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Physician Recommendation System Based on Predicted Disease by Using Apriori Algorithm

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ABSTRACT:-Web-based appointment systems are emerging in healthcare industry providing patients with convenient and diversiform services, among which physician recommendation is becoming more and more popular tool to make assignments of physicians to patients. Motivated by a popular physician recommendation application on a web-based appointment system in China, this paper gives a pioneer work in modeling and solving the physician recommendation problem. The application delivers personalized recommendations of physician assortments to patients with heterogeneous illness conditions, and then, patients would select one physician for appointment according to their preferences. Capturing patient preferences is essential for physician recommendation delivery; however, it is also challenging due to the lack of data on patient preferences. In this project, we formulate the physician recommendation problem based on which the preference learning algorithm is proposed that optimizes the recommendations and learns patient preferences at the same time. Since the illness conditions of patients are heterogeneous, the algorithm aims to make personalized recommendation for each patient.

KEYWORDS: Appointment, Disease Prediction, Recommendation, Apriori Algorithm, Preference Learning.

I. INTRODUCTION

The development of information technology has promoted a wide range of web-based applications, such as e-commerce, online booking of airline and hotel, as well as online services in healthcare industry. Well-known web-based or mobile-based healthcare applications include ZocDoc, Quest Diagnostics, as well as We Doctor and Hao DF in China, and these systems are gatherings of a huge number of resources, i.e., physicians, from different hospitals of different areas. According to someobservations in industry, patients are not able to find the most suitable physicians for their illness condition because of their lack of appropriate medical knowledge. To that end, physician recommendation becomes an effective tool on web- or mobile-based applications to assign adequate resources to patients, which are the motivation of this paper. Generally speaking, these applications provide appointment services to patients through physician assortment recommendations fromwhich patients select one for medical services. Specifically, to start with the service, patients need to first select the favoured hospital location, appointment time.

II. PROBLEM STATEMENT

AnIntelligent system for disease diagnosis plays a major role in a controlling the disease and maintaining the good health status. This paper aims to provide accurate and trustworthy disease prediction analysing symptoms of patients. Early detection of diseases can decrease the mortality and overall complications. We can predict the occurrence of the disease and safe guard people. Then, we will recommend physicians to book appointment for further proper treatment.

III. MOTIVATION

In this epidemic, staying healthy is everyone's priority. Today, there are numerous sources available as individual prediction or recommendation system but the need of the moment is to have an integrated framework comprising both. So, patient can choose doctor according to diseases and nearby location with qualification and experience. This can reduce patient's time and cost to visiting hospital again and again.

IV.RELATED WORK

In [1], the authors propose an ontology, called Generic Human Disease Ontology (GHDO), which

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deals with the knowledge about human diseases with their types, causes, symptoms and treatments.
In [2], the authors have tried to develop the system using artificial intelligence to identify the cause of the headache based on the data input by the patient.
Shengyong W. et al [3], Predicting Disease by using data mining based on healthcare information system, describes the experiments of applying data mining to disease prediction from a large number ofreal-world medical records of hypertension.

V. PROPOSED WORK

A smart system for precise disease prediction and physician recommendation is useful for effective diagnosis as well as treatment. This model determines symptoms of users and predicts the most accurate disease accordingly. Based on the prediction, system recommends the hospital/clinics. In this project, we presented the physician recommendation problem in the Web based appointment system and studied patient preference learning methods. We proposed a preference learning algorithm that delivers personalized physician recommendation based on the continuously learned patient's preference.

