DEVICE FOR EARLY DETECTION OF CARDIAC ARREST

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Abstract:

In India, Heart attack is one of the deadliest disease that tend to take up the life of people .It can occur to any person at any age at any time. There is a record that show that about 25 percent deaths occur to people who falls in between the age group of 25-69. Still now only when a heart attack has been observed the patient can take necessary steps to overcome this. To help our society from earlier cardiac arrest and to decrease death rate, we device a system that can pre-detect cardiac arrest before a patient can experience it. Our project make use of data's like analyzing the number of beats per minute(BPM) and informs as soon as one's heart beat level goes beyond the limit. Adding to this, we also use other related monitored data's like x-ray images and process these using image processing along with IOT.

Keywords:
Support Vector Machine(SVM), UART

1.INTRODUCTION

The project begins its process by using lung image of the patient and checks whether it's been affected or not. Any problem related to lung has a greater percentage for a heart attack. Additional data's are the heart beat of the patient which is obtained through heart beat sensor. We use Arduino to process and get the processed lung data and heart beat values to be sent over through Ethernet module. Arduino gets its lung data through UART cable connected to processing PC. These process are mainly carried over ATmega 328 microcontroller. Thus using heart beat values and processed image values they are sent to doctor using IOT that employees Dynamic IP address to access the web page.

2.LITERATURE SURVEY

In 2011,**Tao Xu,Irene Cheng,** and **Mrinal Mandal,** presented "**Automated Cavity Detection of Infectious Pulmonary Tuberculosis in Chest Radiographs".** The presence of cavities in the upper lung zones is an important indicator of highly infectious Tuberculosis (TB). Diagnoses performed by the radiologists are labor intensive and of high inter-reader variation. After analyzing the existing computer-aided detection techniques, they propose an fully automated TB cavity detection system which combines a 2D Gaussian-model-based template matching (GTM) for candidates detection with Hessian-matrix-based image enhancement (HIE) for the following cavity segmentation and feature extraction. Experimental results demonstrate that our approach outperforms the existing TB cavity detection technique with higher accuracy and lower false positive rate.

In 2015, **Hrudya Das** and **Ajay Nath** presented, "**An Efficient Detection of Tuberculosis from Chest X-rays".** Tuberculosis (TB) is a major health

problem in all over the world. Chest radiographs is becoming an important tool for fighting against TB .Existing Methods are less reliable in high population. So a computer aided system for detecting TB is becoming more needful for the mass screening of TB .Detecting cavities from chest x-ray is an efficient method for diagnosing the TB. So here, an automatic method is explained for detecting the TB from CXR with less effort. Region based active contour segmentation is used for segmenting lung field and the extracted features are classified using supported vector machine as normal and abnormal. The Montgomery County (MC) Data set contains 138 posterior anterior cxrs, among which 80 cxrs are normal and 58 cxrs are abnormal with manifestations of TB are used. All images of the MC set are in 12-bit grayscale, captured with an Eureka stationary x-ray machine (CR).

3.EXISTING SYSTEM

The only existing public dataset for heart rates of physical activity called 'PAMAP2 Dataset: Physical Activity Monitoring'. The dataset is sampled using an HR monitor with a frequency at 9 Hz collected in 2012. The dataset is comprised of the heart rates of nine individuals performing 18 different physical activities. The dataset also holds other biometric values such as body mass index, acceleration data, temperature, gyroscopic data, and orientation. Some of the Constraints includes: No real time monitoring of the level of Stock is being carried out. It does not generate replenishment alerts on low stock automatically, Human effort is more and manpower is wasted.

4.PROPOSED SYSTEM

The wearable device collects heart rate information using its heart rate monitor. This examples uses the Microsoft Band, but the system may be built for any wearable devices that has a heart rate monitor or electrodes for ECG recording. That data is sent to a smart phone via Bluetooth. An application on the phone holds this data in two minute intervals.

Data may be sent to the phone on each beat or all at once. At the end of each two minute interval, the sample is sent via HTTP request to a Django server hosting the Python machine learning code. Also on this server is the dataset of labeled heart rate samples, which has the opportunity to grow with each new input sample. The running code will classify the sample and send back a response. If the sample is classified as the onset of sudden cardiac arrest, then the phone and wearable device's notification system is used to notify the user. Otherwise, the phone sends no warning notification.

