A Survey on Smart Digital Health Care Record with Prediction of Health Condition

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ABSTRACT

Humans are known to be the most intelligent species on the earth and are inherently more health conscious. Since Centuries mankind has discovered various healthcare systems. To automate the process and predict diseases more correctly machine learning methods are attending popularity in research community. We need to implement machine learning methodologies to identify the best-predicted values related to the patients in their respected health condition and also need to analyze the previous health records. For that, we need to maintain a repository or the warehouse where we need to maintain digital data related to the patients and their treatment.

Keywords: Healthcare, Health Card, QR Code, Prediction, Methodology.

I INTRODUCTION

The main aim of this research paper is to store the overall health information of the patient in a Digital card. This card will consist of all the medication details, reports etc. of the patient .The implementation of the project has be done in Artificial Intelligence (Machine learning using python).

I.1 Machine Learning

Machine learning is the main background of this prediction process and the data we acquired from the medical application. This application details can be informed in the later sections and the information we gathered can be used for the machine learning models for better prediction of what is going to happen for the patient in future and what are the main constrains the patients have to follow if there are any problems with their health condition.[9][10]

I.2 Data Collection

We need to collect the data from some sources in our environment and in our circumstances. We need to create a repository which will be useful for maintaining the stability in gathering the information from other sources. In collection of information we may get noisy data and we need to remove them using pre-processing methodology. This process will maintain the stability and ambiguous information in the repository[6-9]
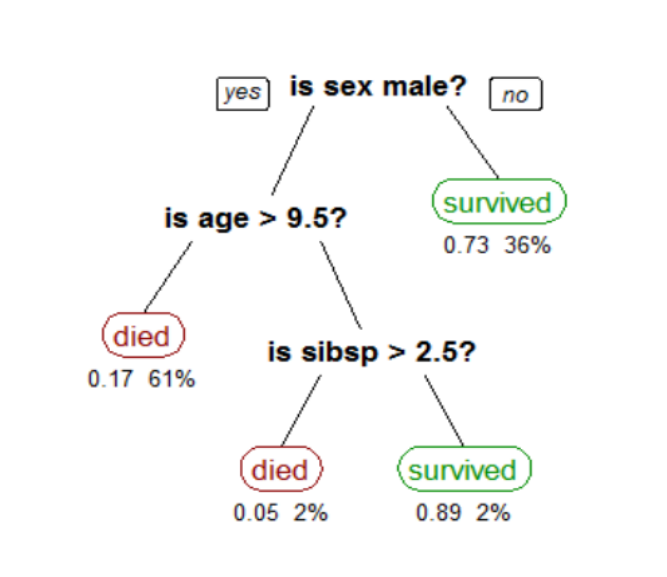
I.3 Decision Tree

Fig-1. Decision tree example

A Decision Tree has influenced a wide area of machine learning, covering both classification and regression. In decision analysis, a decision tree can be used to visually and explicitly represent decisions and decision making. As the name goes, it uses a tree-like model of decisions. Though a commonly used tool in data mining for deriving a strategy to reach a particular goal, its also widely used in machine learning.[11]as shown in the fig-1.example

I.4 Random Forest Tree

Random forest, like its name implies, consists of a large number of individual decision trees that operate as an ensemble. Each individual tree in the random forest spits out a class prediction and the class with the most votes becomes our model's prediction (see fig2. example).
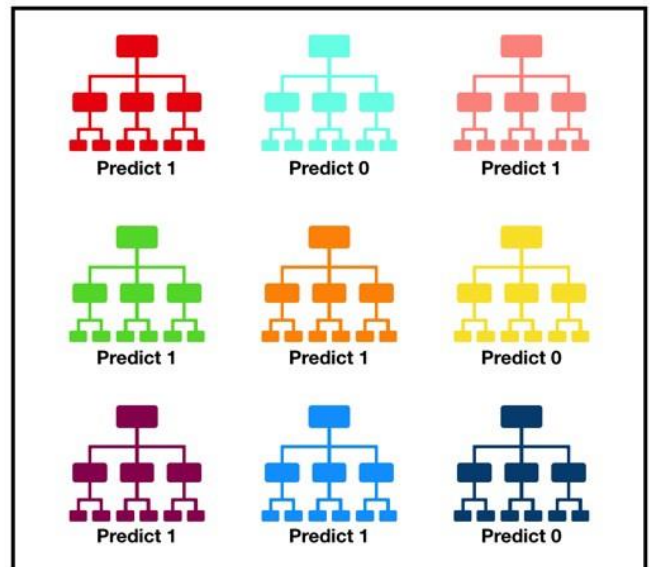
Fig-2.Random forest tree example

In data science speak, the reason that the random forest model works so well is:A large number of relatively uncorrelated models (trees) operating as a committee will outperform any of the individual constituent models.

