Drug Recommendation System Based On Sentiment Analysis of Drug Reviews Using Machine Learning

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Abstract - The absence of appropriate tools and medications, as well as the scarcity of professionals and other healthcare workers,is at an all-time high since the coronavirus first appeared. There are many deaths as a result of the medical community as a whole being in crisis. Individuals started to take treatment on themselves without an appropriate counselling since it was unobtainable, leading to their health state worse than normal. Recently, machine learning has demonstrated useful in many areas, and creative work pertaining to automation has increased. The goal of this study is to introduce a drug system for recommendations that may significantly reduce the shortage of specialists. Create the drug recommendation system in this study by employing a range of vectorization methods, like Bow, TF-IDF, Word 2 Vector, and Manually Component Evaluation, to forecast the sentiment from patient evaluations.

Keywords: SVM, Deep learning, TF-IDF.

I. INTRODUCTION

The number of coronavirus cases is increasing at an exponential rate, and as a result, there is a medical shortage across the country. This is especially true in rural areas where there are fewer specialists than in urban areas. It takes a doctor six to twelve years to obtain the required training. As such, it is not possible to rapidly increase the number of doctors in a short period of time. In this challenging period, a Telemedicine framework should be revitalized to the greatest extent possible. These days, clinical errors are extremely common. Prescription errors harm more than 200 thousand people in China and 100,000 people in the USA annually. Since specialists formulate the answer based on their extremely limited understanding, almost 40% of doctors make blunders when prescribing. Selecting the best prescription is important for individuals who require doctors who have extensive knowledge of antibacterial drugs, patients, and microscopic organisms. Every day, a new study is published that includes more medications and tests that are available to medical professionals. A recommendation system is an accustomed system that suggests an item to the user based on their need and benefit.[1] When this reaches higher state, complications like dehydration, malnutrition, or infection occur which leads to death. The opinion at the MCI stage will help the person to concentrate on a healthy approach to life, and good planning to take care of memory loss. It can be regarded to as sophisticated assumption of the whole series of events which can be stipulated to the origin and back to the form of its originality.[8]

II. AIMS AND OBJECTIVE

a) Aim

The aim is to build a system that recommends drugs based on sentiment analysis of drug assessments using machine learning techniques. The approach aims to make medicine suggestions more accurate and effective by using the views expressed in drug reviews.

Objective

Assemble a pharmacological review dataset from multiple web sources: The first step in developing the drug recommendation system is compiling a collection of medication reviews for sentiment analysis.

III. LITERATURE SURVEY

Paper 1: Drug Recommendation System

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As the internet and web-based commerce grow at an exponential rate, item reviews are now considered essential and crucial when purchasing goods anywhere in the globe. People everywhere havebecome accustomed to researching products online and reading reviews prior to making a purchase. The majority of previous surveys have concentrated on e-commerce evaluation expectations and proposals; however, the fields of therapeutic therapies or medical care have rarely been covered.

People are becoming more concerned about their health and turning to the internet for diagnosis. A 2013 Pew American Research Centre survey found that about 35% of users had looked up the diagnosis of medical disorders online, while about 60% of people had searched for health-related issues online. The purpose of a medicines recommendation framework is to help patients and professionals increase their understanding of medications for particular medical problems. A traditional system that makes recommendations to the user based on an item's necessity and benefit is called a recommender framework. These frameworks analyse client sentiment through surveys and create recommendations tailored to their specific needs. A medicine suggestion system uses sentiment evaluation and feature development to provide medication based on patient feedback under certain situations. The creation of techniques, procedures, and instruments for identifying and obtaining emotional information—such as viewpoints and attitudes—from language isknown as sentiment analysis.[3]

Paper 2: Drugs Rating Generation and Recommendation from Sentiment Analysis of Drug Reviews using Machine Learning

