A Project report on

Sentimental Analysis of drug reviews using Machine Learning

A Dissertation submitted to JNTU Hyderabad in partial fulfillment of the academic requirements for the award of the degree.

Bachelor of Technology

in

Computer Science and Engineering

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CERTIFICATE

This is to certify that the Major Project Phase-1 report entitled **"Sentimental Analysis of drug reviews using Machine Learning"** being submitted by B.Navya (19H51A0564), D.Sai Prasanna (19H51A0567), M.Bhavesh (19H51A0579) in partial fulfillment for the award of **Bachelor of Technology in Computer Science and Engineering** is a record of bonafide work carried out his/her under my guidance and supervision.

The results embodied in this project report have not been submitted to any other University or Institute for the award of any Degree.

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ABSTRACT

Since coronavirus has shown up, inaccessibility of legitimate clinical resources is at its peak, like the shortage of specialists and healthcare workers, lack of proper equipment and medicines etc. The entire medical fraternity is in distress, which results in numerous individual's demise. Due to unavailability, individuals started taking medication independently without appropriate consultation, making the health condition worse than usual. We studied the existing systems in detail.The existing systems that we studied are Stacked Artificial Neural Network drug recommender, Ontology based drug recommender,Mobile Drug recommender.All the three existing systems studied use different algorithms. We compared the existing systems based on various criteria.They are based on the algorithms used, their vectorisation techniques etc.The demerits that we identified in the existing systems are that they did not predict the medicine for the complex diseases, they did not take the reviews from patient,they did not detect the sentiment of the patients views. So, in our proposed model Sentimental Analysis of drug reviews using Machine Learning we will overcome the mentioned demerits found in existing systems.

CHAPTER 1

INTRODUCTION

CHAPTER 1
INTRODUCTION

1.1 Problem Statement

The importance of online recommender systems for drugs, medical professionals, and hospitals is growing. Today, the majority of people use online consultations for drug recommendations for all types of health issues. Emergencies such as pandemics, floods, or cyclones can be helped by the medical recommender system. In the era of machine learning, recommender systems produce more accurate, quick, and reliable clinical predictions with minimal costs. These systems maintain better performance, integrity, and privacy of patient data in the decision-making process and provide precise information at any time. Therefore, we will develop a drug recommendation system to improve the fairness and safety of treatment for infectious diseases.

1.2 Research Objective

The goal of this drug recommendation system is to examine the dataset using sentiment analysis and recommend drugs based on the condition, ratings and reviews using Machine Learning approaches for various health conditions of a patient.This system is very essential in this fast growing technological world, which can save lives by helping doctors.

1.3 Project Scope and Limitations

The function of drug recommender systems is to provide recommendations based on recorded information on the users preferences. These systems use information filtering techniques to process information and provide the user with potentially more relevant drugs.

- To develop a drug recommending system that suggests a medicine to the patient.
- The accuracy must be more than the existing drug recommending systems.
- We propose a drug recommendation system using machine learning that prescribes drugs to the patient based on previous medical records of stored data.

The limitations are as follows:

- Data that is required to train the system must be collected frequently as per the changes.
- The data set does not contain the details of all existing diseases.
- The sentimental analysis cannot completely replace the understanding of reviews.

CHAPTER 2

BACKGROUND WORK

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BACKGROUND WORK

2.1. ANN drug recommending system

2.1.1. Introduction

Drug recommender systems with an artificial neural network (ANN) model is used to improve the fairness and safety of treatment for infectious diseases. To reduce side effects, drugs are recommended based on a patient's previous health profile, lifestyle, and habits. A system such as this could be useful in recommending safe medicines to patients, especially during health emergencies.The fair drug recommendation system takes into account health conditions, preferences, race, and gender. Based on the weighted binary singular value decomposition, a stacked ANN is proposed.

2.1.2. Merits, Demerits and Challenges

- **Merits**
  - Easy to use.