I.5 Digital Card

The Digital Card consists of the QR Code scanner which can be only accessed by the doctor and the receptionist in the hospital. The QR Code looks like as follows [16][17].

This QR Code contains the following information related to the patient and their treatment information a. Name b. Gender c. Age d. Weight e. Height f. Contact info g. Habits h. Food Type i. Any Previous Disease information j. Duration of the suffering k. Current symptoms. l. Lab reports m. Scanning Reports n. Medication History o. Current Medication p. Current Review updatesq. Current Lab Reports (If Any) r. Next Review Updates.
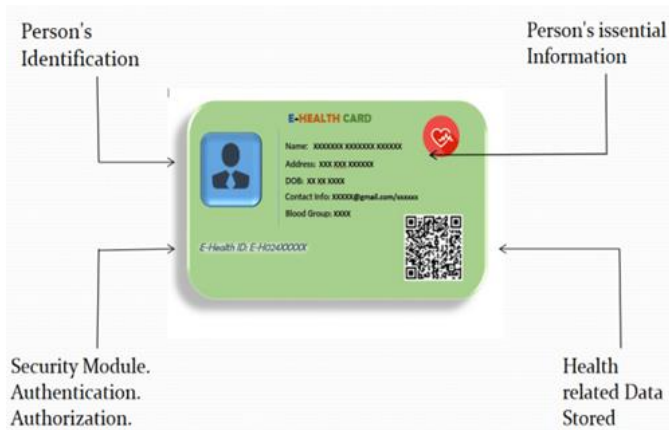
Fig-3.Layout of Health Card

It explains the structure of the medical card and the information related to the patients can be stored in the QR Code which we are generating on the card.

II   LITERATURE SURVEY

Healthcare Models Smart cards offer a new perspective for healthcare applications due to the security level provided for data storage. Smart cards in healthcare applications can be used for storing information including personal data, insurance policy, emergency medical information, hospital admission data and recent medical records [3]. Numerous healthcare systems around the world start using smart cards to improve the quality of healthcare services [4]. Different healthcare models have been proposed either on national level; e.g. in Germany [5] or regional level; e.g. in US. [6].

In the field of machine learning and artificial intelligence, we can look up to several ways to predict health condition, maintain the records and get rid of Inconsistencies, redundancy and data loss. The same is achieved by:-"Disease prediction technique using data mining techniques" which pacts with the prediction of heart diseases using different machine learning algorithms. It excerpts raw data from the database and provides analysis of the working of the heart. "Computer based diagnosis using artificial neural network"

II.1 Research

It consists of the information related to different research identifications in the field of medical. NCBI is the main repository for the medical information identification. All the medical records and the information related to different researches in the medical domain can be identified in NCBI repository.[1] Here we gathered information related to some of theresearch works over the globe. They are as follows:

II.1.1   Jougen Research

Jougen [1] and his team worked on the principle of identifying the comparison between different paper based and electronic health records of the patients. EHR also referred as Electronic Health Records is the base function of many other things like digital maintenance of the reports, files, care sheets etc. All the information which are on the paper can be converted to the digital records using EHR. EHR is a very powerful thought of mankind to maintain health records into digital format.

II.1.2   Kathrin M Cresswell

Kathrin M. Cresswell [3] Deals with the format of EHR maintenance in the health record maintenance in this research work mentioned in the science direct. He was dealing with the inpatient clinical records maintenance of different hospitals.

II.2 Existing System

There are many different designed on the health care most effective thing in the medical there will be a large amount manipulated and the performance machine learning models will best features we include in our systems of this kind of work eQR Code and data security The QR Code will help the doctor best way to treat the patient information.

 The current mainly focusing on how the repository and not even process of maintaining those performance of predictions [4].

