SMART HEALTHCARE SYSTEM
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Abstract - As we know that “Health is Wealth”, but due to the busy lifestyle, people don’t get enough time for health checkups and a healthy, nutritional diet. The existing approaches for healthcare have some limitations and focuses on only major diseases but common diseases are neglected and therefore in the proposed system the various concepts and methods of data mining are used like Association based rule mining and Apriori algorithm to consider the common disease. So putting this scenario in mind, we are introducing Smart Healthcare System, which serves the users by providing them the facility of calculating BMI, getting the diet charts depending on the BMI and also the facility of disease prediction, where the user will enter the symptoms and will get to know the probable diseases the user might be suffering from.

Keywords: Body Mass Index, Data Mining, Apriori, Healthcare, Disease, Disease Prediction Analysis.

I. INTRODUCTION
It happens many times with people that they are concerned about their health but they don’t get enough time in their daily life to visit a doctor or a dietician to get checked up and take necessary precautions to stay healthy. Keeping this scenario in mind, SMART HEALTHCARE SYSTEM is introduced which will serve the users and provide them a helping hand in taking these precautions and stay healthy. It uses the concepts of data mining. Data mining consists of Data, Information and Knowledge, where Data are any facts, numbers, or text that can be processed by a system. The technique used in the proposed system is predictive analysis because the diseases are predicted based on the symptoms entered.

II. LITERATURE SURVEY
The existing approaches more focuses on major diseases like Heart Diseases, Hypertension and Cancer but common diseases like fever, cold, malaria, jaundice, dengue, muscle ache etc. and for major diseases like cancer and heart disease, one cannot simply rely on system, doctor’s involvement is must.

V Krishnaiah1 has proposed Diagnosis of Heart Disease Patients Using Fuzzy Classification Technique [1] where the focus was to remove uncertainty of unstructured data, an attempt was made by introducing fuzziness in the measured data. The overall objective of the research work is to predict the heart disease patients with more accuracy which is useful for health care information systems.

G.Sumalatha has proposed Medical Data Mining And Analysis For Disease Dataset Using Classification Techniques[2] where survey on three different disease diagnosis are taken in to the consideration. This survey paper reveals various existing approaches that have processed for diagnosis these diseases using data mining techniques. Using classification technique the different diseases like diabetes, breast cancer & heart diseases can be treated.

Feixiang Huang, Shengyong Wang, and Chien-Chung Chan proposed Predicting Disease By Using Data Mining Based on Healthcare Information System [3] This system under-sampling technique is applied on the data sets as data analysis process to predict hypertension from patient medical records. They reported the experiments of applying data mining to disease prediction from a large number of real world medical records.

Anjana Gosain proposed Analysis of Health Care Data Using Different Data Mining Techniques [4], in this the objective was to: (1) present an evaluation of techniques such as decision tree and association rules to predict the occurrence of route of transmission based on treatment history of HIV patients. (2) Demonstrate that data mining method can yield valuable new knowledge and pattern related to the HIV patient; (3) assesses the utilization of healthcare resources and demonstrate the socioeconomic, demographic and medical histories of patient.

From the literature survey, it is observed that all the research papers are focused only on critical diseases, in which doctors help is crucial. None of the papers are focused on commonly occurring diseases that are often neglected. A system is proposed to overcome this drawback.

III. PROPOSED SYSTEM
People usually avoid going to the doctor or simply neglect it if they are suffering from diseases like fever, body ache, cold, nausea etc. thinking that these disease are not too critical to be worried about and will get cured on its own, taking its own time. But people are not aware of the fact that these not so critical diseases can later be converted into critical diseases to be worried about such as malaria. In malaria, the symptoms usually start by common fever and body ache, and the person suffering thinks that it is a common fever which will go away and avoids the doctor. But the fever later turns critical and the person is bound to visit the doctor and gets diagnosed by malaria. If the person had not neglected it, the diseases could have been diagnosed quite earlier. Keeping this scenario in mind, the Smart Healthcare System is proposed which focuses on such not so critical diseases which are usually neglected by people and provides them with the facility where they can get themselves diagnosed online and be aware about their health.