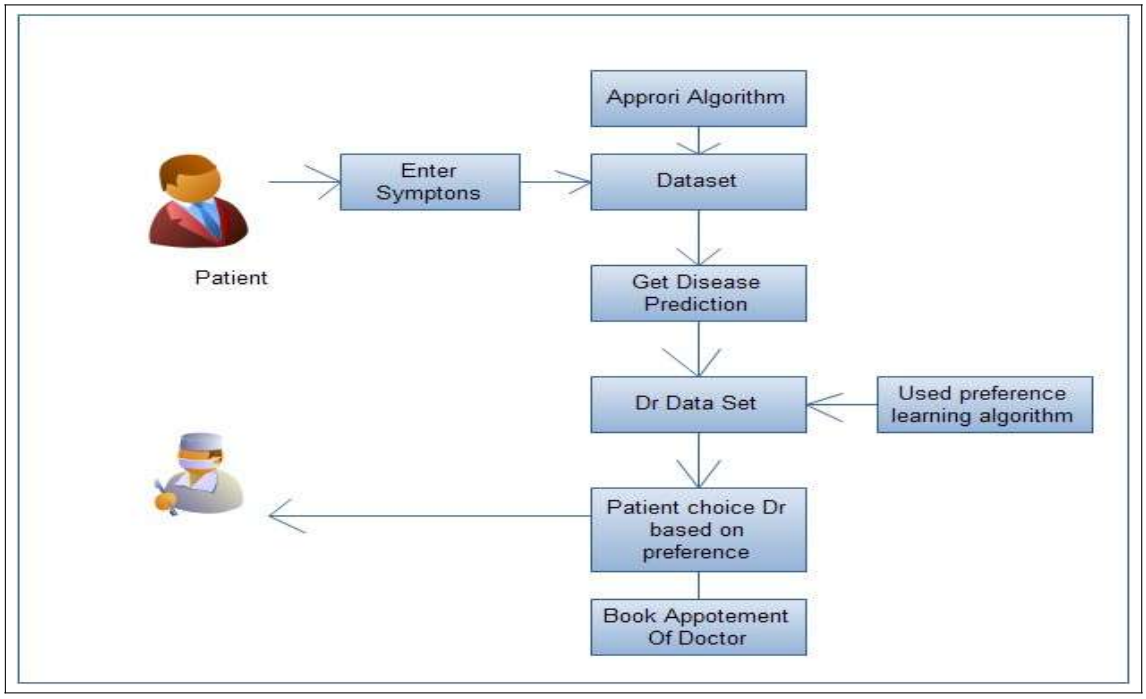

Figure 1: System Overview Diagram

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VI. IMPLEMENTATION OF ALGORITHM

- **Preference Learning:**

Preferencesdefineacentralconceptinhumandecision makingandhave,thus,recentlyinspiredthedevelopm entofpreference centeredcomputationalsystems.Preferencedatahas beengenerated fromaincreasingnumber ofdisciplines thatinvestigatepreferencehandlingandpreferencele arning(PL)includingartificialintelligenceandmachi nelearning(ML),decisionsupportsystems,marketin gre-search,operationsresearch,economicsandhumanco mputerinteraction.Giventheincreasingimportancea ndavailabilityofpreferencedata,theseveralbenefitso fdatacollectionprotocolsbasedonpreferencesandra nksandtheadvantagesofPLoveranyothermachinelea rningmethodswhenordinaldataistreated,preference learningnowadaysdefinesonethekeymachinelearni ngsubareas.TofacilitatethebroaduseofPLalgorithm sandmethodsamongMLresearchers,students,educa torsandpractitionersthispaperintroducestheopen-sourcePreferenceLearningToolbox(PLT)2.

- **Apriori Algorithm:** The Apriori Algorithm is a significant algorithm for mining frequent item sets for Boolean association rules. Apriori uses a" bottom up" approach, where frequent subsets

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compute one item at a time, this step is known as candidate generation, and groups of candidates are tested beside the data. The support of an itemset is the share of transaction in the database in which the item X appears. It signifies the popularity of an itemset. First it creates a frequency table of all the occurrences that take place in all the transactions. Then only those elements are significant for which the support is greater than or equal to the threshold support. The next step is to make all the possible pairs of the significant items keeping in mind that the order does not matter. After which we count the occurrences of each pair in all the transactions. Only those item set are considered which cross the support threshold.

Symptoms: Fever, erythema, chill, pruritus, Unsteady gait, Fatigue,Hoarseness, weight gain, Indigestion and difficulty in swallowing, unusual vaginal bleeding, unexpected weight loss, night sweats or fever, Increased thirst, frequent urination, extreme hunger, urine, fatigue, irritability.

Table 1: Input Attributes

VII. RESULT

We have used Apriori algorithm and preference learning to develop a system that predicts probable diseases based on patient symptoms as observed which results in better diagnosis and further treatment. This system was designed and implemented by analyzing the dataset. After implementing various supervised machine learning algorithms on the dataset, Apriori algorithms showed better results as compared to k-nearest neighbors and Decision Tree algorithms which showed relatively poor performance. Hence final system was designed through the implementation of Apriori algorithms that were finally used for disease diagnosis. Shown below is the table of the set of symptoms, diseases and the probability of the occurrence of the predicted disease. Based on the analysis we can say that Apriori algorithm is giving better results as the algorithm is based on frequent item dataset. Moreover, it gives us probability of symptom corresponding to all the disease. In that way a person will be able to know if he/she is having more than one disease.

Table 2: Symptoms, Diseases and Probability of the occurrence of the predicted disease, with the algorithms.

DISEASES	SYMPTOMS	PROBABILITY OF APRIORI ALORITHM
VIRAL INFECTION	Fever, erythema, chill, pruritus	100
HYPHOTHYROIDISM	Unsteady gait, Fatigue, Hoarseness, weight gain.	100
CANCER	Indigestion and difficulty in swallowing, unusual vaginal bleeding, unexpected weight loss, night sweats or fever.	100
DIABETES	Increased thirst, frequent urination, extreme hunger, urine, fatigue, irritability	100

VIII. CONCLUSION

In this project, an analytical model of primary care delivery with e-visits is developed. Formulas to evaluate the mean and variance of lengths of visit for both the office and e-visit patients are derived. Three scheduling policies coordinating the office and e-visits are compared and the impact of e-visit on primary care delivery is investigated. This model provides a quantitative tool for primary care physicians and clinic managers to apprehend e-visit and design effective care delivery policies.This system can further be improved by incorporating various other symptoms.

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