- **Demerits**
  - There exists a propagation delay.
  - The overall accuracy, completeness, and consistency of data is very less.
  - Error rate increases with increase in hidden layers.

- **Challenges**
  - Collecting enormous data to produce desired results.

2.1.3. Implementation of ANN drug recommending system

Input: Patient data

Output: Recommended drug

1. Categorize the users according to the filtered features, and cluster all the individuals that have the same features.

2. Selection of the similar cluster individuals to the active individual

3. Calculate the drug features (i.e., dosages, tolerance, smell, gas generation) of the active individual by considering the health status and the user preferences.

4. Generate recommendations by calculating the individual's health status.

5. Store the list of the recommended drugs upon the acceptance of the user. If the individuals reject the list of drugs and dosages, provide them with the alternative list of drugs and dosages which has been followed by similar individuals who have been assessed using the drug recommendation algorithm.

6. Generate the list of recommended lists of drugs and dosages based on the individual's health status, lifestyle, and individual preferences.

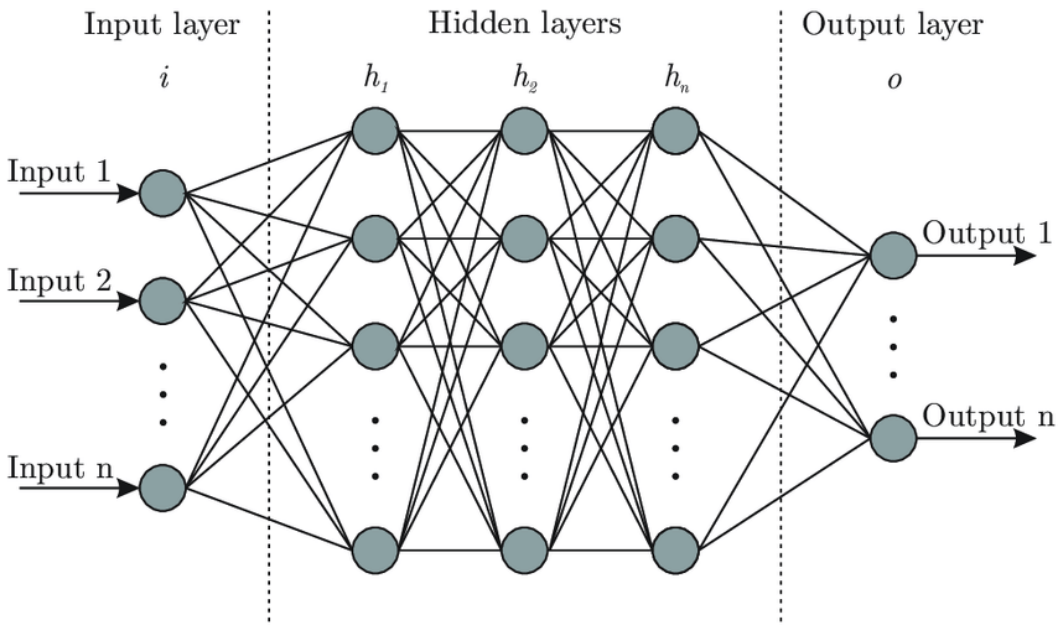

Fig 2.1: Stacked Artificial Network structure

2.2. Ontology based drug recommendation

2.2.1. Introduction

Ontology based drug recommendation systems are developed using ATC codes,indications,contra-indications,situations to predict the drug for the patient.It is an online service where a user can query the drug database and get information on available drugs that are found in the market, e.g. indications, recommended dosage, excipients, interactions, adverse effects, etc, where all the latter are related to the drugs active substances.

2.2.2. Merits, Demerits and Challenges

- **Merits**
    - It uses a unique code assigned to a medicine according to the organ or system it works on and how it works by World Health Organization.
    - It uses a knowledge base.
    - It delivers the result quickly.

- **Demerits**
    - ATC codes are not given to all the existing diseases.
    - Network configuration, setup, deployment complexities are higher.
    - The query time is more than 5 milliseconds.

