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Smartphone based Ischemic Heart Disease (Heart Attack) Risk Prediction using Clinical Data and Data Mining Approaches

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***Abstract* -** We designed a mobile application to deal with Ischemic Heart Disease (IHD) (Heart Attack) An Android based mobile application has been used for coordinating clinical information taken from patients suffering from Ischemic Heart Disease (IHD). The clinical information from 787 patients has been investigated and associated with the hazard factors like Hypertension, Diabetes, Dyslipidemia (Abnormal cholesterol), Smoking, Family History, Obesity, Stress and existing clinical side effect which may propose basic non-identified IHD. The information was mined with information mining innovation and a score is produced. Effects are characterized into low, medium and high for IHD. On looking at and ordering the patients whose information is acquired for producing the score; we found there is a noteworthy relationship of having a heart occasion when low and high and medium and high class are analyzed; p=0.0001 and 0.0001 individually. Our examination is to influence straightforward way to deal with recognize the IHD to risk and careful the population to get themselves assessed by a cardiologist to maintain a strategic distance from sudden passing. As of now accessible instruments has a few confinements which makes them underutilized by populace. Our exploration item may decrease this constraint and advance hazard assessment on time.

***Keywords*:** Heart Disease, Risk score tree, Chi-Square, p-value, IHD, Prediction Data Mining, Android, Smartphone.

I. INTRODUCTION

Ischemic Heart Disease (IHD) is one of the real reasons for death around the globe. According to WHO report the loss of life is 6.96% because of Ischemic Heart Disease (IHD), which positions it first as the reason for death [1]. There ought to be broad endeavors at different levels to decrease the mortality and dismalness out of IHDs.

Preventive prescription is picking up significance and prominence all around. For a few infections, counteractive action is superior to fix [2]. IHD scenes can be primordially, principally and optionally counteracted. A system to forestall improvement of risk factors or control of risk variables will alter the danger of IHD. Having scene of IHD has enduring impacts on the person from having rehashed scenes of chest agony to having restricted personal satisfaction because of heart disappointment and even passing [3]. It is the need of great importance to make most extreme number of individuals careful for health and make them to stroll up to a specialist for preventive health checks. Computing and sorting a man into a risk level may assist the individual with motivating for a preventive wellbeing check so mortality can be decreased however much as could be expected.

Smartphone are a standout amongst the most broadly used innovation around the world. Through it, different applications are being produced and being utilized by all-inclusive community for different means. Truth be told, there is great mental effect of data when portable application advises about something to a person [4]. Advancement of a cell phone based apparatus would profit masses of individuals. Right now there are sure apparatuses accessible to foresee danger of IHD which bears fantastic scholarly greatness however are underutilized by general individuals because of couple of impediments like compulsory contributions of Lipid profiles and Blood Pressure (BP) values besides, these risk scores don't individualizes the hazard. Improvement of an instrument to

anticipate the heart attack chance in light of risk components may push quite a bit of populace to check their own risk.

II. Related Work

A detailed study on identified risk factor Ischemic Heart Disease (IHD). This paper was to examine blood pressure and categories with coronary heart disease (CHD) risk and to incorporate them into coronary prediction algorithms [5]. They set a community based group. With 12 years of follow up and demonstrated the association between IHD and hypertension, diabetes and dyslipidemia.

Ralph B. D'Agostino proposed a system to accurately predict coronary heart disease (CHD) risk, of the Framingham functions developed compared with the performance of risk functions developed specifically from the individual cohort's data. Their comparisons included evaluation of the equality of relative risks for standard CHD risk factors, discrimination, and calibration. They used cox regression coefficients and chi square test as statistical measures [6]. The Framingham functions performed well for both black and white men and women. This event's was taken within 5 years of follow up. In their score system High density Lipoprotein (HDL), Low Density Lipoprotein (LDL), diabetes, blood pressure etc. inputs are mandatory [7].

Lora E. Burke and a group of scientist reviewed how mobile health can play important role in cardiovascular disease prevention. They showed many statistics and gave some idea how mobile health can prevent cardiovascular disease [8]. They recommended some future research such as mobile application for treating obesity encouraging regular physical activity, smoking cessation, control of hypertension, and dyslipidemia; and treating diabetes mellitus [9].

III. PROBLEM DEFINITION

The accessible tools which are utilized for breaking down heart disease have a few impediments which make them underutilized by population. So we built up a basic way to deal with predict risk of creating Ischemic Heart Disease (IHD) (Heart Attack) using smartphone based application in android.

