International Journal of Research in Engineering, Science and Management
Volume-2, Issue-6, June-2019
www.ijresm.com | ISSN (Online): 2581-5792

Smart Health Care Prediction System

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***Abstract*: In medical and health care areas, due to rules and due to the availability of computers, a large amount of data is becoming available. A key objective is to assess the data mining techniques in the clinical and healthcare application to develop a proper decision. Data Mining is one of the most moving areas of research that is become increasingly popular in health organization. Mining plays an important role for finding new trends in healthcare organization which in turns helpful for all the parties associated with this field. In this paper, we used some advanced techniques for improving basic Naive Bayes classifier i.e. Naive bayes classifiers with laplace smoothing are collection of classifications algorithms based on Bayes Theorem. The system allows user to share their symptoms and issues. Here we use some intelligent data mining technologies that help us to accurately predict the illness associated with patient's symptoms. The patient can easily diagnose the disease by solving their problems using systems.**

***Keywords*: Data mining, Naïve Bayes, Laplace smoothing, Clinical Predictions.**

1. Introduction

Data Mining is one of the most important and inspiring research area for exploring meaningful information from huge datasets. Era Data Mining in healthcare field becoming popular because of the efficient analytical methods require to find unknown and valuable information in the health data field. In health industry, Data Mining provides several benefits such as detection of the fraud in health insurance, availability of medical solution to the patients at lower cost, detection of causes of diseases and identification of medical treatment methods. It also helps the healthcare researchers for making efficient healthcare policies, constructing drug recommendation systems, developing health profiles of individuals etc. It may have happened that you will need help of doctor immediately, but they are not available for some reason. The HealthCare Prediction system is an end user support and online maintenance project. Here we propose a system that provide the user with immediate guidance on their health issues, which are online through an intelligent healthcare system. The system has been related to various symptoms and the disease or diseases related to that symptoms. The system permits user to share their symptoms and issues. After that, the user symptoms are examine by various diseases related to them. Here we use some intelligent data mining techniques to guess the most accurate disease that could be related with patient's symptoms. Data mining has introduce a variety of technologies that will overcome this problem and help to focus on health and work at same time. If the system is unable to provide suitable results then it informs the user about the type of disease it feels user's symptoms are associated with. If user's symptoms are not fully compatible with any of data with our database, then this indicates that the virus may tested by its symptoms. It also has contact with doctor address, Feedback for system operation and contact with administrator dashboard for system operations.

2. Related work

Divya Tomar and Sonali Agarwal have presented a brief introduction of data mining techniques such as classification, clustering, association, regression in health domain and their advantages and disadvantages. This survey also highlights applications, challenges and future issues of Data Mining in healthcare. The various results produced by implementing the Naive Bayes algorithm of Association technique.

The focus of this paper is to provide definite information about public chronic diseases. They have built a prototype to show the efficiency of these methods which will inform users about the disease they are suffering from. It predicts probable diseases by mining data sets and provides suggested doctors and remedial solutions. The importance of data mining using medical data then discussion of general data mining techniques has been presented. Furthermore, methodology describes the conceptual model for the extraction of rules on medical databases finally result can guide the relationship between the different attributes presented in the data. In this regard, they applied FP growth algorithm for extracting rules from the medical data. Medical data mining has been a popular data mining topic of late. Naive Bayes classifier has gained wide popularity as a probability-based classification method despite its assumption that attributes are conditionally mutually independent given the class label. This paper makes a study into discretization techniques to improve the classification accuracy of Naive Bayes with respect to medical datasets.

3. Proposed methodology

To overcome the drawback of existing system we have developed smart health Care prediction System. The system design of the proposed system is shown in Figure:

Fig. 1. Proposed System

A. Admin module

- *Admin Login:* Login to the System using administrator ID and Password.
- *Add doctor:* administrator can add to doctor related diseases.
- View Patient details: Administrator can see the system that uses it..
- *View Feedback:* Administrator can view feedback given by patients.

