# Application for Heart Abnormalities Detection Through Human Iris

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***Abstract:*** *The Heart disease is the leading cause of death for both men and women worldwide. Iridology is the science that allows a health practitioner or non-expert to learn the signs in the iris of the eye that is capable of indicating the presence of abnormalities in the body and other weaknesses. Iridiology is one of the preliminary way of detecting condition of organ. This work proposes a new model which refers to studies before for detecting heart condition through iris. In order to perform that it go through several phase such as pre-processing,segmentation and classification. The main contribution of works lies in comparing different techniques of detecting heart disease through iris and developing android application that select image and perform sobel edge detection and segmentation on selected image.*

***Keywords:*** **Heart,Iridiology,Sobel Edge,Thresholding,Android App**

## 1. Introduction

The heart is a muscular organ in most animals, which pumps blood through the blood vessels of the circulatory system. Signs and symptoms of heart failure commonly includes shortness of breath, excessive tiredness and leg swelling. Heart is crucial organ of human body. If heart stops beating then person will no more alive. Heart diseases are the number one cause of death globally, 17.9 million die every year due to heart disease. Heart disease can cause at any age. Even youngsters suffers from abnormal heart conditions. Many times abnormal heart condition detected when condition of heart becomes severe then treatment for it is not easy. Doing regular heart check-ups is not feasible due required cost and time.

Many types of heart disease can be prevented or treated with healthy lifestyle choices. Human eye reflects the condition of different organs in different eye regions. The iridiology can be useful for predicting organ disease,including heart, lung spleen,kidney and liver. The computer based and mobile based techniques used to detect heart disease through iris. Iridology has evolved along with the technology development, such as digital camera and image processing [3]. In the figure 1 the heart area on iridiology chart is shown. This heart area from iris is extracted for checking the heart condition. Human left eye represent heart region. The accuracy of result depend on cropping performed on human eye,segmentation,heart area extraction and the quality of image captured.

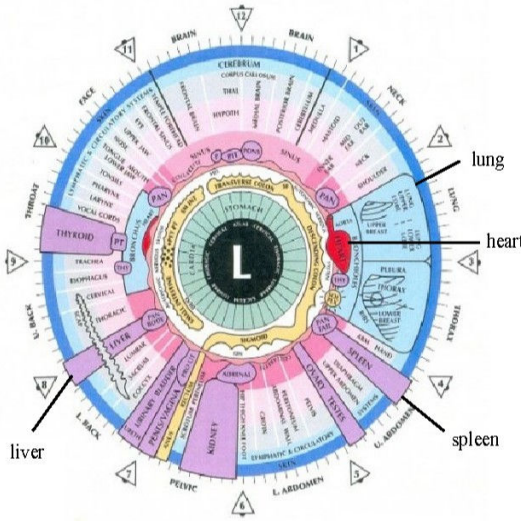


***Figure 1. Heart Area on Irdiology Chart***

In our developed application login,sign up ,questionnaire model ,processing and segmentation,classification model is present. Heart abnormalities detection on computer system gives contribution for the patient with 86.4% accuracy [3]. This mobile based technique resulted in an experimental using 20 data indicating that the auto cropping results is 45% success for cropping process and all the success cropping brings accuracy for classification [2]. The android mobile based technique used,the correct segmentation process gives 86.66 % accuracy and this accuracy achieved on 40 iris images [1]. The unsuccessful result due incorrect cropping of iris,additional light ,distance between iris and camera and segmentation process.

## 2. Literature Review

### 2.1 Febiana Dyah Kusuma,et.al[1](2018)

In this paper the model had developed for detecting the heart abnormalities through iris based on mobile with several phases of the process, such as capturing based on target, pre-processing, auto crop based on a histogram analysis,heart area extraction feature and classification using thresholding algorithm. For clear iris image extra light is used so reflection in eye can be avoided. The model trained by 40 abnormal and normal patients labeled iris data .The model performance produces 86.66 precision. It does not 100% gives result due unsuccessful segmentation result. Its major advantage is that it is mobile based application so anyone and anywhere use this application. The camera requirement is minimum 8 mega pixels , the greater resolution produces clearer image and the distance between camera and iris should be 10 cm.

