

Online HealthCare Decision Support System

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Abstract: Healthcare has always been the most important issue in human life. In today's environment due to heavy work pressure and fast life, it may not be possible for personal healthcare. This paper focuses on a web based decision support system which is based on distributed data mining and designed for the healthcare industry. Innumerable Decision Support Systems are prevailing in the market to cater the needs of the various industries based on various purposes. The importance of any Decision Support System resides on the quality of information it provides compared to other information system which leads to take effective decisions. The main focus of this paper is to discover frequent diseases with help of HealthCare providers. The medical industries have great amount of data set collections about diagnosis, patient details and medications. To turn these crude data into useful pattern and to predicate forthcoming trends, data mining approaches are used in health care industries.

Keywords: Decision Support System, Distributed Data Mining, Data sets, Health Care Providers.

I. INTRODUCTION

A health care provider is an institution or person that provides preventive, curative, promotional or rehabilitative health care services in a systematic way to individuals, families or community. In health care industry data mining is more popular and essential for all the healthcare applications. Hospitals, doctors contain many data, but these data are not been used for some useful purpose. This data will be converted into some useful purpose by using any of the data mining techniques [1].Data mining is the process of finding the hidden knowledge from the database or any other information repositories. The main purpose of the health care industry is to improve the quality of healthcare data by reducing the missing values and removing the noise in the database [2]. More recently, information technologies, and computer software in particular, have extended the scope of their activities to healthcare enterprise management, planning and administration. Now new digital communications technologies, of which the Internet is the most visible paradigm, are opening up their capabilities to all the actors, including patients and general public [6].The main purpose of the data mining is to find the hidden knowledge from the database. Cleaning of unwanted data such as removing noise, redundant data and irrelevant data will be done by data mining pre-processing techniques. After pre-processing the data will be used.

II. RELATED WORK

In the last decade there has been increasing usage of data mining techniques on medical data for discovering useful trends or patterns that are used in diagnosis and decision making.

Decision Support Systems (DSS) implement ICT to ensure better services to all the actors in the healthcare industry including patients and general public. A Decision Support System which incorporates Interactive Voice Response System (IVRS) to collect information from health workers through their mobiles, software modules to update data from IVRS to Database server automatically [3].A Health care delivery model based on mobile technology as an information transmission tool between rural patients and centrally located providers, using trained intermediaries as a local facilitators, entrepreneurs and health activists [5].

The decision support system is representing the interconnected and integrated world of healthcare. These existing approaches for Decision Support System suffer from one or more of the following disadvantages

1. All the healthcare management systems resemble hospital management systems

2. Importance has been given to the administration procedures and implementations

3. Many healthcare decision support systems need to be interconnected to ensure information exchange. Interconnectivity increases the exposure of risk of damage, loss and fraud. Security and privacy of patient's information are concerns of all healthcare organizations [9]. Author proposed the system which can provide medical feedback to the patients through mobile devices based on the biomedical and environmental data collected by deployed sensors. The system uses the Wearable Wireless Body/Personal Area Network for collecting data from patients, mining the data, intelligently predicts patient's health status and provides feedback to patients through their mobile devices. The patients will participate in the health care process by their mobile devices and thus can access their health information from anywhere any time. But actual implementation of data mining framework for decision support system is not done. Real-Time analysis of physiological data to support medical applications [8]. The scope of e-health applications includes different lines of development, which can be classified as, Information Services, E-Commerce, Electronic Connectivity and Messaging, Online Computer Software Application, Medical Service [6].

As manual reporting does not facilitate any query, sorting, relating etc., there is immense need of an ease to implement information system, which can report and analyze the data in time so as to check for any out breaks and monitoring [4]. Medical diagnosis by learning pattern through the collected data of diabetes, hepatitis and heart diseases and to develop intelligent medical decision support systems to help the physicians [7].

A Health care system which collects diagnosed patterns classifies them into normal and emergency terms and declares emergency by comparing the two data groups and suggests methods to analyze and model patterns of patients' normal and emergency status [6]. The challenge, as much of our time as of times to come, is to ensure that these new possibilities (which new technologies make available to us) are disseminated and distributed as widely as possible, serve to improve the quality of life and well being of the general public and, lastly, help reduce imbalances and inequalities in society while favouring the development of the economy. In brief it is a, matter of advancing, not merely towards a better interconnected but rather towards a better integrated world [10]. The proposed Decision Support System mines higher level of information or knowledge from the relational databases. The Decision Support System is the main tool in medical service to cater the needs of the target groups. The target groups for e-health applications are elderly patients and general public. The patients and general public can be empowered by internet, can be motivated to use the Decision Support System that can enable such targets to get medical assistance and better decision making. The added feature of the proposed system is the ranking of tablets by doctors, so that only best tablets are suggested to the patients.

