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Predictive Analysis: Implementation of Smart Interface in Healthcare Organizations

Shivi Panwar, Shivika, Bindu Rani
Department of Information Technology
Inderprastha Engineering College, Ghaziabad, India
Corresponding Author's E-mail: *shivika.hcs@gmail.com**
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Abstract

Data analysis has extracted the hidden insights in the field of healthcare. This paper basically studies various technologies used to upgrade the current Healthcare Systems by data analysis and predictive analysis. With the help of data analysis, the patients, doctors and pharmacists are themselves able to do their desirable functions easily and on their own. It also helps in making it easier for each side to interact, thus making healthcare industry even more approachable and available to everyone. This analysis of data bridged the gap between the patient, hospital and the researchers. Using this system, it is comparatively easier now to ensure the appropriate care and maintain efficiency.

Keywords*: - Data capturing, Predictive analysis, Graphical implementation.*

INTRODUCTION

In the past two decades, advanced information technologies, such as mobile communication systems [1],big data [2], and wearable computing [3], have been widely used in the sector of healthcare[4].However, the large amounts of healthcare data brings the following challenges for data management, storage, and processing:

Sheer volume of data: With the improvement of electro medical and wearable devices, the data volume of healthcare systems has been extensively increasing [5].

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- ***High Throughout:*** Generally, major electro medical and wearable devices can continuously acquit health data, while these data need to be processed rapidly for prompt response to emergencies [6].

- ***Various Forms:*** There is a large amount of healthcare data that is generated and stored in healthcare systems such as medical records, hospitalization record, medical imaging and surgery data. These multisource data include text, image, audio and video [7]. More importantly, the same category of healthcare data collected through different devices may follow the different data standard defined by providers.

In order to overcome these challenges, a smart interface system for data analysis has been designed. Nowadays, one of the greatest challenges is how to develop an extensive healthcare system that effectively manages multisource heterogeneous healthcare data. Further the conventional database systems do not have the capability to let different people in healthcare sector interact without a mediator. Thus, this paper presents a detailed design of a smart healthcare system assisted by data analysis and predictive analysis and further makes the following contributions:

- It lets the doctors see the patient's medical history, appointment details etc.

- It also helps the pharmacist to see the increased demand of a particular medicine using predictive analysis.

- It also allows patients to get appointments according to their own comfort. The patient can also choose the doctor on their own by judging through doctor's previous ratings given by the patients.

- Moreover, the system has predictive analysis feature through which heart diseases can be predicted particularly.

RELATED WORK

Healthcare sector produce huge data and capturing such data is a challenge. Data is captured from various sources such as pharmacy, patient data, electronic Data from devices, manual data from the doctor's desk etc.

To keep a track of all this data, first task is to capture it and store it. Selection of data to be captured is a tactical strategy. The

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decision depends on what type of results is desired in the output. Once this data is captured from different sources the next task is to align the data into analytics functions. There are various tools to capture the data and make it feasible to implement mathematical functions over them. Distributed data can be processed efficiently with tools like Hadoop and NoSql. These tools capture the data and make it viable for data analysis

METHODOLOGY

In this, Naïve Bayes' algorithm has been used. Using this algorithm, a Heart Disease Prediction System is developed. This system can answer complex queries which cannot be answered using traditional systems. This system involves higher number of data sets and attributes which are directly collected from doctor's information (data sets) for accurate prediction of heart disease. Using medical information of patients such as age, gender, blood pressure, blood sugar etc, and the system can predict the likelihood of patients getting a heart disease.

Based on the attributes given in the data set, a questionnaire is made. The questionnaire contains the following information: ***See Table:-1***

Using the values of attributes given in Table I, the Naïve Bayes' Algorithm computes the probability of having a heart disease.

Table I.

Serial No.	Attribute	Description
1	Age	In years
2	Gender	Value 1: Male Value 2: Female
3	Chest pain type	Value 1: Typical type 1 angina Value 2: Typical type angina Value 3: Non angina pain
4	Blood sugar	Value 1: >120 mg/dl Value 2: <120 mg/dl
5	Thalach	Max heart rate achieved
6	Weight	In kgs

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A. Naïve Bayes' Algorithm

In probability theory, Bayes' theorem relates conditional and marginal probabilities of two random events. For example, A patient may be observed to have certain symptoms, Bayes' theorem can be used to compute the probabilities that a proposed diagnosis is correct, given that observation.

Bayes' Theorem is given by:

Prob(B given A)=Prob(A and B)/Prob(A)Where, A represents the prior event and B represents the dependent event.

RESULT ANALYSIS

In terms of Data analytics, clean data can be represented in graphical form. In order to clean the data, functions of data analysis are used. These functions convert the data and make it usable to produce relevant statistical results. These functions convert the data into mathematical variables which can be plotted against the axis. Graphical representation of raw data is necessary to process the suitable information out of it. Various functions used in data analysis are VLookup(), Sort(), Filter(), SumIf(). These functions are used to convert raw data into suitable format which are then transformed into mathematical functions to plot graphs for analysis. A graph showcases numerical values in a qualitative structure and provides a broader view of the data.

CONCLUSION

Heart disease is the major cause of death for both men and women. If a person already knows the warning signs and symptoms of a heart attack, in this case he/she can act fast to a heart attack. The chances of survival are greater when emergency treatment begins quickly. So, this paper mainly focuses on how a Heart disease Prediction System can be designed using Naïve Bayes Algorithm. This system can answer complex queries which cannot be answered using traditional systems and thus helps to overcome the drawbacks of the existing system.

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