### 2.2 Aditya Afgan Hermawan,et.al[2](2017)

In this paper a approach presents auto cropping on iris images based on mobile device. There are several stages such as capture eye base on target, pre-processing, cropping,

segmentation, feature extraction and classification using thresholding algorithms. The system proposed was tested at Mugi Barokah Clinic Surabaya. This approach resulted in an experimental using 20 iris data indicating that the auto cropping results is 45% success for cropping process and all the success cropping brings accuracy for classification. The model was not effective due cropping of a iris image many times result into unsuccessful cropping result.

### 2.3 Syarifa Akmilis S.,et.al[3](2016)

This approach a computerized iridology system for detecting heart conditions which is designed through several stages such as pre-processing, auto cropping,segmentation, feature extraction and classification using thresholding algorithm. Put a sample of the patient's iris shows the condition of normal and abnormal heart. An experimental study of proposed system by using 40 data of normal and abnormal patients. This gives contribution for the patient with 86.4% accuracy. The accuracy is high due the lighting is adequate, then the result will be accurate and cutting slices high degree of accuracy. This model developed in C# in visual studio on windows system.

### 2.4 Entin Martiana Kusumaningtyas,et.al[4](2016)

This is computer based system uses auto-cropping for image cropping. The images were taken with a digital camera from Mugi Barokah Clinic Surabaya which containing all part of the eye. The digital camera was 12.4 Mega Pixels. They made an experimental study using 40 images to perform the auto cropping in order to get iris image. This approach produced 40% accuracy. The accuracy lower due to the first time auto cropping used instead of manual cropping. Binarization result was not correct in many cases. So, the accurate cropping not achieved at it result into incorrect output.

### 2.5 David Habsara Hareva,et.al[5](2013)

This is an iridology application for predicting a person health through analysis of iris image. Commonly for commercial purpose, it used Desktop-PC, but we embedded it on Android-based Smartphone. The objective of this research is to find out whether healthcare application that providing direct diagnosis from real time capturing image can be carried out through mobile phone in general. For that purpose, they developed other version of application that run on windows mobile and windows operating system. It found that if low camera specification used to take the image of iris then accurate result is not produced. The device tested with regard to processor speed, screen size, storage size, and image retrieval using built-in camera. Although the results can be predicted that the used device with high specifications will be faster to process image analysis,clearly in displaying images.

## 3. Methodology

The overview of system view is as shown in figure 2 shows System architecture. There are six main blocks in system.

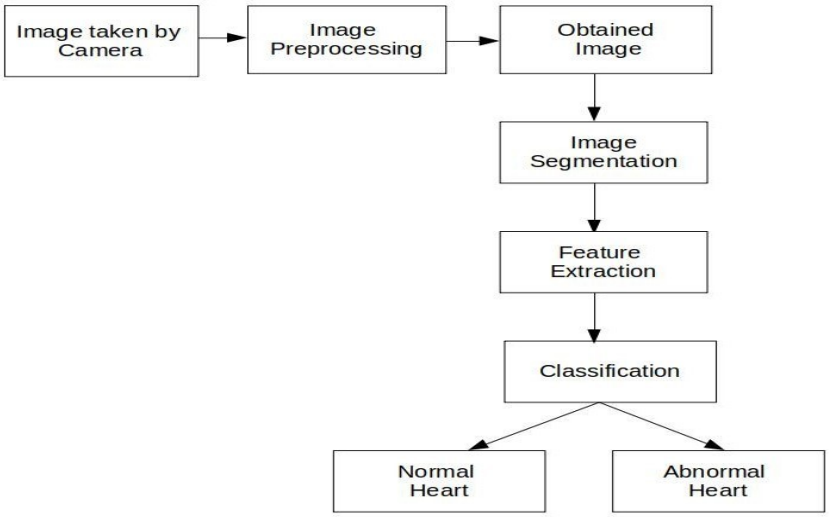


***Figure 2. System Architecture***

### 3.1 Retrieving Image

The image must be a left eye image with clear iris. This phase is crucial because unless the clear image is obtained the proper processing and analysis is not possible. The computer based system take image by digital camera [3][4] and the mobile based system take image of eye by camera developed in application [1][2].