B. Patient module

- *Patient Login:* Patient Log in to the system using patient ID and Password.
- *Patient Registration:* If Patient is a new user he will enter his personal details for registration and he will get a user Id and password which he can log in to the system.
- *Disease Prediction:* Patient will specify the symptoms caused due to his illness. The system will ask certain questions regarding his illness and then predict the disease based on the symptoms specified by patient and the system will also suggest doctors based on the disease.
- *Search Doctor:* Patient can search for doctor by specifying name, address or type.
- *Feedback:* Patient will give feedback this will be reported to the admin.

C. Doctor module

- *Doctor Login:* Doctor will access the system using his User ID and Password.
- *Patient Details*: Doctor can view patient's personal details.
- *Notification:* Doctor will get notice about how many people have accessed to the system and predicted by the system.

4. Algorithm

The proposed system uses data mining technique "Naïve Bayes classifier" for the creation of the futuristic system. This system contains large amount of data sets and features that are directly collected from doctor's information as per accurate estimation of disease. "Naive Bayes or Bayes" Rule is the base for many machine learning and data mining methods. Naive Bayes is an algorithms based on applying Bayes theorem with a strong assumption, each feature is independent of the others to redeem the given range of sample. They are potentially classified, so the probability of each range will be measure using bayes theorem and the output will be output with high probability. Naive Bayes classifiers have been successfully applied to many domains. One solution could be laplace smoothing is the technique to stick specific data. A short-sample correction, or pseudo-count, will be included in each possible estimate. This is a way of regularizing Naive Bayes, and when the pseudo-count is zero it is called Laplace smoothing. Bayes' Theorem is useful to handle the conditional probabilities, because it provides us with way to reverse it. Baye's therom is,

$$P(H|X) = \frac{P(X|H)\times P(H)}{P(X)}$$

Where,

- P(H|X) is the posterior probability of class (target) given predictor (attribute).
- P(H) is the prior probability of class.
- P(X|H) is the probability of predictor given class likelihood.

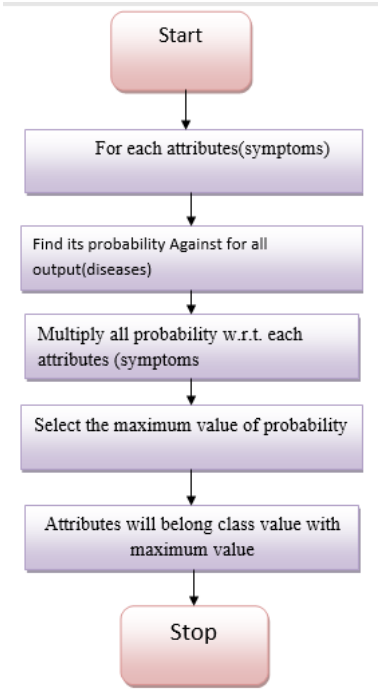

Fig. 2. Naïve Bayes Algorithm

This problem is problematic when frequency-based probability is zero, because it looses all the information in the other probabilities for this and it need to be resolve. A solution

would be Laplace smoothing, which is a method for smoothing categorical data. A small-sample correction, or pseudo-count, will be included in every probability estimate. Accordingly, no probability will be zero. this is a way of standardizing Naive Bayes, and when the pseudo-count is zero, it is known Laplace smoothing.

$$\hat{\theta}_i = \frac{x_i + \alpha}{N + \alpha d} \qquad (i = 1, \ldots, d),$$

where the pseudo-count $\alpha > 0$ is the smoothing parameter ($\alpha = 0$ corresponds to no smoothing). Additive smoothing is a type of shrinkage estimator, as the resulting estimate will be between the empirical estimate xi / N, and the uniform probability 1/d. Using Laplace's rule of succession, some authors have argued that α should be 1 (in which case the term add-one smoothing is also used).