III. PROPOSED WORK

The proposed Decision Support System is developed to collect the information about his/her disease from patient through user interfaces like web page. Formal inputs like name, age, symptoms will be filled in the entry form which is available on website. Once the patient fills the application form, a Patient Identity Number for him will be given. The collection of symptoms for the respective diseases and tablets is maintained as the dataset. The system diagnoses the disease by mapping the data provided by the patient for fetching the disease from Database and generates the report on website which tells about the disease, he is suffering from and proper medication to be taken for the identified disease based on the ratings given by the registered doctors.

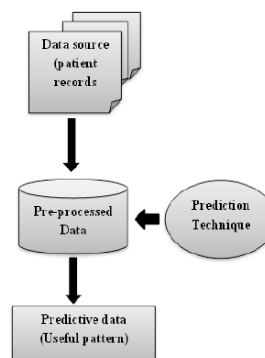


Fig 1. Overview of the System Design

Optionally, the system will provide best hospitals based on the land mark entered by the patient and patient may select the hospital of his choice. Further, the registered doctor can manually enter the prescription details and then

the prescription is mailed to the patient. Linear regression is employed here using data mining technique. The unifying goal of the Knowledge Discovery in Database algorithm is to extract knowledge from data in the context of large databases. The proposed Decision Support System employs the above said algorithm and the ranking methodology is further included to suggest the highly rated tablets to patients by the registered doctors.

Knowledge Discovery in Database.

It is a process of

- Developing an understanding an application domain.
- Creating the target data sets.
- Data cleaning and preprocessing.
- Data reduction and projection.
- Choosing the data mining task.
- Choosing the data mining algorithm(s).
- Data mining.
- Interpreting mined patterns.
- Consolidating discovered knowledge.

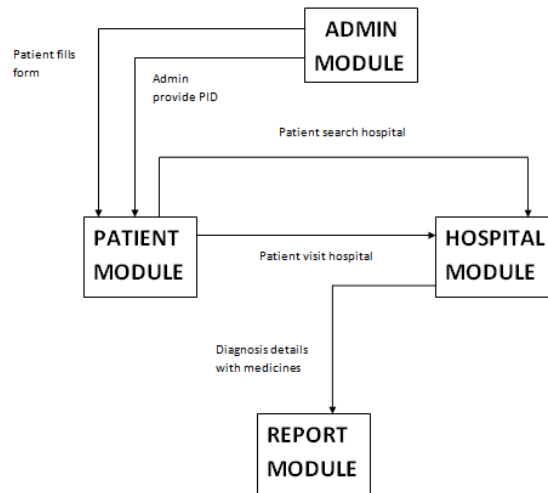


Fig 2. Main modules of System

Linear regression: Regression can be performed using many different types of techniques. One of the techniques is simple linear regression. In this study we used simple linear regression [9]. Simple linear regression fits a straight line through the set of n points in such a way, which makes the sum of squared residuals of the model as small as possible. The formula for Simple linear regression is:

$$y = c_0 + c_1x_1 + \dots + c_nx_n$$

By determining the regression coefficients, c_0, c_1, \dots, c_n the relationship between the output parameter y , and the input parameters x_1, x_2, \dots, x_n can be estimated. Regression can be used to perform classification using two different approaches:

1. Division: The data is divided into regions based on the class.
2. Prediction: Formulae are generated to predict the output class value.

The first case views the data as plotted in n-dimensional space without any explicit class values shown. Through regression, the space is divided into regions-one per class. With second approach, a value for each class is included in the graph and using regression, the formula for a line to predict class value is generated. In this study we used the first

$$L = \sum_{i=1}^n \epsilon_i^2 = \sum_{i=1}^n (y_i - c_0)^2$$

To minimize the error taking the derivative with respect to

c_0 and setting equal to zero we get

$$-2\sum_{i=1}^n y_i + \sum_{i=1}^n c_0 = 0$$

$y = c0 + \epsilon$, then the sum of the squares of the error is:

If the linear regression formula is

And solving for $c0$ we get,

$$c_0 = \frac{\sum_{i=1}^n Y_i}{n}$$

$$y = c0 + \epsilon$$

In this we found the value for $c0$, that is best partitioned medicine ratings, from which we differentiated between better and best medicine. These ratings are given by the doctors.

IV. EXPERIMENTAL RESULTS

The patient will register or if he has already registered then he will login. After that he fills the required information like his age, blood group, height, weight, symptoms he is suffering from.

Fig 3. Basic information of patient

Once he fills all the required information, our system will generate the probable disease the patient is suffering from, based on the symptoms entered by him and an appropriate medicine is suggested according to the ratings given by the doctors.

Fig 4. Result page

V. CONCLUSION

The proposed healthcare system serves various stakeholders of the healthcare domain. It focuses on the satisfaction level of the patients who utilize the services. The linear regression algorithm helps in suggesting the best medicines to the patients, from the list of medicines available. The proposed system is highly patient/ customer oriented. It will be easier for the patients to get the service without spending much money, or wait in a long queue to see the doctor, to get the medicines, to get the information about the best services available. The database is a relational database and the data is updated on regular basis. The proposed method can also be extended with features such as pharmacy details to check the availability of drugs, Live video calling of doctor and patient .

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