Medicine Recommendation System

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Abstract- *Nowadays people are progressively started caring about the health and medical diagnosis problems. However, according to the administration's report, more than 1 crore people every year die due to medication error done by novices(New doctor's) . More than 42% medication errors are caused by doctors because they provide prescriptions according to their experience which are quite limited. And sometimes they have left many parts of the book they have read Technologies as data mining and recommender technologies provide possibilities to explore potential knowledge from diagnosis history and help the doctors to prescribe medication correctly to decrease the medication error. In this recommendation we will design and implement a universal medicine recommender system framework that applies data mining technologies to the recommendation system. The medicine recommender system consists of database system module, recommendation model module, model evaluation, and data visualization module. We investigated different medicine recommendation algorithms which are generally used in recommendation system SVM (Support Vector Machine), BP neural network algorithm and ID3 decision tree algorithm based on the diagnosis data. Each algorithm are checked to get better performance. Finally, in the given open data set, SVM recommendation model is selected for the medicine recommendation module to obtain a good trade-off among model accuracy and model efficiency, Experimental results shows that our system will be able to give proper medication recommendation*

1. INTRODUCTION

Health related information is one of the most widely concerned topics on the Web. A survey in 2013 by the Pew Internet and American Life Project found that 59% of adults have looked online for health topics, and with 35% of respondents focusing on diagnosing a medical condition online Behind the data, we find that more and more people are caring about the health and medical diagnosis problem. However, there are still many people losing their lives due to medication errors. According to the administration's report, more than 200 thousand people in China, even 100 thousand in USA, die each year due to medication errors. More than 42% medication errors are caused by doctors because experts write the prescription according to their experiences which are quite limited there are some facts that may lead to these issues:

(i) many hospitals lack either doctors or medical experts for critical illness

(ii) expert diagnosis is mainly depended on the expert's experience, especially for those inexperienced novices, which are hard to avoid mistakes Hospital Information System (HIS) generates massive data,

(iii) How to discover potential and useful knowledge from the diagnosis case data is a big challenge. Data mining and recommender technologies represent a promising direction to solve these challenging problems. We introduce a universal medicine recommender system framework that is designed and implemented to apply data mining technologies to recommendation systems that use the potential knowledge hiding in medical records to decrease medical errors. The medicine recommender system consists of database system module. As more people are caring about the health and medical diagnosis problems so here we decided to focus in this area and to create something which would help the people in this field so we thought to create a website through which the user as well as the doctor will be able to search for the different options of medicines for the same diseases using different Data Mining techniques "Medicine Recommender System" it will also help chemist or nurses to recommend a medicine in the absence of doctor. The basic aim of Medicine Recommendation System is to design an effective and accurate system for predicting proper medication for patients. As large amount of historical data is available, our system aims to exploit this data and make it useful for society. Our system will analyze the data and aim to provide accurate predictions of medicines

2. LITERATURE REVIEW

Recommender systems aim to provide users with personalized products and service to deal with the increasing online information overload problem. Various recommender system techniques have been proposed since the mid-1990s, and many sorts of recommender system software have been developed recently for a variety of applications.

Most of the recommender technologies are applied to the e- government area, e-business area, e-commerce/e-shopping area, e-learning area, e-tourism area and so on. However, medicine area includes rare recommender technologies, and this will focus on the design of the medicine recommender system and mining knowledge from medical case data Commonly used recommendation techniques include collaborative filtering (CF), content-based (CB),knowledge-based (KB) techniques and hybrid recommendation technologies. Each recommendation technology has advantages and limitations: CB mainly generates recommendations by using traditional retrieval methods and machine learning methods, but CB has overspecialized recommendations; Collaborative filtering (CF)-based recommendation techniques help people to make choices based on the opinions of other people who share similar interests, while CF has sparseness, scalability and cold-start problems. Knowledge-based (KB) recommendation offers items to users based on knowledge about the users, items and/or their relationships. Usually, KB recommendations retain a functional knowledge base that describes how a particular item meets a specific user's need. To achieve higher performance and overcome the drawbacks of traditional recommendation techniques, a hybrid recommendation technique that combines the best features of two or more recommendation techniques into one hybrid technique has been proposed. When it comes to a new application area, a new recommendation framework is necessary to solve these problem. Intelligent medical diagnosis has get more and more concern. Some selected techniques for data mining in medicine are discussed in. Data mining technology has been used to predict heart disease, and to diagnosis thyroid diseases. The workshop on health search and discovery discusses several challenges and important topics about search and discovery in the medical domain, indicating that information retrieval, personalization, expertise modeling, data mining and privacy preservation are critical to enable advances in health and discovery. These approaches do solve some problems in medical diagnosis and apply new data- driven technologies to the medical field. However, there does not exist a universal model which can 14 work well for all the data and conditions. When faced with different data and application scenarios, it is necessary to build a different model and conduct data analysis. In this paper, we introduce a universal medicine recommender system framework that is designed and implemented to apply data mining technologies to the recommender system that use the potential knowledge We investigate the medicine recommendation algorithms of the SVM (Support Vector Machine), BP neural network algorithm and ID3 decision tree algorithm based on the diagnosis data. Finally, SVM is selected for the medicine recommendation model for its high accuracy, good efficiency and scalability