IV. Methodology

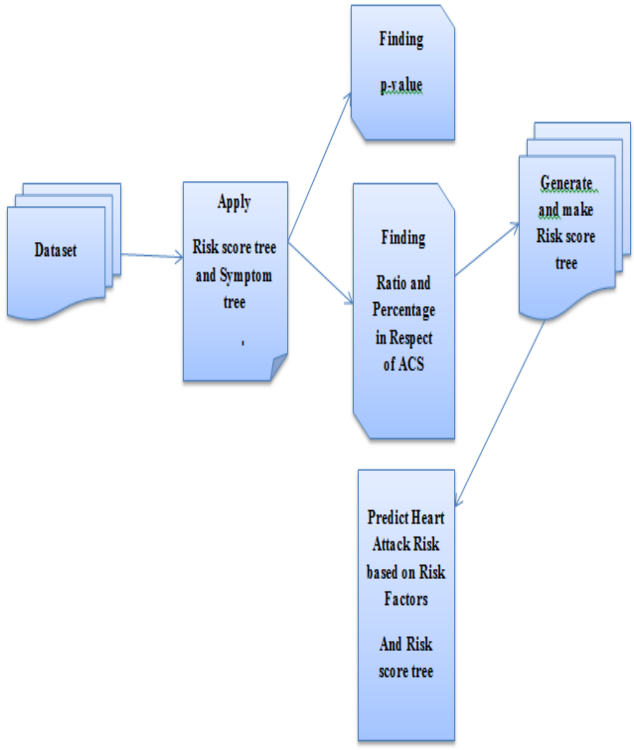


Fig 1: System Architecture

Risk Score Tree: To build this tree we utilized chi square connection and finding the p-value. P - Value was utilized to discover the level of significance. A score was given which was analyzed from ratio and percentage in regard of Acute Coronary Syndrome (ACS) which is IHD and a histogram was created.

Chi-Square correlation: Chi-square test finds the perceived information connection between two qualities. On the off chance that has a particular qualities, in particular a1, a2 ....ac and b has r unmistakable qualities in particular b1, b2 ... br. The information tuples can be appeared as table where with the c estimations of a making up the segments and the r estimations of b making up the columns [10].

p-Value: p remains for likelihood. The p esteem, or figured likelihood, is the likelihood of finding the watched, or more extraordinary outcomes when the invalid theory (H0) of an investigation being referred to is valid. The definition of extraordinary relies upon how the theory is being tried. p is additionally depicted regarding dismissing H0 when it is in reality obvious, notwithstanding, it's

anything but an immediate likelihood of this state. p-value may take an incentive somewhere in the range of 0 and 1.

The Score Calculation: Age was sub-classified into 4 and given scores in based of level of significance and relationship with having IHD. Age between 15-30 years is sub arranged as score 1, between 30-40 years as score 2 and between 40-55 years as score 3 and a most elevated score of 4 for clients over 55 years old.

Android Application Features: The data and score tree generated was integrated to the android software named Predict Risk. After reading and accepting the terms and conditions the user is registered with information like identity, address, age, gender, contact details. An input format consisting of questions related to history of Hypertension, Diabetes, Dyslipidemia, Family history, Drug history, Stress, exercise habit and symptoms was developed. The user gives a specific input about the existing known risk factors and symptoms upon which the application calculated the score and categorizes the person into a risk.

