

HEART DISEASE PREDICTION USING BIG DATA ANALYTICS

"Know Your Heart"

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Abstract- This article aims to present the information regarding development of angiographic heart disease predicting android application. The motivation behind the development of an application for heart disease prediction is to deliver a feasible, economical and uncomplicated platform for users who do not have access to fancy healthcare systems. The interesting feature of the application is that a customer sitting at home can easily understand the health of his heart, recognize if he needs to make any modifications for his existing condition and eventually explore the lifestyle choices that he can adapt.

Keywords — Angiographic disease, prediction, heart disease, Android, healthcare.

I. INTRODUCTION

In this fast-paced world, people are restless and prone to continuous stress. As a result of unbalanced lifestyles, people develop unhealthy eating habits including consuming junk and processed food. These factors collectively deteriorate their heart health by disturbing the electrolyte levels in their body and blood pressure while they remain totally unaware of the severity of the situation. Eventually they face conditions like severe pain and uneven heartbeat which is in progressed state and sometimes leads to a more permanent heart problem like heart attack. Essentially, most of us are not even capable of interpreting medical reports at its core. In this project, we have made an effort to build a Heart Disease prediction application using Big Data Analytics. The android app takes the medical reports and the entire history of the patient as input and predicts the likelihood of any forthcoming complications or heart problems beforehand based on trained datasets. The model also provides graphical representation of patient's current health scenario along with the relevant recommendations for how he can make some basic lifestyle changes. The app also recommends if he can consult a medical health professional in severe cases, if necessary. This enables the patient to easily visualize his current heart strength and provide corrective actions.

II. LITERATURE SURVEY & PROBLEM DESCRIPTION

The current applications available on the android play store or apple store are very helpful in gathering health related data such as calories burnt

by the user, heart rate, body temperature etc. There is a need of an application which is smart enough to gather this whole data in one platform and by applying intelligent algorithms, will predict probability of any disease if it detects any symptoms.

Moreover, the application should recommend the cure or prevention of the disease to help user at his ease. This enables need of very simple and economical application which a user of any age is comfortable with. Hence, the system described further is proposed and developed for angiographic heart disease prediction as a prototype.

III. METHODOLOGY

A. Prediction of heart disease of un-registered user -

Gather Heart Related Data:

The first part of our application is gathering of data from the customer (refer Fig 1.1). We have constructed a form which gathers the following information of the customer-

- Age ranging from 18 to 100 years
- Gender
- Chest Pain Type containing values Typical Angina, Atypical Angina, Non-anginal pain, Asymptomatic
- Resting Blood Sugar containing values from 90 mm Hg to 200 mm Hg
- Cholesterol containing values from 180 mg/dl to 350 mg/dl
- Resting ECG containing values Normal, having ST-T wave abnormality and showing probable or definite left ventricular hypertrophy by Estes.
- Maximum Heart Rate values ranging from 60 bpm to greater than 140 bpm
- Exercise Induced Angina

Fig 1.1

The information submitted by this form is sent through a connection using REST API to the machine learning model and the heart disease prediction is calculated based on trained dataset.

Machine Learning Algorithm:

We have run the machine learning model based on the trained data that we have collected from UCIs heart disease data set. The dataset contains 76 parameters but we have utilized the 8 parameters mentioned above to train our model (refer fig 1.2). The model is tested with various algorithms such as KNN, SVM and logistic regression and most effective and accurate model is deployed on aws lambda as a server.

As soon as the submit button is clicked, the call goes to trained model, model runs its inference loop and predicts output for provided data. The call to the model and output fetched in the app both the operations work on the API written in nodejs.

Age	Chest_pain	BP	Cholesterol	Fasting_blood_sugar	Resting_ECG	Max_HR	Exercise_induced_a	Angiographic_disea
46	4	130	238	0	0	90	0	0
60	3	120	178	1	0	96	0	0
62	3	130	263	0	0	97	0	2
47	4	120	205	0	0	98	1	4
57	1	130	308	0	0	98	0	0
54	3	130	294	0	1	100	1	4
48	2	131	308	0	1	100	1	0
62	4	138	294	1	0	106	0	2
48	4	138	214	0	0	108	1	3
48	4	120	254	0	1	110	0	0
50	4	120	328	0	0	110	1	0
58	2	160	393	0	0	110	1	4
65	4	150	225	0	2	114	0	4
66	1	150	228	0	0	114	0	0
68	3	120	211	0	2	115	0	0

Fig 1.2

Based on the trained data we our model provides a prediction about the heart disease of the customer(refer fig 1.3).