3. PROBLEM DEFINATION

Medicine recommendation is one of the most important and challenging tasks in the modern world. As there are many new diseases which are discovered by the doctors Sometime a medicine for one diseases can lead to the side- effects which can further lead to the discovery of new diseases. Our goal is to build such a recommendation model which will help the doctors to prescribe a medicine to the patient t even if they have not studied about that before the doctor has to open the framework and has to search about the diseases of the patient it will also help to the inexperienced doctors and patients for using the right drugs high accuracy and efficiency is very critical for such a recommender system

4. SYSTEM ARCHITECTURE

4.1 Interfaces:

There is a single type of interface as such supported by our system namely

User Interfaces:

The product will exist on a real-life system. The Interface will be a simple and easy to use interface. The user needs to give input of the diseases which they are looking for after that the medicine will be predicted according to the diseases entered the result box will display the result of the fired query.

Hardware Interfaces:

The system has minimal Hardware interfaces. A normal personal desktop or a laptop will be a good choice to run the system. It is recommended for the system to have higher ram and processing power in order to compute and predict quickly.

Software Interfaces:

To apply machine learning i.e. Neural Networks a library known as Tensor Flow must be imported in python.in addition another similar library known as Keras is also imported for supporting machine learning algorithms. Other supporting libs are Pandas, NumPy, SKlearn etc. library known as matplotlib is used to plot the data into graphical form. Pycharm or Jupyter Notebook is used to run the algorithms

Problem Statement:

Medicine recommendation is one of the most important and challenging tasks in the modern world. As there are many new diseases which are discovered by the doctors Sometime a medicine for one diseases can lead to the side-effects which can further lead to the discovery of new diseases. Our goal is to build such a recommendation model which will help the doctors to prescribe a medicine to the patient t even if they have not studied about that before the doctor has to open the framework and has to search about the diseases of the patient it will also help to the inexperienced doctors and patients for using the right drugs high accuracy and efficiency is very critical for such a recommender system

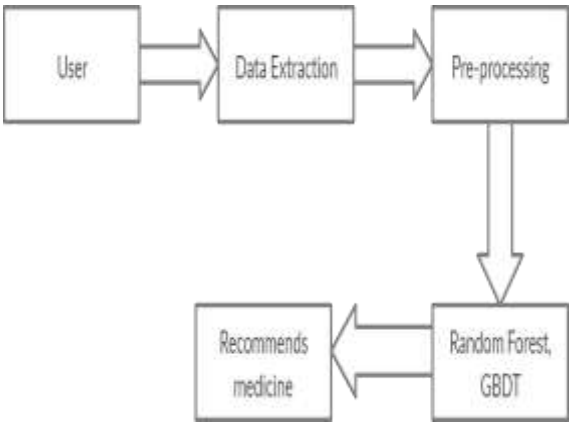


Fig -1: System Architecture of Medicine

5. System Analysis and Design

The data for the medicine is very huge and consist various parameters the data has been segregated according to the diseases the data indicates medicine along with the reviews of the patient who used it this data was used to train the model and predict the medicine using machine learning algorithms.

Graphical User Interface: The medicine recommender System takes the input from the user about the diseases user is feeling after that it will give different medicines that can be used to cure the diseases

Reliability & Availability: Our system will be highly available as it does not use any internet or cloud technology. Our system relies on the data that is pre- stored and doesn't require to be connected to third party for resources.

Performance: The performance of our system is high as compared to other models. We have an accuracy of around 70-75 % which is more than any other algorithm that is used.

