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Medicine Recommendation System Using Review Mining

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Abstract: *In this dynamic era of rapid technological advancement, the integration of digital technologies in the field of healthcare has widely proven to be a commendable innovation. The project aims to contribute effectively in healthcare sector by providing aid to people by the means of internet. It aims to provide reliable recommendation to patients with diseases on the basis of their medical records, health condition, reviews by patients on medications they received and ratings. The project works on Natural Language Processing, followed by training of the model, analysing its performance and improving it. The project works on two principle components: Review Mining and Rating Analysis. Review Mining is based on Sentiment Analysis of Reviews to comprehend the reviews of the patients. Rating Analysis will help us to determine the effectiveness of certain medicines which in turn will provide us a comparative efficacy of the medicine to cure respective diseases.*

Keywords: Machine Learning, Medicine Recommendation, Review Sentiment, Sentiment Analysis, Feature Extraction

I. INTRODUCTION

In the current digital era, technology has permeated every aspect of human life—from education and communication to commerce and healthcare. We now live in a fast-paced, technology-driven world where innovations such as Artificial Intelligence (AI), cloud computing, and data analytics are revolutionizing how services are delivered. Among the many sectors benefiting from technological advances, healthcare is experiencing transformative changes. The integration of AI with healthcare services not only accelerates diagnosis and treatment but also enables personalized medicine, optimized workflows, and data-driven clinical decision-making.

The Medicine Recommendation Project is a novel initiative that seeks to harness AI to automate and personalize the process of recommending medicines to patients. Unlike traditional methods that require direct consultation with a healthcare professional, this system provides a more accessible alternative by utilizing publicly available patient data—including reviews, ratings, and treatment history—to identify and suggest suitable medications based on individual user input

II. PROBLEM STATEMENT

Despite the abundance of healthcare resources, patients often face difficulties in determining the most effective medication for their condition, especially when confronted with multiple drug options for similar symptoms.

Challenges include:

Lack of access to real-time or affordable medical consultation. Inability to differentiate between similar drugs based on side effects, effectiveness, and user experience. Limited personalized advice when reviewing medicines online. This project addresses the need for a smart, automated medicine recommendation system that reduces this burden by providing reliable suggestions based on patient feedback and machine learning models trained on such data.

Objective The main goals of the Medicine Recommendation System are: To build a model that can predict and recommend appropriate medicines based on user-provided health information. To analyze user-generated reviews and ratings of medicines for deriving patterns. To use Natural Language Processing (NLP) for extracting meaningful

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insights from unstructured text data. o identify the most accurate ML algorithm for integration into the final recommendation system.

III. METHODOLOGY

The system design involves several key stages to ensure high performance, reliability, and user relevance:

Data Collection

The initial dataset consists of publicly available information on medicines, including: Patient reviews Ratings (on effectiveness, ease of use, and satisfaction) Conditions or diseases treated Side effects experience This data can be collected from healthcare review platforms like Drugs.com, WebMD, or similar APIs.

Data Preprocessing

Preprocessing is essential to clean and format the data for analysis. This includes:

Handling missing values (e.g., empty fields in reviews or ratings).Removing duplicates to ensure each entry is unique.Text normalization: Converting all text to lowercase and removing special characters or stopwords.Text lemmatization: Transforming words to their root form (e.g., "running" → "run"), which helps standardize vocabulary across reviews.

Feature Engineering

TF-IDF (Term Frequency-Inverse Document Frequency) is applied to convert text data into numerical feature vectors.Sentiment scores are calculated from reviews to evaluate patient satisfaction. Categorical encoding is applied to convert disease types, user demographics, and rating categories into numerical form.

Model Training and Selection

Multiple machine learning algorithms are trained and evaluated to determine the best-performing model for medicine recommendation. These may include:n Naïve Bayes Classifier: Suitable for text classification tasks. Support Vector Machines (SVM): Effective for high-dimensional feature spaces. Random Forest: Handles both classification and regression, offering robustness and interpretability. XGBoost: A gradient boosting algorithm known for its accuracy and speed. Deep Learning (Optional): Recurrent Neural Networks (RNNs) or BERT for advanced NLP-based recommendations.