- **Challenges**
    - Medical knowledge integration and reusability must be well aware by the developers.
    - After the definition of the domain ontologies and the core ontology, an appropriate rule base for indications and contraindications are to be defined.

2.2.3. Implementation of Ontology based drug recommendation .

This project outcome presents a semantic-enabled online service, capable of offering real time drug-drug and drug-diseases interaction discovery. For enabling this kind of service, medical information and terminology had to be translated to ontological terms and be appropriately coupled with medical knowledge of the field. International standards such as the aforementioned ICD-10 and UNII, provide the backbone of the common representation of medical data, while the medical knowledge of drug interactions is represented by a rule base which makes use of the aforementioned standards. Details of the system architecture are shown below. This system is developed using a traditional business logic rule engine.

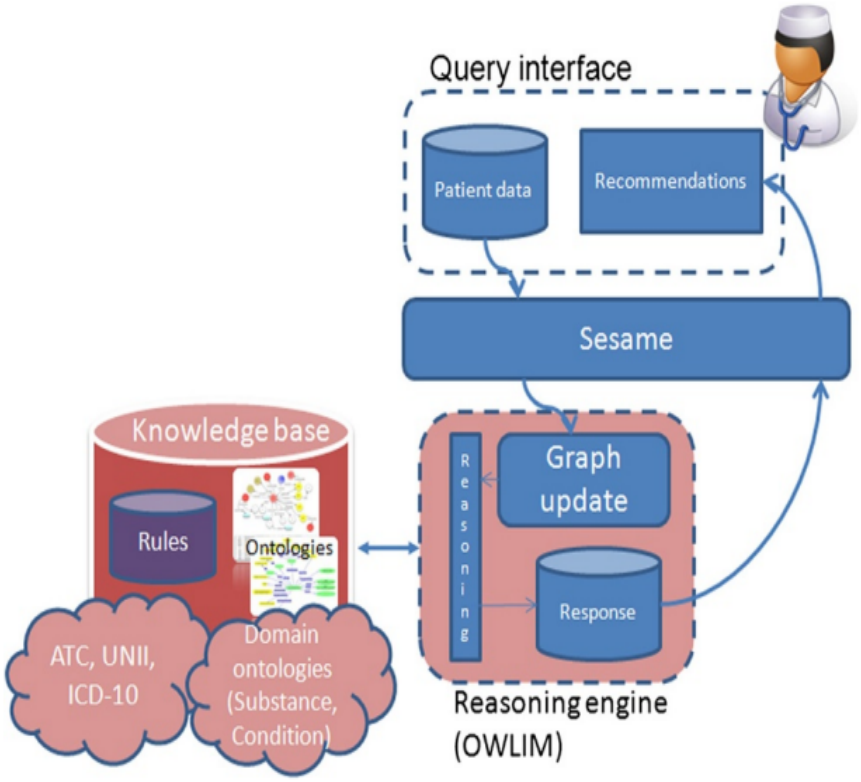

Fig 2.2:Implementation of Ontology based drug recommendation system

2.3. Mobile drug recommender

2.3.1. Introduction:

It is an android application which would assist a patient in getting drug prescriptions based on what symptoms the patient entered.It is a mobile application system for patients that will be able to suggest or recommend drugs based on a list of symptoms. The application uses a recommender algorithm that uses evolving rules automatically using collaborative filtering modeling technique.

2.3.2. Merits, Demerits and Challenges

- **Merits**
  - It will provide a rule-based decision support system which enables high-quality service by simulating the decision-making ability of a health professional.
  - This system will provide access to information regardless of time and place through web-based platform-independent applications.
  - It will be compatible with mobile devices.
  - It will be able to work with different hospital management systems and third-party system or applications via API support.
- **Demerits**
  - The medicines are not recommended for all the diseases and allergies.
  - Does not include advanced algorithms.
- **Challenges**
  - As it uses an unsupervised learning algorithm, to get the desired result, we should provide huge datasets