The proliferation of Web 2.0 platforms has led to the creationof massive amounts of user-generated content, or socialmedia. As a result, during the past ten years, an excessivenumber of academics have studied proficient algorithms forsentiment analysis of user-generated information. Sentimentanalysis, sometimes referred to as sentiment mining, are thestudy of people's views, perceptions, beliefs, judgments,views, or emotion regarding various things, such as goods,services, companies, individuals, events, and subjects. Thesetwo application domains have drawn a lot of attention lately. Positive and negative analyses are typically separated intotwo groups in sentimental research. It becomes challengingfor individuals to make decisions, nevertheless, if everycandidate's product expresses either pleasant or negativeemotions.[7]

Paper 3: Design and Develop Drug Recommender Framework System Based on Multilingual Sentiment Analysis Using RNN

The significance of item reviews has increased as a result of the internet's and the web-based industry's explosive growth. People all across the world are used to reading reviews and visiting websites before making a purchase. Clinical therapies or the delivery of medical care have not received many recommendations in the field of online commerce, despite the fact that the bulk of previous studies mostly concentrated on evaluating expectations.

More people are turning to the internet to hunt up a diagnosis because they are concerned about their health. According to a 2013 Pew American Research Center survey, around 60% of participants looked up health-related issues online, with roughly 35% of users seeking advice on how to diagnose medical conditions. A framework for medical recommendations is vitally important to help patients and medical professionals better understand medications for certain medical concerns. Users are given product recommendations by a popular method known as a "recommender framework" based on their wants and advantages. This framework is used to examine the customer questionnaire findings, and recommendations are then given based on the individual needs of the customer. The individual who prescribes medications. The system uses sentiment evaluation and feature development to conditionally deliver medications based on patient reviews. Sentiment analysis is a field of study that uses a range of techniques, tools, and approaches to identify and extract emotional information from languages, such as opinions and attitudes.[4]

IV. EXISTING SYSTEM

A semantically enhanced web architecture designed to assist experts in finding information about the drugs. The algorithm of semantic clustering estimates the similarity between treatment data. Recurrent neural networks (RNNs) and Naive Bayes are used in multilingual sentiment analysis. Cloud- assisted medication suggestion (CADRE). According to side effects, CADRE might recommend medications with top-N- related prescriptions. Framework for hash tag recommenders that makes use of the skip-gram model.[2]

V. COMPARATIVE STUDY

Table.1: Comparative Analysis

Paper Title	Author	Year	Publication	Description
Drug RecommendationSystem based on Sentiment Analysis of Drug Reviews using Machine	Satvik Garg	2021	Jaypee University of Information Technology	The premise of the studyis that the medication that is advised should bebased on the patient's

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learning				ability.
Drug RecommendationSystem	Yash Ritesh Tanna, Vaibhav Avinash Parmar, Surakshit Shivaji Bhalkeshware, Abhinav Maindre, Pragati Malusare	2023	International Journalof Creative Research Thoughts (IJCRT)	. The purpose of a medicines recommendation framework isto help patients and professionals increase their understanding of medications for particular medical problems.
Drugs Rating Generation and Recommendation fromSentiment Analysis of Drug Reviews using Machine Learning	Md. Deloar Hossain, Md. Shafiul Azam, Md Jahan Ali, Hakilo Sabit	2020	Emerging Technology in Computing, Communication and Electronics (ETCCE)	The proliferation of Web 2.0 platforms has led to thecreation of massive amounts of user-generatedcontent, or social media.
Design and Develop Drug Recommender Framework System Basedon Multilingual SentimentAnalysis Using RNN	Dr. D. J SamathaNaidu, B. Jayalalitha	2023	International Journal of Research Publication andReviews	A framework for medical recommendations is vitallyimportant to help patients and medical professionals understand medications formedical concerns.

VI. PROBLEM STATEMENT

The exponential rise in coronavirus cases is creating a global scarcity of doctors, especially in rural areas where there are fewer specialists than in urban areas. A doctor needs to spend six to twelve years in school to complete their training. Therefore, adding more doctors in a short period of time is not feasible. In this challenging time, telemedicine infrastructure needs to be developed as quickly as feasible.[6]