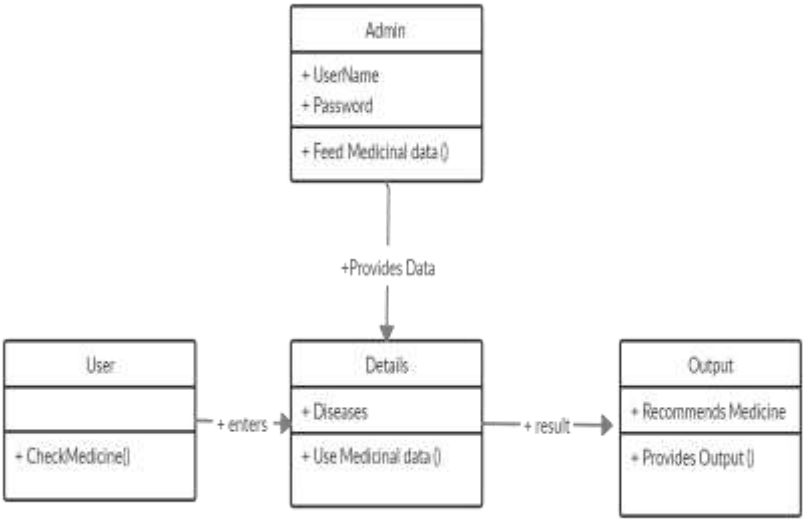


Fig -2: System Architecture of Medicine

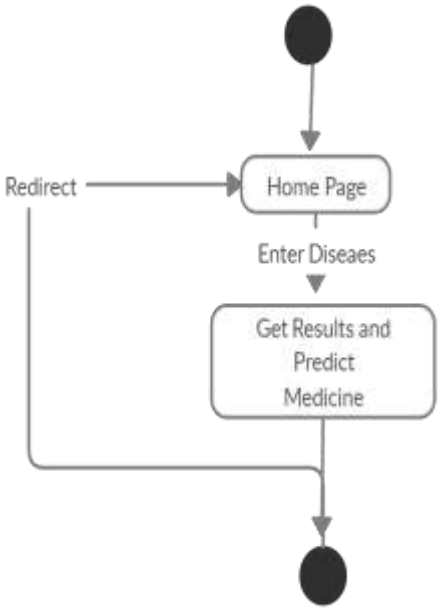
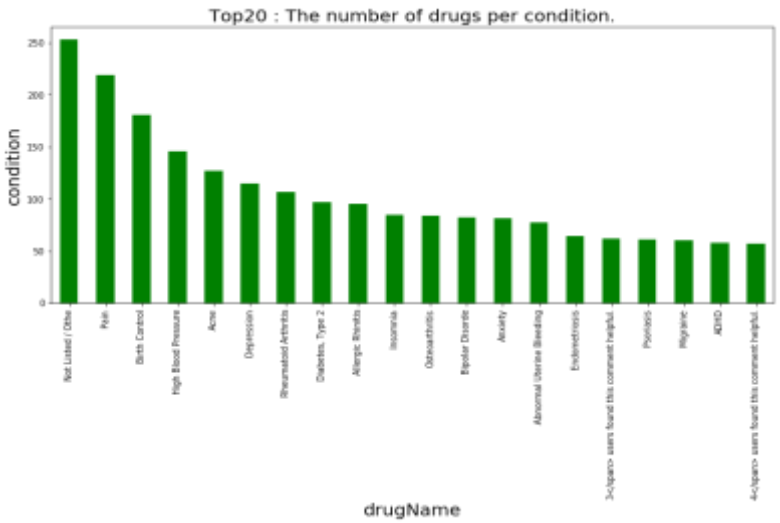


Fig -3: System Architecture of Medicine

6. RESULTS

.● **TensorFlow** – TensorFlow takes input as a multi- dimensional array, also known as tensors. You can construct a sort of flowchart of operations (called a Graph) that you want to perform on that input. The input goes in at one end, and then it flows through this system of multiple operations and comes out the other end as output. This is why it is called TensorFlow because the tensor goes in it flows through a list of operations, and then it comes out the other side. TensorFlow is the best library of all because it is built to be accessible for everyone. TensorFlow library incorporates different API to build at scale deep learning architecture like CNN or RNN. TensorFlow is based on graph computation; it allows the developer to visualize the construction of the neural network with Tensor board. This tool is helpful to debug the program. Finally, TensorFlow is built to be deployed at scale. It runs on CPU and GPU.

● **Keras, NumPy & Pandas** - Keras is a high-level neural networks API, written in Python and capable of running on top of TensorFlow, CNTK, or Theano. It was developed with a focus on enabling fast experimentation. Being able to go from idea to result with the least possible delay iskey to doing good research. NumPy is an open source Python library used for scientific computing and provides a host of features that allow a Python programmer to work with high-performance arrays and matrices. In addition, pandas s a package for data manipulation that uses the Data Frame objects from R (as well as different R packages)



7. CONCLUSION

We devise a universal medicine recommender system framework that applies data mining technologies to the medical diagnosis, which consists of database system module, data preparation module, recommendation model module, model evaluation model, and data visualization module. And we give a concrete implementation of each module based on an open dataset. Experiments are done to evaluate the models, finally, SVM is selected for the medicine recommendation model for its high accuracy, good efficiency and scalability in this open dataset. In consideration of the safety of the patient, we also proposed a mistaken-check mechanism that ensures the safety and the quality of service. In future work, we plan to build our own recommendation model to improve the accuracy and efficiency of model further. We also plan to apply Map Reduce parallel technologies to our medicine recommender system to enlarge the ability of processing big diagnosis data.

8. REFERENCES

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