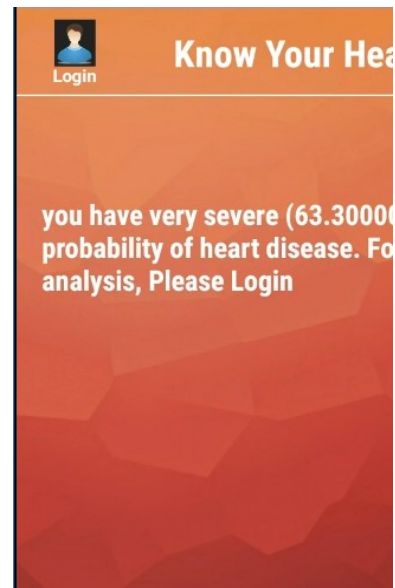


Fig 1.3

Register-

For an unregistered user we provide the functionality to register using the following parameters:

- Username which has a valid value and no special characters
- Age ranging from 18 to 100
- Gender
- A valid Email Address
- A strong Password

Fig:1.4

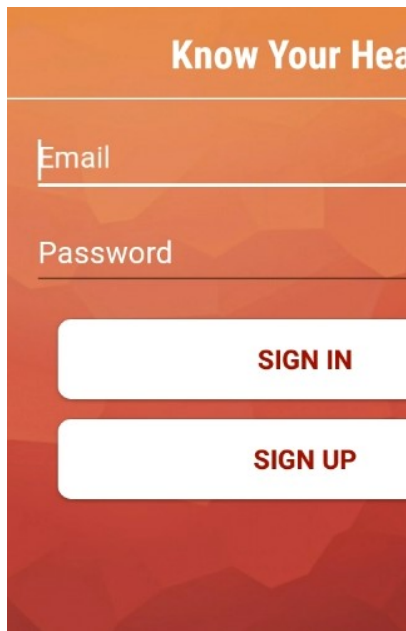


Fig 1.5

We have used SQLite sever to store the user login details. The user can login to the application using his credentials or through google sign in.

Health chart-

A logged in user will have access to a graphical analysis of his heart parameters as compared with the recommended values of the user of that age and gender.

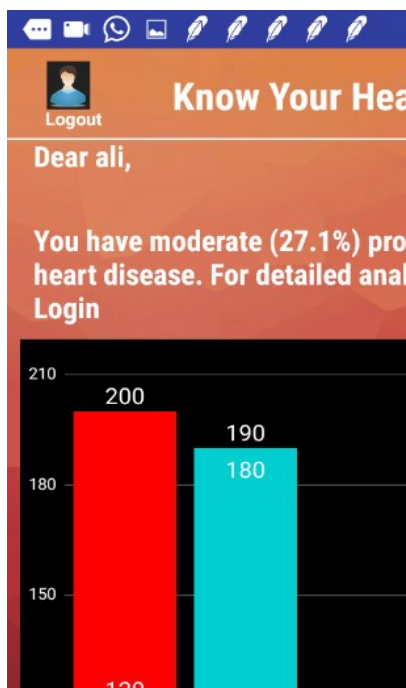


Fig.1.6



Fig.1.7

As seen in the graph above, the health chart is drawn for the user as per his health condition and recommendations.

Diet, Lifestyle and Exercise Recommendations-

We take into consideration the prediction done by the model along with the age and gender of the user to determine which user requires what kind of lifestyle changes.

B. Prediction of heart disease on registered user using Sensors-

Sensor Data- We have collected data from a sensor app named iCare Health Monitor. The application is available on android play store and apple store as well. The application uses infrared rays in camera and flashlight of mobile phone and detects blood flow rate in a finger. This helps tracking user's pulse rate and blood flow rate. Both of these readings effectively provide approximate cholesterol value.

A temperature sensor works simultaneously and it detects body temperature too. Accelerometer in cell phone helps in measuring calories burnt.

This is how real time user health data is gathered and is fed to "know your heart" application for angiographic heart disease prediction.

IV. FUTURE SCOPE

The "know your heart" application currently provides predictions regarding angiographic heart disease. The application can be extended to provide the probability of other heart related diseases such as coronary artery disease and many other severe diseases.

The application currently does not measure real time user health data. I will be programmed to measure real time user data such as body temperature, heart beats and calories etc. Hence, the application will be fully end to end system without taking help of other applications such as i-Care.

The google login feature will be provided in future to keep track of user's previous readings and current updates on his google drive.

The application will be made available to apple ios users too.

V. CONCLUSION

A simple, convenient and smart android application is developed as CMPE-272 course project which on giving health data, predicts probability of angiographic heart disease to the user. The application is smart enough to provide precautionary measures, immediate cures on less probable cases and suggests health professional visits in severe cases.

Furthermore, the application gathers the health data using other built-in android as well as ios applications and predicts real time disease probability for the user.

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