2.3.3. Implementation of Mobile Drug recommender

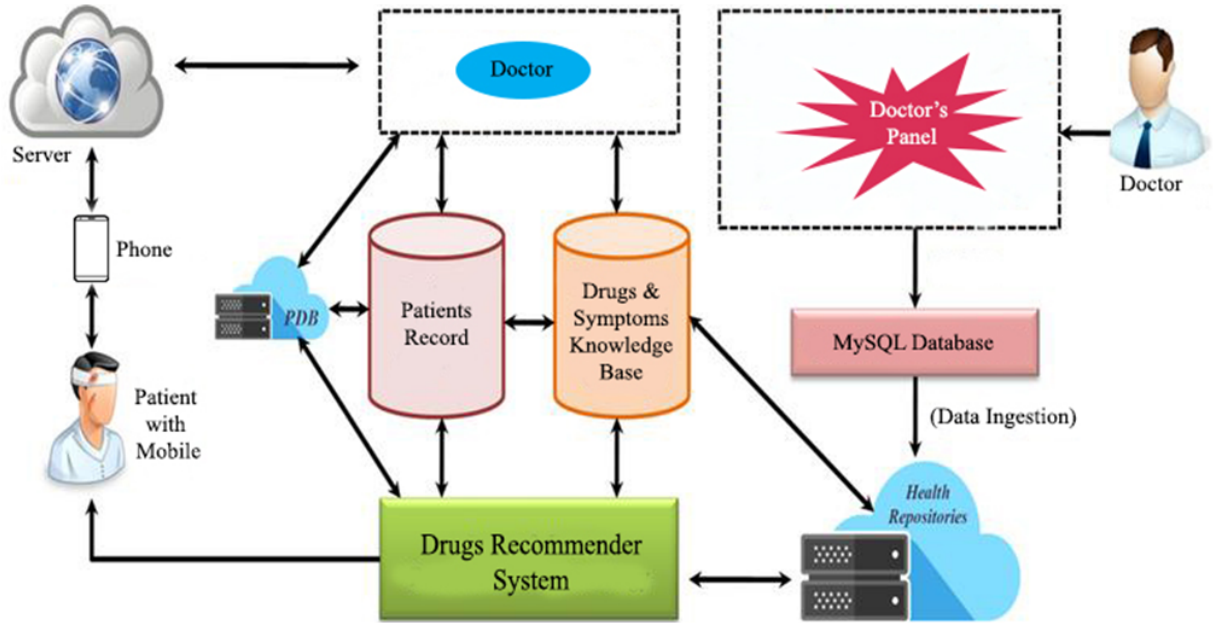

Fig 2.3(i): Mobile drug recommender architecture .

The mobile drug recommender is developed using collaborative filtering method.In hybrid recommender system, different techniques of collaborative approaches and other recommender techniques (usually content based approaches), combined to get better results. Various problems like cold-start, data sparsity and scalability can be avoided by using hybrid approach Adomavicius . There are different ways of combining CF with other recommender techniques which are as follows: Hybrid Recommenders Incorporating CF,Content-Based Features,Hybrid Recommenders Combining CF and Other Recommender Systems.