How Naive Bayes algorithm works?

Below training data set of Symptoms and corresponding target Diseases (suggesting possibilities of diseases). Now, we need to classify whether symptoms will occurs or not based on symptoms. Let's follow the below steps to perform it.

Step 1: Convert the data set into a frequency table

Step 2: Create Likelihood table by finding the probabilities like Overcast probability and probability diseases

Step 3: Now, use Naive Bayesian equation to calculate the posterior probability for each class. The class with the highest posterior probability is the result of prediction.

5. Result and Discussion

A. *Dataset used*

This dataset contains data for diseases and Symptoms. There are Set of Six Symptoms which is related disease in given dataset.

Table 1
Dataset

Sym1	Sym2	Sym3	Sym4	Sym5	Sym6	Disease
pain chest	shortness of breath	asthenia	nausea	syncope	vertigo	hypertensive disease
pain chest	shortness of breath	asthenia	polyuria	mental status changes	rale	diabetes
pain chest	shortness of breath	sweating increased	angina pectoris	hypokinesia	orthopnea	coronary heart disease
pain chest	shortness of breath	sweating increased	chest discomfort	syncope	worry	hypercholesterolemia
pain chest	shortness of breath	neck stiffness	wheezing	hypoxemia	productive cough	embolism pulmonary
pain chest	shortness of breath	hypokinesia	weight gain	syncope	rale	cardiomyopathy
pain chest	shortness of breath	catatonia	overweight	ecchymosis	mood depressed	obesity
pain chest	shortness of breath	sweating	angina pectoris	asymptomatic	rale	ischemia
pain chest	shortness of breath	sweating	cough	orthopnea	palpitation	paroxysmal dyspnea
pain chest	shortness of breath	fever	hyperkalemia	gravida	bleeding of vagina	kidney disease
pain chest	shortness of breath	sweating increased	dizziness	hypokinesia	giddy mood	hyperlipidemia
pain chest	asthenia	sweating increased	constipation	nausea	palpitation	gastroesophageal reflux
feeling suicidal	weepiness	mood depressed	unable to concentr	homelessness	sleeplessness	depressive disorder
feeling suicidal	agitation	mood depressed	irritable mood	homelessness	blackout	paranoia
fever	pain	chill	cough	diarrhea	swelling	infection

B. *Result of prediction of disease*

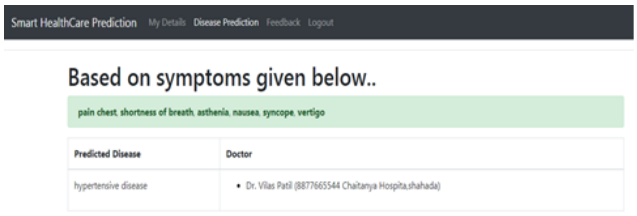

Fig. 3. Prediction of disease

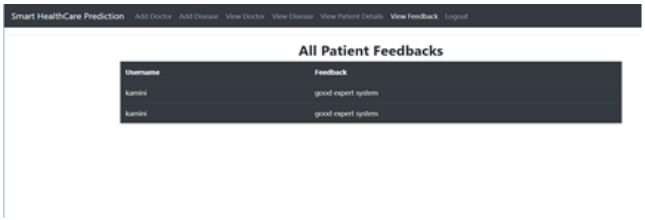

Fig. 4. Feedback of patients

6. Conclusion

This paper presents a new framework for analyzing and estimating diseases-based on symptoms. Occasionally, there is situation that helps you instantly when you need a doctor, but they not available for some reason. Our purpose is to provide new healthCare prediction system, which is an online system, and different patients at any locations can view it. We have come to the conclusion that using data mining technique including Naïve Bayes algorithm with Laplace smoothing, we can predict disease that might happen on basis of given symptoms by patient which they feel. This system will be able to predict disease and Recommend doctors related to diseases near their location in emergency time.

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