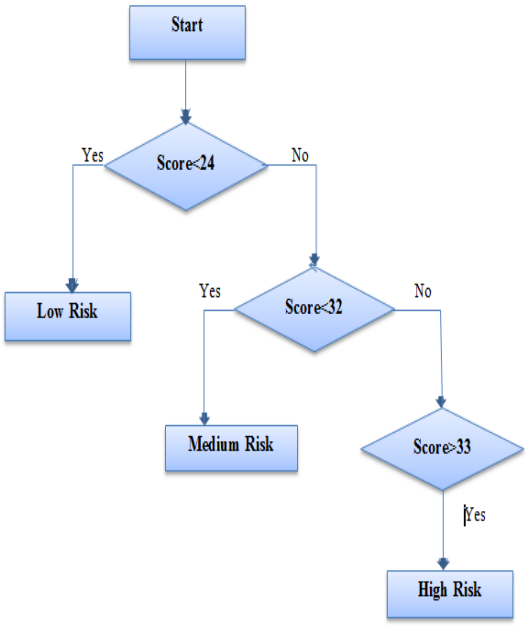
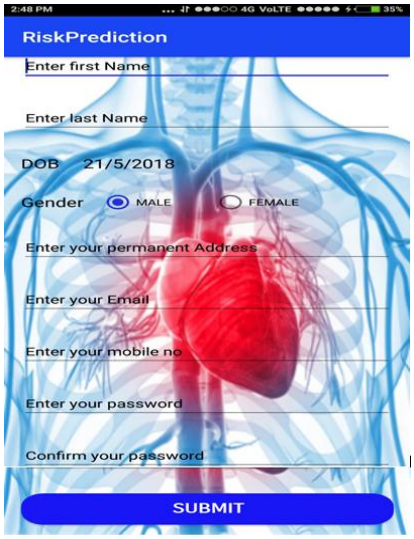
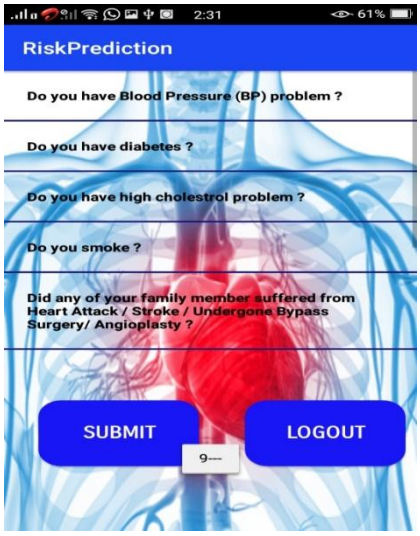


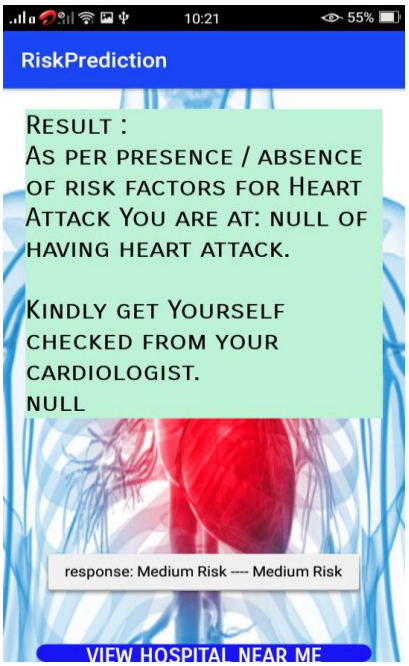
Fig 2: Risk score tree

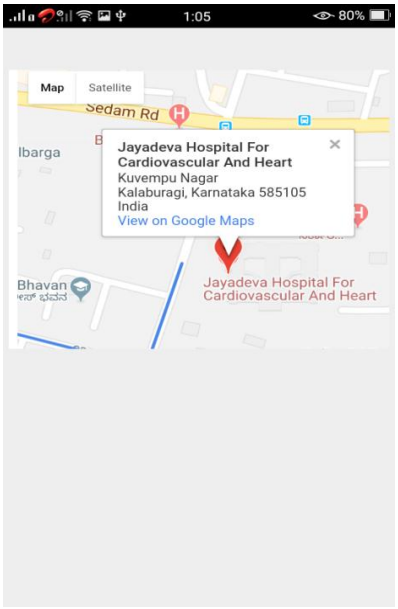
V. Results and Discussion

On contrasting and sorting the patients whose information was acquired for producing the score; we found there is a huge connection of having a heart occasion when low and high classification was thought about ; p=0.0001.Among patients ordered into high; 86.7% had IHD while in low category, only 12.5% had IHD. The distinction amongst medium and high was additionally critical with p=0.0001; However there was m no noteworthy contrast amongst medium and okay classes; subsequently medium classification staying in the hazy area. Our application should be tried further for affectability and specificity.









VI. Conclusion and Future Scope

Mobile applications are playing vital roles in day today life. They could help billions of people to access health information, health advices and guidelines. Our research is motivated to make simple approach to detect the IHD risk and aware the population to get themselves evaluated by a cardiologist to avoid sudden deaths. Our research application Predict Risk reduces this limitation and promotes a risk evaluation on time. This mobile application uses DM techniques where several question are asked to predict the IHD and alert the person is risk found to consult the physician.

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