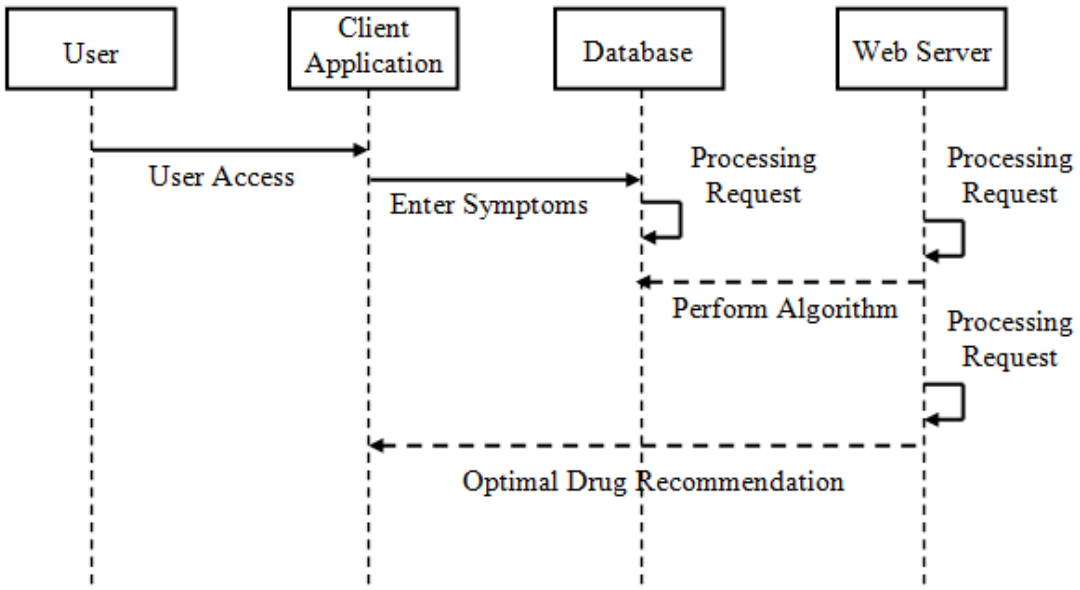

Fig 2.3(ii) : Sequence diagram

CHAPTER 3

RESULTS AND DISCUSSION

CHAPTER 3

RESULTS AND DISCUSSION

3.1. Comparison of Existing Solutions

Feature	ANN Drug recommender	Ontology based drug recommendation	Mobile drug recommender
Algorithms used	Stacked Artificial Neural network	ATC Codes	Collaborative filtering
Data collection	Yes	Yes	Yes
Data preparation	No	Yes	Yes
Data modeling	Yes	No	Yes
Parallel computing	Yes	No	No
Accuracy	83%	80.3%	61%