### 3.2 Pre-Processing Phase

The pre-processing phase contains the filters such as median filter, high pass filter for enhancing the image quality. The process of cropping image is auto cropping in computer based system [3]. In mobile based applications iris is cropped by using auto cropping using histogram analysis [1][2]. Cropping result affects the final outcome. After the cropping the sobel edge detection is performed on the cropped image for extracting lines of iris. This will produce a detailed and clear iris image. Figure 3. shows sobel edge detection performed by us in our developed android application.

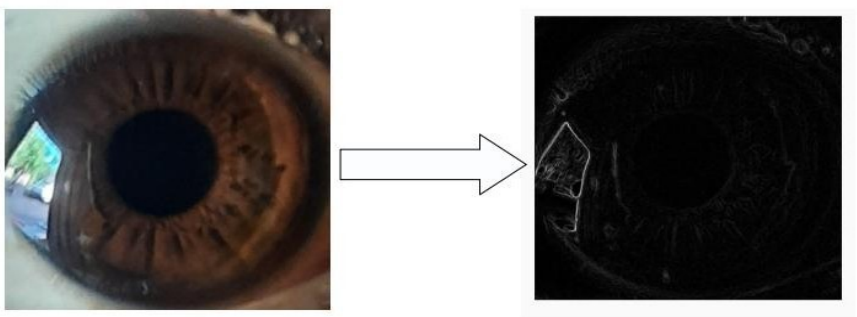

***Figure 3. Sobel Edge Detection Result on Cropped Iris***

### 3.3 Image Segmentation

Image segmentation for getting region of iris representing heart. The results of the sobel edge detection will be segmented to get the heart region of interest. This process is focused on taking parts that represent the heart area from the iris image. Based on the Iris Chart, the heart area is mapped to the left eye at 02.20 – 03.10 o'clock. To retrieve the area, the iris image divided into 32 columns and 32 rows. Figure 4. shows how iris image is divided and region of interest extracted. The region bordered with orange color rectangle needs to extract to get heart region.

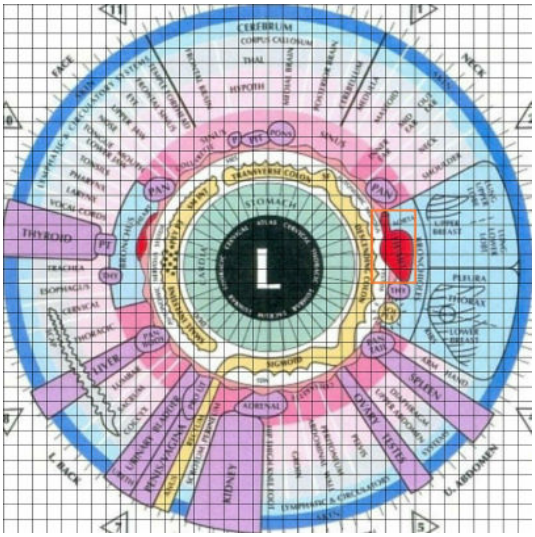


***Figure 4. Segmentation on Left Eye***

### 3.4 Feature Extraction

Feature extraction uses to obtain the critical information of heart's region of interest area. To get the information,heart's region of interest image had to transform to the binary image. Then the black and white pixels number on image will be calculated to find the ratio. Following are formula's to calculate the ratio's .

Ratio of White = Total White Pixels / Total Pixels

Ratio of Black = Total Black Pixels / Total Pixels

Average of white and black pixel of training data set used for the threshold classification. The proper training data set gives the maximum accuracy. In [2], 20 labeled iris images is used for training and In [1], 40 labeled iris images are used in training data set. Accuracy in [1] was higher as compare to [2].