It includes following modules:

**Calculating BMI:** The basic parameters for calculating BMI are height and weight. The weight can be taken in pounds or kilograms, and the height can be taken in centimeters, meters, inches or feet-inches. The web-application will take these inputs from users and will calculate the BMI using the formulae given below and will provide the final result showing the BMI value and whether the user is underweight, normal, overweight or obese.

The BMI is calculated using the formula given below.

\[
\text{BMI} = \frac{\text{weight in kilograms}}{(\text{height in meters} \times \text{height in meters})}
\]

**BMI Chart:**

<table>
<thead>
<tr>
<th>Category</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>Below 18.5</td>
</tr>
<tr>
<td>Normal</td>
<td>18.5 - 25</td>
</tr>
<tr>
<td>Overweight</td>
<td>25.1 - 30</td>
</tr>
<tr>
<td>Obese</td>
<td>Above 30</td>
</tr>
</tbody>
</table>

Generating diet charts: Depending on the BMI value and the category, if the user requests, the web-application will generate a diet chart. Smart Healthcare System also has special diet chart for the people suffering from diabetes and blood pressure. The users suffering from diabetes and blood pressure will have to click on the yes button. Finally the diet charts will be provided on a button’s click.

**Disease Prediction:** If the user is unwell or suffering from some disease, and is unable to visit the doctor due to reasons such as lack of time, financial problem etc. In this case, the user can use our website where he will enter the symptoms and depending upon that, the website will show the possible disease that the user might be suffering from, along with the probability. The system will also predict that if the user is suffering from some more symptoms than that entered by the user, then the user might be suffering from some particular disease. Along with this, the web application will include a link that consists of the explanation about the diseases and the links of various medical websites and doctors for reference.

![Proposed System](image_url)

**Fig.1: Proposed System.**

**IV. ALGORITHM DETAILS**
The Smart Healthcare System falls under the Data Mining domain as lot of data regarding the diseases and its symptoms is stored into the database and then mined as and when requested or required.

**Data mining:** Data mining (sometimes referred to as knowledge or information discovery) is that the method of analyzing knowledge from totally different views and summarizing it into helpful information that may be accustomed to increase revenue, cuts costs, or both. Data processing software system is one in all variety of analytical tools for analyzing knowledge. It permits users to investigate knowledge info from many various dimensions, classify it, and summarize the relationships known. Information is the patterns, associations, or relationships among all this data that provides information and knowledge is the information that can be converted into knowledge about historical patterns and future trends.

**Predictive analysis:** Predictive analytics is the branch of the advanced analytics that is employed to create predictions concerning unknown future events. Predictive analysis uses many techniques from data mining, statistics, machine learning, modeling and artificial intelligence to analyze current data to make predictions about future. The patterns found in historical and transactional data can be used to identify risks and opportunities for future.

The analysis is done by Association based rule mining.

**Association based rule mining:** Association rule has 2 elements, associate antecedent (if) and a resultant (then). Associate in antecedent is an item found within the knowledge. A resultant is Associate in item that's found together with the antecedent. Association rules square measure created by analyzing knowledge for frequent if/then patterns and the standards support and confidence to spot the foremost necessary relationships. Support is a sign of however often the things seem within the info. Confidence indicates the amount of times the if/then statements are found to be true. In data processing, association rules area unit helpful for analyzing and predicting client behavior. They play a crucial half in supermarket information analysis, product bunch, and catalog style and store layout. Programmers use association rules to make programs capable of machine learning. Machine learning could be a form of AI that seeks to make programs with the power to become a lot of economical while not being expressly programmed.

Considering the following example: Consider a user A, if A wants to perform prediction analysis, A will be provided with a list of symptoms eg: S1, S2, S3, S4, S5.

If A selects S1 and S2, and if a particular disease has these two symptoms in common, then that particular disease will be shown as an output to the user.

But, if there are other symptoms along with S1 and S2, which were entered by the user for a particular disease, then the system will guide the user in knowing that, along with S1 and S2, if the user has this extra symptom, then the user might be suffering from that particular disease.

V. CONCLUSION AND FUTURE WORK

Smart Healthcare System makes people aware that common disease too can be turned into critical diseases, by enhancing their knowledge about the common diseases through diagnosis and the remedies of the diseases that can be treated at home. It also spreads nutritional awareness.

In future we would like to add more diseases for prediction and also to tie up with an insurance company for business purpose.

REFERENCES

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