Some of the advantages are:

1. Real time monitoring of the level of stock,
2. Generates replenishment alerts on low stock automatically,
3. Avoids human efforts saves on manpower,
4. Sales personnel can replenish the shelf or make an order for more items

5.SYSTEM DESIGN

The architecture diagram of the proposed approach along with the hardware interfacing is illustrated in figure 1

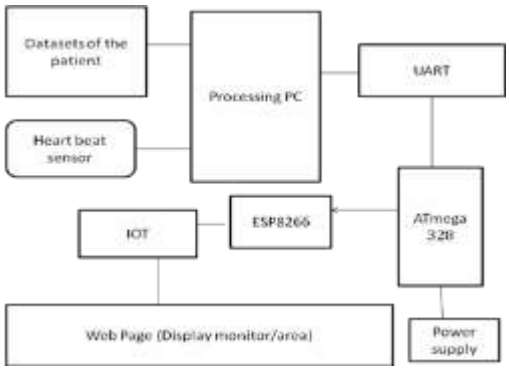


Figure 1: Architecture Diagram

The above diagram clearly show the connection of modules and microcontroller connected with each other. The dataset of patient is the already trained dataset which is contained in the PC. The dataset and Heart beat values obtained through heart beat sensor is processed in the processing PC. The processed data goes to ATmega 328 through UART cable.

The microcontroller send the data to Ethernet module, where the IP address of the corresponding Ethernet cable is used to show up the processed information. The web page is accessed by the doctor using the Dynamic IP address obtained from the Ethernet module to access the Webpage.

The process flow of the system is depicted in Figure 2

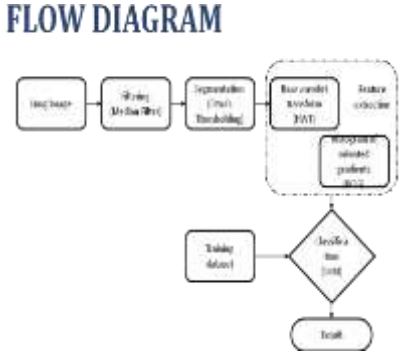


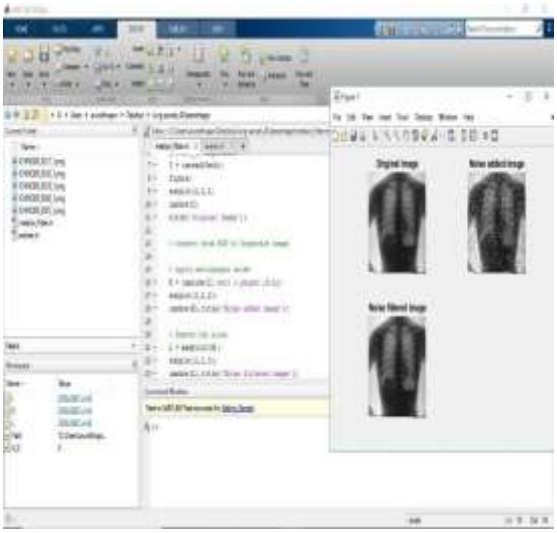
Figure 2: Process Flow Diagram

The above flow chart diagram clearly explains how a Lung image is processed and the data is obtained. First we use the affected patient lung X-ray image to process it. The lung X-ray image are grayscale by default. The image can contain some noise that can interfere the data and result. For this we filter the image using Median Filter, where the filters remove noise, and we obtain noise free image. The image of the lung is segmented to find the appropriate area that is affected.

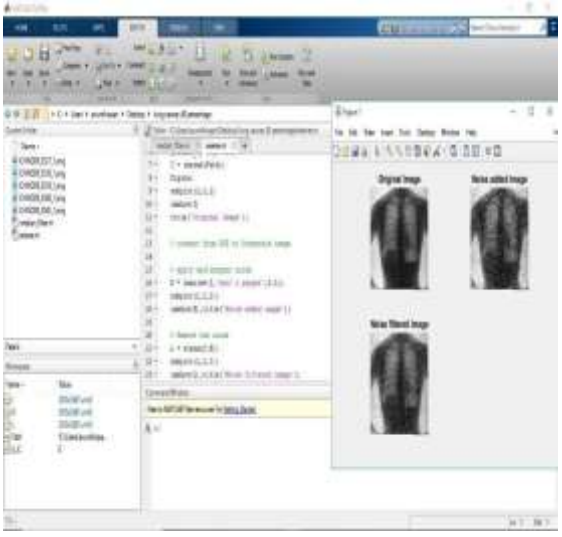
The segmentation is done using Otsu's Thresholding method. Parallely, features of the affected image is extracted and compared with the already classified trained dataset using Support Vector Machine(SVM).The feature extraction is done using Haar Wavelet Transform(HWT)and Histogram Oriented Gradients(HOG).The Computed values are sent through Arduino Uno microcontroller and Ethernet shield to the webpage which will be monitored by the doctor.