### 3.5 Classification

Classification phase in this study using Thresholding Algorithm. After going through the extraction process,each ratio in the image data will be classified. The following are the steps for Thresholding algorithm classification:

• Determine the threshold limit used. Threshold is calculated by the training data set.

• Categorize the data that is less than and over the threshold.

• There are two labels,which are normal (N) and abnormal (AB). Enter the data for classification.

• Determine the data value, in below or above the threshold.

• Labeling data according to the category that was originally determined.

## 4. Work on Application Development

We have developed application Check It in Android which contains login screen,sign up screen,questionnaire model for asking health related question and direct to screen based on answer of question to take test or not.

### 4.1. Android App Layout

**4.1.1. Home Screen:** This is home screen of a which shows option for login and sign up new user.

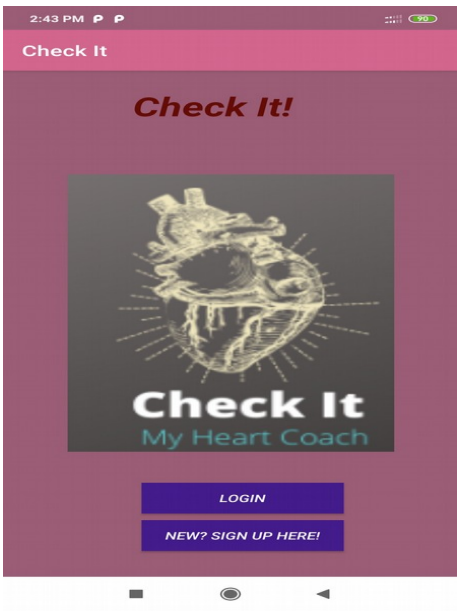


***Figure 5. Home Page***

**4.1.2. Sign Up Screen:** This is sign up screen for new user.

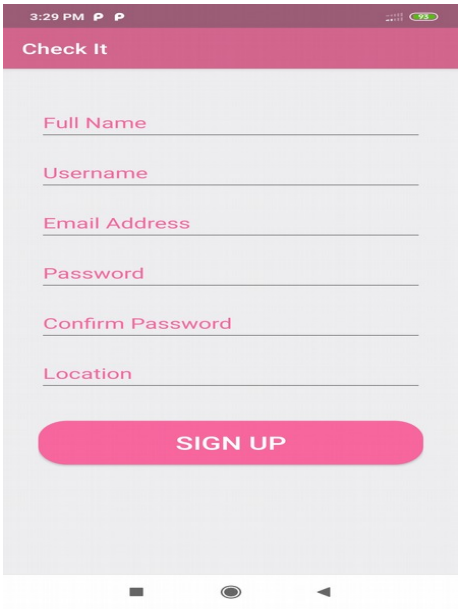


***Figure 6. Sign Up Page***

**4.1.3. Login Screen:** This is login screen for existing user.


***Figure 7. User Login Page***

**4.1.4. Questionnaire Screen:** This is questionnaire page for asking questions for user if more than three symptoms present in user then user directed to page for taking test else it will display page for no need to take test.

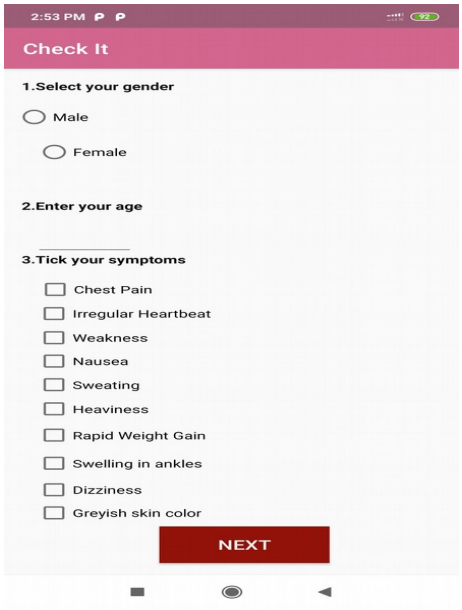


***Figure 8. Questionnaire Page***

**4.1.5. Screen for Choosing Iris Image:** This screen shows option for choosing image and detect for further processing such as sobel edge detection,segmentation and classfication. After clicking on detect button it go through sobel edge detection,segmentation process and classification.