The overall finding of the above discussion is given below as Table-1.

Table-1: Comparative review of Existing Research Papers

Sr. No.	Paper Name	Author	Method Proposed	Limitations
1.	A Smart Card Based Healthcare System	Hakim Fourar-Laidi E. Turhan Tunali	Access accurate health data quickly. Encryption Keys and Digital signature. Software Reusability.	Internet supported system ,Network issue. Technical problem risks are high.
2.	A Case Study For Bangladesh for Healthcare System	Prof. Mohammad Ariful Bashed. Palash Chandra Roy	Secure and Authenticated and Data Communication. Speed ,Portability Efficient to use and easy interface.	Less Cost-efficient. User needs to put correct data or else it behaves abnormally.
3.	Electronic Healthcare Model Based on Smart Card For Saudi Medical Centres.	Ebtisam Alabdulqader Hakim Fourar-Laidi	Pharmacies provide the prescription only when insurance company allows. Synchronization system synchronizes data every time patient uses card.	Redundancy of data is seen. No unique ID is provided to the card.

III TAXONOMY CHART

Parameters→ Papers ↓	QRCode On Card	Downloadof Health Information	Trackingof Data Using unique ID	Health Prediction	Easeof Access	Stake holder Iinvolvement
ASmart Card Based Healthcare System	NO	NO	NO	NO	YES	YES
A Case Study For Bangladesh for Healthcare System	NO	NO	YES	NO	YES	YES
Electronic Healthcare Model Based on Smart Card For Saudi Medical Centres	YES	NO	NO	YES	NO	YES

Table-2: Taxonomy chart

IV RESULT

Decision trees and random forests are supervised learning algorithms used for both classification and regression problems. These two algorithms are best explained together because random forests are a bunch of decision trees combined.[7] There are ofcourse certain dynamics and parameters to consider when creating and combining decision trees.

Initially data will be generated application and in the first phase decision tree model and after results we transfer the remaining random forest for the better prediction Here we get the highest accuracy forest than DT.[2] Fig-4 will represent the random forest and decision the result of the disease gathered.
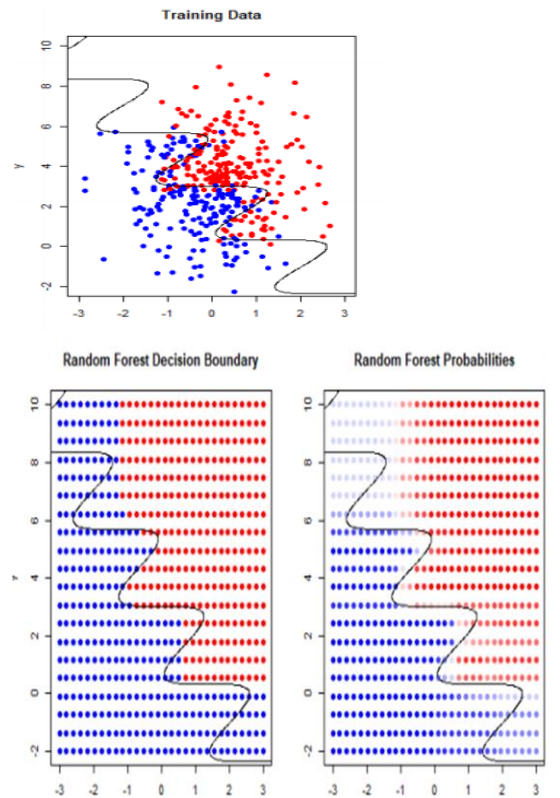

Fig-4: Result of Training data with Decisiontrees and the random forest decision boundary implementation.

V CONCLUSION

The main purpose of this paper is to determine work on medical database with the help of digital card to store information and analyse.This research paper focuses on storing the patients' health information in the digital card,analysing and designing a system where patients real-time information can be processed and evaluated based on previous symptoms and on current symptoms for different diseases. By this paper we have concluded that Random Forest, Decision tree are the best algorithms with higher accuracy rate than others for predicting and analysis.[13] So in future we can continue this paper by implementing these algorithms for better results and working model. This paper also outlines the technique to deploy this method to android and web platform to analyse and predict using real time data of users by collaborating with doctors and various medical organization.[5]

VI ACKNOWLEDGEMENT

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