3.2. Data Collection and Performance metrics

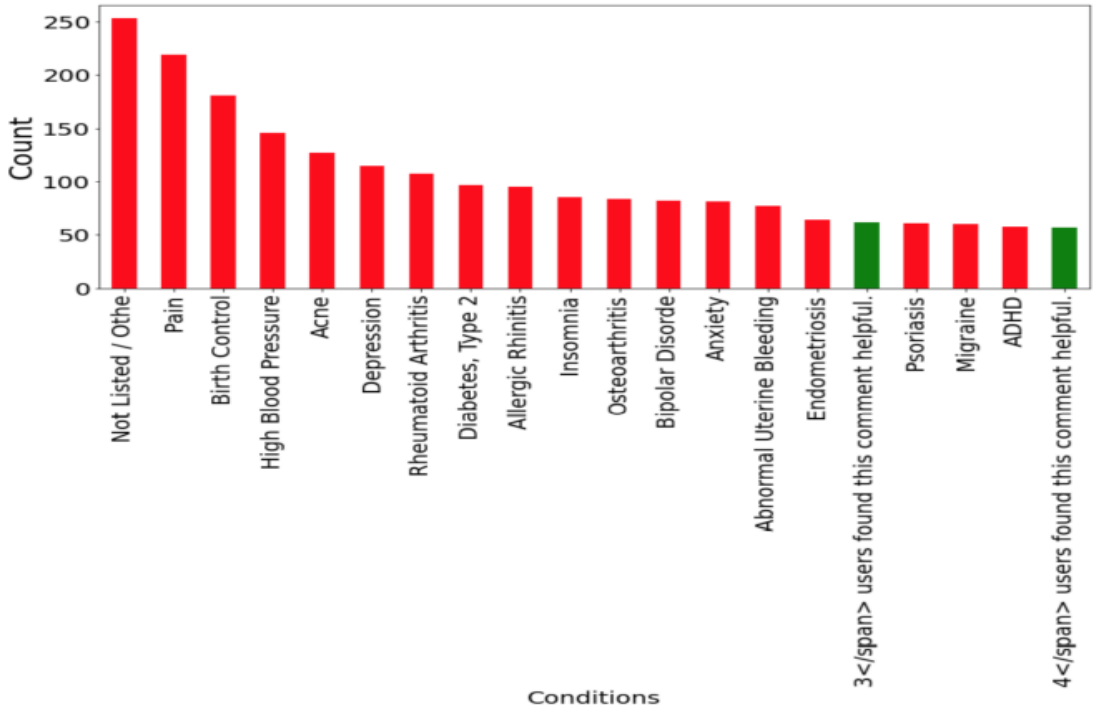

Figure 3.2(i) : Bar plot of Top 20 conditions that has a maximum drugs

Fig 3.2(i) shows the top 20 conditions that have a maximum number of drugs available. One thing to notice in this figure is that there are two green-colored columns, which shows the conditions that have no meaning. The removal of all these sorts of conditions from the final dataset makes the total row count equal to 212141.

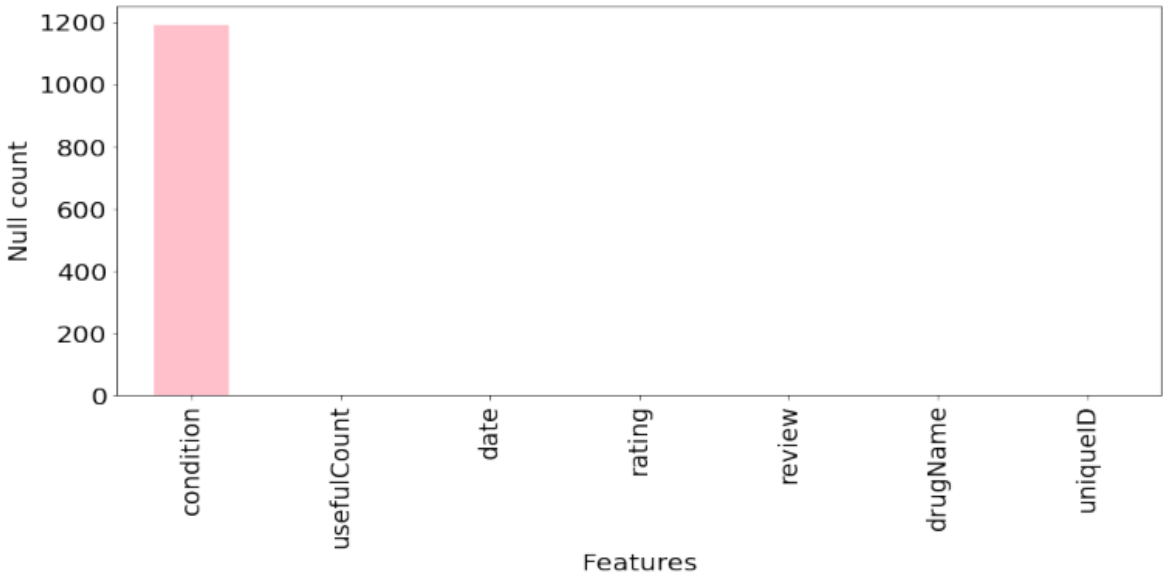

Figure 3.2(ii): Bar plot of the number of null values versus attributes

After checking null values, duplicate rows, removing unnecessary values, and text from rows and subsequently, removed all 1200 null values rows in the conditions column, as shown in Fig 3.2(ii)

CHAPTER 4

CONCLUSION

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Our project aims at developing a drug recommender system using Machine Learning.The recommendation is done based on the previous history of a medical data.Our project uses Sentimental Analysis. As part of its development,we studied various existing solutions of drug recommender systems. We identified their advantages,disadvantages and the challenges faced.We made a comparison table of existing solutions based on various criteria.We decided to develop a drug recommender system that overcomes most of the drawbacks of existing solutions.We collected the dataset from UCI ML repository that is required for our project.

CHAPTER-5

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REFERENCES

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