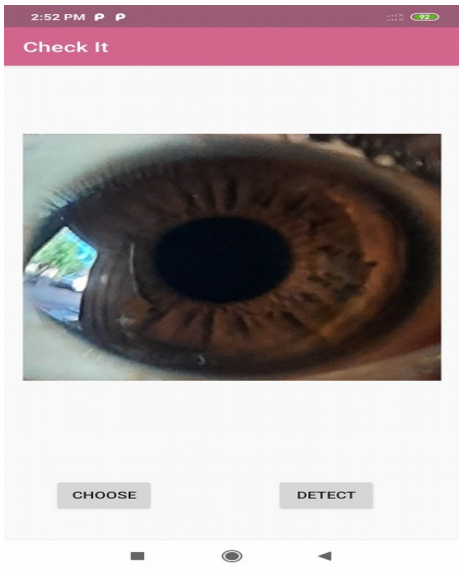

*Figure 9. Image Selection Page*

**4.1.6. Result Screen:** Threshold values for black and white pixels is set based normal persons data for classification based on that it shows the result for abnormal and normal heart condition for a person.


*Figure 10. Result Page for Abnormal Heart*


*Figure 11. Result Page for Normal Heart*

## 5. Conclusion

Technology is something that grows every day in various forms. It could be in the form of Networking, Communication, Education, Global Innovations and Healthcare. Smartphones are something that we all use in our day to day life and most importantly it is used beyond just texting, gaming or internet surfing. Proposed application uses smartphone as a weapon against increasing number of heart diseases worldwide. The user of application can do analysis or computing of heart condition anytime and anywhere just by uploading image of iris/eye into the application. The application uses iridology technique and calculation processes for checking heart. Successful iris cropping is the first and foremost step of application. The factors such as light,camera resolution and the distance from camera and face affect the result. If the region of interest is misplaced then classification result wrong. Smartphone based system are better than computerized system.

## 6. Future Scope

In the future,application can be expanded to not only detect heart abnormalities but also for detection of abnormalities in kidney,liver and lungs.

## *7.* Acknowledgment

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## 8. References

[1] Febriana Dyah Kusuma,Entin Martiana Kusumaningtyas,Ali Ridho Barakbah,Aditya Afgan Hermawan, “Heart Abnormalities Detection Through Iris Based on Mobile” ,in 2018 International Electronics Symposium on Knowledge Creation and Intelligent Computing (IES-KCIC).

[2] Entin Martiana,Ali Ridho Barakbah,Aditya Afgan Hermawan,Silvia Rulia Candra, “Auto Cropping For Application of Heart Abnormalities Detection Through Iris Based on Mobile Devices” ,in 2017 International Electronics Symposium on Knowledge Creation and Intelligent Computing (IES-KCIC).

[3] Entin Martiana K., Ali Ridho Barakbah, Syarifa Akmilis S., Aditya Afgan Hermawan “Application For Heart Abnormalities Detection Through Iris”, in 2016 International Electronics Symposium (IES).

[4] Entin Martiana K., Ali Ridho Barakbah, Syarifa Akmilis S., Aditya Afgan Hermawan, “Auto Cropping On Iris Image For Iridology Using Histogram Analysis” , 2016 Knowledge Creation and Intelligent Computing (KCIC).

[5] David Habsara Hareva, Samuel Lukas, Natanael Oktavian Suharta, “The Smart Device for Healthcare Service: Iris diagnosis application” , 2013 Eleventh International Conference on ICT and Knowledge Engineering.

[6] Aulia Fitriana Sari, 2014, “Iris Recognition For Detection Of Liver Organ Disorders” , EEPIS.

[7] N. Fauziah, "Iridology Application for Kidney Condition Analysis through Iris Eye Imagery," 2014.

[8] https://en.m.wikipedia.org/wiki/Irdiology

[9] https://en.m.wikipedia.org/wiki/Heart-failure