Each model is evaluated using metrics such as:

Accuracy Precision Recall F1 Score The model with the best performance is selected for integration into the system.. Recommendation Logic Once the model is trained, the recommendation process follows this flow:

User Input: The user enters details such as their condition, symptoms, and any known allergies or prior medications.

Model Inference: The trained model analyzes the input, matches it against its knowledge base (trained on historical review data), and predicts suitable medications.

Output Generation: A ranked list of recommended medicines is provided, with additional context such as:Average user ratings Common side effects Links to detailed reviews or medical information

III. LITERATURE REVIEW

In healthcare sector, various contributions have been made. Certain research works shows the contribution through their studies and proven effective in this field.

Project Conference Related Work

A review on data mining techniques in healthcare sector; by Kavyasree S Anil A, Richa Jain [1] International Conference of Innovative Computing & Communication (ICICC), 2022. Provided an analysis of certain medications derived from data between 2017 and 2019. The analysis were used to identify effective medications on the basis of medical conditions.

A machine learning based drug recommendation system for healthcare; by Mahima Mohapatra et al.[2] Graduate Research in Engineering and Technology(GRET), 2022 Helped patients to make accurate medication choice by analyzing drug review and ratings.

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Medicine Recommendation System using ML; by Prof. Harna Bodele el al.[3] International Journal For Research In Applied Science & Engineering Technology(IJRASET), 2024 Delivered personalized and accurate medication recommendations by analyzing patient's data and correlating it with known
data of diseases and medications.

Recommendation of Drug Based On Its Reviews Using Machine Learning; by Roopa D E et al.[4]
International Journal of Research in Engineering and Science (IJRES), 2022 Analyses the worth of drugs, whether it is suitable to be used or not. It determines if the effects of the drugs are positive or negative.

Medicine Recommendation System; by Varun A.Goyal et al.[5] International Research Journal of Engineering and Technology (IRJET), 2020 Data mining techniques were created and used to build recommendation systems. These systems take advantage of hidden information in medical records to help reduce medical mistakes. In simple terms, the goal is to use the valuable data from patient records to make better decisions and
lower the chances of errors in healthcare.

Medicine Recommendation System Based On Patient Reviews; by T. Venkat Narayana et al.[6] International journal of Scientific & Technology Research,2020 Proivdes recommendation to patients about the medicines based on patient's reviews.

IV. RESEARCH METHODOLOGY

The dataset is gathered from year 2017 to 2019. A detailed analysis is conducted using Matplotlib, Seaborn, NumPy and Pandas. The initial results will highlight the top 20 and bottom 20 drugs for a particular medical condition. Further analysis is conducted which focuses on ratings between 1 and 10, along with an in- depth review analysis. The rating analysis classifies the medicines from 1 to 5 as negative and 6 to 10 as positive. It also calculates the mean rating for each month and year. Review analysis examines data from 2017 to 2019, identifying the months and years with the highest number of reviews. Next step includes data pre- processing and data-cleaning which involve detecting any null values present in the dataset. A word cloud for reviews is generated. Stop words such as "is," "are," and "am" etc. are removed, since they do not hold any significant value. This helps in improving text-processing efficiency and increase accuracy. The word cloud analysis reveals the top 20 and bottom 20 most frequently used words. Text data is thoroughly cleaned by removing stop words, extra spaces, and performing lemmatization to prepare it for further analysis. Any condition which involves only 1 drug, is eliminated to ensure relevant comparisons.

A machine learning pipeline is developed where models and algorithms are trained with training dataset. The algorithm which results in achieving maximum accuracy is selected. This system is integrated with a user interface featuring a dropdown list, allowing users to select a medical condition and receive medicine recommendations. As a future scope, the project aims to integrate with an e-commerce platform, enabling users to purchase recommended medications seamlessly.

V. CONCLUSION

This project highlights the importance of Machine Learning in the field of Healthcare. It focuses on contributing in the field of medicine and healthcare and promoting ease of use through a user-interactive interface and the model is trained to assist the patients. It delivers the most efficient output to the desired input, improving the overall performance of the system. Existing research works show the most effective algorithms so far were developed using Sentiment Analysis, SVM Algorithm, Filter-based algorithms.

The incorporation of user's medical history, reviews and ratings provides the system, capability to work on user's data, efficiently. Hence it provides more accurate results. Moreover, it trains the model to process information through a large set of data which helps in training the model precisely.

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