VII. MATHEMATICAL MODEL

Term Frequency–Inverse Document Frequency: Among the most popular characteristics for text analysis are the TF-IDF features. TF-IDF weights each phrase in a given document according to its term frequency (TF) and inverse document frequency (IDF). Higher weight score words are thought to be more significant. The TF-IDF weight is deterermine by using. recommendations to the user based on their needs and advantages. These frameworks use consumer surveys to analyse their attitude and provide recommendations tailored to their specific needs. A drug recommender system uses sentiment evaluation and feature development to provide medication based on patient feedback and a set of predetermined conditions. Sentiment analysis is a series of techniques, procedures, and instruments for identifying and obtaining emotional information, including opinions and attitudes.[5]

ADVANTAGES OF PROPOSED SYSTEM:

Because it provides the suggested algorithm for natural language processing—which counts the repetitions of each token in the document under review—the system is more efficient. The programme employs precise sentiment analysis prediction methods for Data Visualisation and Cleaning.

VII. ALGORITHM

Drug recommendation model for all drugs Reviews carry out:

1. Review Score Mean = mean

(Polarity of Dictionary Sentiment* Useful Count + Rating)

2. Sort (group by (condition & drug name with Mean of Review Score, descending order) for every condition in Patient Condition.

1. Logistic Regression

#Fitting Logistic Regression from sklearn.linear model import Logistic Regression lg_model = Logistic Regression() lg_model.fit (X_train, y_train) #Predicting the Test set Results y_pred= lg_model.predict (X_test)

2. Random Forest

Fitting Random Forestfrom sklearn.ensemble

Import Random Forest Classifierrf_model= Random Forest Classifier () rf_model.fit (X_train, y_train)

Predicting the Test set Results y_pred = rf_model.predict (X_test)

Logistic Regression: LR performs classification based on the likelihood that the data belong to class '0' or class '1' using the logistic function also known as the sigmoid function.

$$(x) = \frac{1}{1 + e^{-z}}$$

where x is the input, e is the base of the nature log, and σ(x) is the output in the interval [0, 1]. Logistic regression is a popular tool for sentiment analysis in both Arabic and English, and it performs well when the data is linearly separable.

Random Forest: During the training stage, the Random Forest algorithm creates an ensemble of decision trees. A random subset of the dataset is used to build each tree, and

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a random subset of features in each partition are assessed. Because each tree is more variable as a result of the randomness, the likelihood of overfitting is decreased and overall prediction accuracy is increased. A class of models known as RF can be used for both regression and classification. Its performance is improved through voting over individual decision trees. When n is the quantity of decision trees and dt1, dt2, and dt3 are the decision trees, are utilise to make the final prediction.

$$Prediction = m(dt_1, dt_2, dt_3, \ldots\ldots, dt_{n,})$$

$$Prediction = mode \sum_{i=0}^{n} dt_{i,}$$

AdaBoost Classifier: By converting numerous weak learners (simple models) into robust, strong learners, it improves prediction accuracy. AdaBoost's main concept is to create a sequence of models repeatedly, with each one fixing the mistakes of the preceding one. AdaBoost enhances prediction skills and attains greater accuracy by merging many models. While training the classifier on the initial data set, Adaboost trains the additional copies of the classifier on the same dataset where the error is identified.