6.SCREEN SHOTS

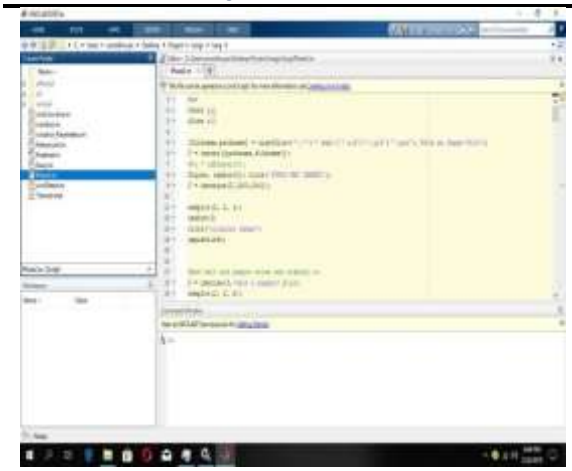
The weiner filter image is given below:



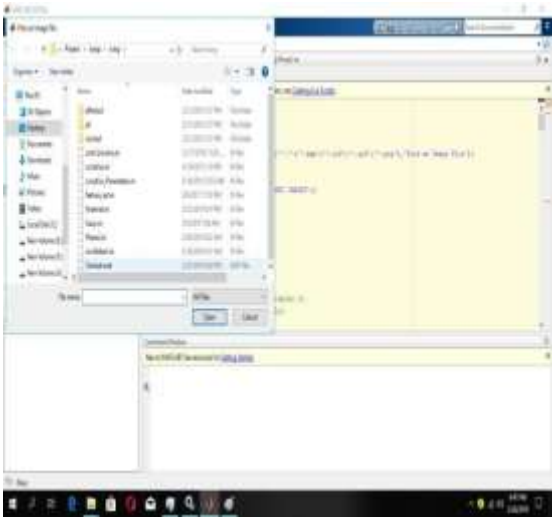
The Median filter image is given below:



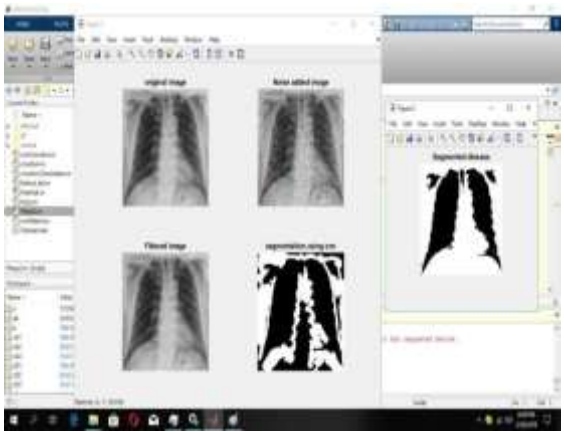
Here we assign the path of image directory:



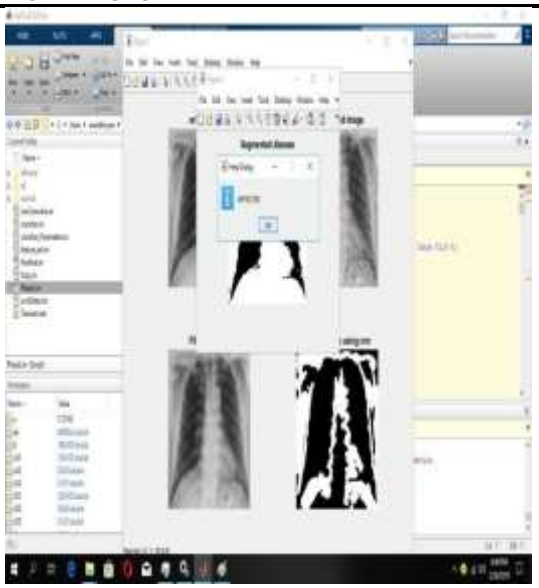
Here we import dataset:



The image shows the selected image of lung:



The given image show whether the lung is affected or not:



7.CONCLUSION AND FUTURE ENHANCEMENT

Pulmonary tuberculosis (TB) persists as a great public health problem in Korea. Increases in the overall age of the population around the world caused increase in drug abuse. Drug addiction can cause serious health problems. A report from WHO states that use of tobacco and smoking can seriously kills lung as they are slow poison to death. These drugs and smoking is one of the main reason for increase in TB which can affect lung. There has been a large scale of death due to TB which has not been cared or diagnosed. Any problem in lung like lung cancer or TB can affect Heart easily as they are closely related.

Hence by taking the main symptom as TB we proceed this by checking whether the patient lung is either affected or not. In addition we use the Heartbeat data's of the patient. If the result shows that the lung is affected and abnormal in heartbeat then it is a indication that there is possibility of cardiac arrest and can also be diagnosed. These process is only possible only with the help of image processing which is cheap and reliable to use for both doctors and patients. Hence the overall project provides the facility of Earlier Cardiac Arrest Detection for patient at cheap, easy, quick and reliable.
In future, the results of the patient can be stored in the cloud so that, many doctors can access the data and prescribes with the treatment

8. REFERENCES

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