0.80 LTHRESHOLD-0.10

SOBEL- SIGMA-3 HTRESHOLD-0.80 LTHRESHOLD-0.10

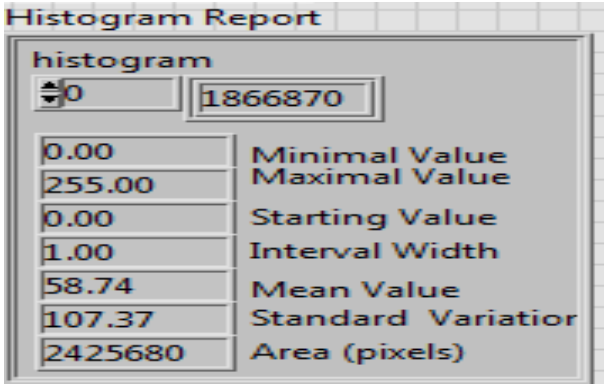


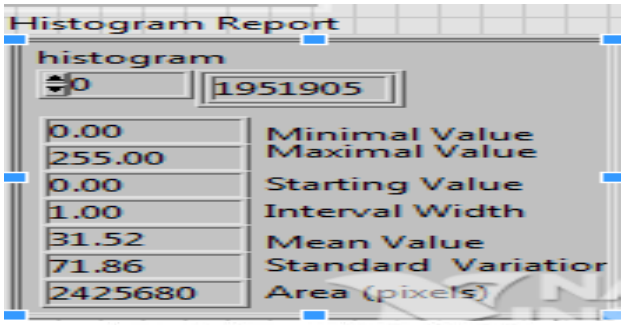
CANNY -SIGMA-2 HTRESHOLD-0.70 LTHRESHOLD 0.20

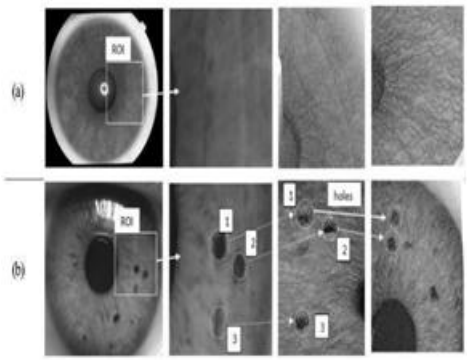
DATASETS FROM IIT DELHI



Heart and lung weakness showing abnormal heart tissue iris. Arterlosclerotic disorder. (L) Stomach looks very "toxic to potential deposits of narcotics" Bowel distended. Tissue acidity very pronounced. (R) As for the left- hand leg. Bladder cancer: Heart failure on the left side. (From leg odema). The reports for the normal eye suggest the grey or whitish ring is not present. The magnitude of the gradient calculates the intensity shift of that same point in the original image. Fig:3 indicates the identification of an edge. It is done using method Sobeling. Watershed gradient algorithm divides the image into parts of minimal intensity called water basiens and it will highlight the group of pixels with similar intensities shown in Fig: 4.Opening is







somewhat like erosion that eliminates some of the foreground (bright) pixels. Closing is similar to opening which removes some (bright) pixels from the background. Reconstruction segmentation of the connected pixel components with the same intensity value in Fig: 7 opening-closing, and is called regional maxima as shown in Fig: 8. this regional maxima is placed on the original image, the two things are still typically obvious. Regionally superimposed maxima on the original image. The region with maximum intensity was shown at opening-closing threshold by reconstruction. We can detect the presence or not of a gray or whitish ring from this.

III. CONCLUSION:

The iris recognition and segmentation, and the region of interest are identified and segmented using the Watershed algorithm. The camera takes the input of a normal eye image. We can see that the grayish ring is not identifiable. So Arcus Senilis doesn't exist. The watershed algorithm is applied to the affected eye of Arcus senilis and the slight difference we can see in the output is the presence of the grayish circle. Due to the low intensity the accuracy of interest in the particular region is lower.

So it's better to
take the image using iridology iris camera though during segmentation we can avoid such intensity problems. Because the image of an iris is the most important area of interest for segmentation.

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