$$F(x) = sign \sum_{m=0}^{M} \theta_m f_m(x))$$

IX. SYSTEM ARCHETECTURE

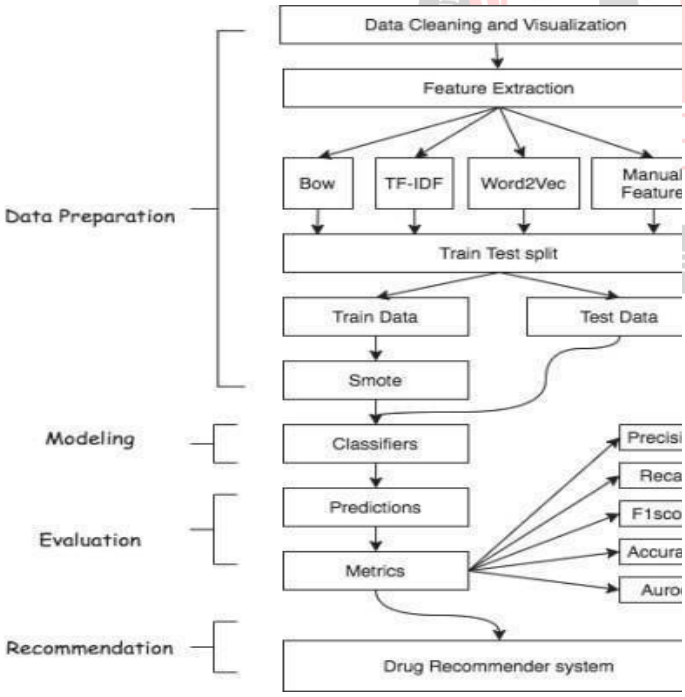

Fig.1: System Architecture

The suggested model utilized to create a medication recommendation system is depicted in Fig. 1. There are four steps in all: preparation of the data, classification, assessment, and recommendation used common data preparation methods in this study, such as deleting text from rows, checking null values, and removing duplicate rows and superfluous entries. Following text preprocessing, the data must be properly set up in order to construct sentiment analysis classifiers. Text cannot be processed directly by machine learning algorithms; instead, it must be converted to numerical format. Specifically, numerical vectors. To avoid the issue of class imbalance, only the training data underwent a synthetic minority over-sampling procedure following the Train Test split.

X. ADVANTAGES

- Classification of drugs are significant.
- They aid in shielding you from harmful drug interactions and negative effects.
- They influence a lot of therapy choices.
- They aid in making sure the drug is absorbed and used by your body.
- Classification of drugs are significant.
- They aid in defending you against harmful drug interactions and negative effects.

XI. DESIGN DETAILS

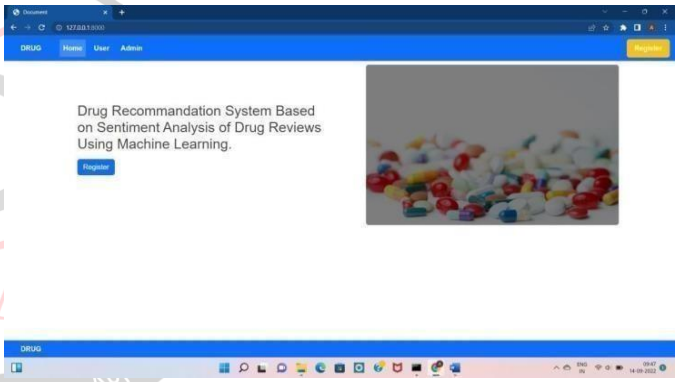

Fig 2:- Home page

Home Page: - In Home Page, modules are displayed and they are admin panel and user panel.

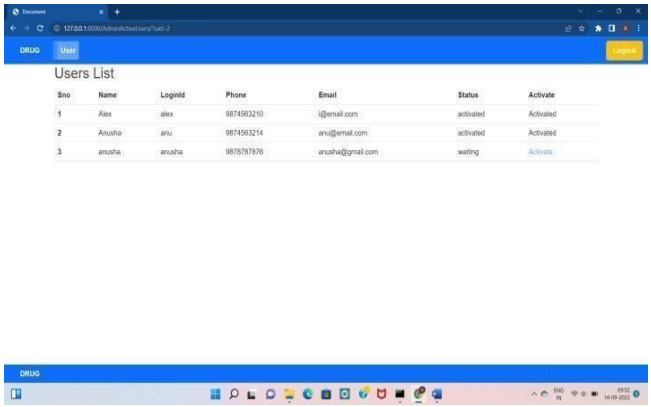

Fig 3:- User list

User List: - The registered users can be activated by the admin. Only the user can log into our system when he has

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activated. The admin can use the browser to access all of the data.

XII. CONCLUSION

Thus, we have tried to implement the paper "Satvik Garg" Drug Recommendation System based on Sentiment Analysis of Drug Reviews using Machine learning "2021 Jaypee University of Information Technology IEEE Access and the conclusion is as follows. The following is the outcome. However, there are a number of benefits to using sentiment analysis with TF-IDF and Word2Vec for medicine recommendation when it comes to drug evaluations.

Future research will compare various oversampling strategies, employ various n-gram values, and optimize algorithms to enhance the recommender system's performance.

XIII. REFRENCE

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