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Drug Recommendation System Using Machine Learing

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Abstract

Machine learning's value has soared in diverse applications, driving automation in creative work. We present a medication recommendation system to lighten experts' workload. Our method suggests medications effectively. COVID-19 has strained clinical resources, leading to scarcity of experts, equipment, and medications. People resort to self-medication without guidance, worsening the health situation. Bow, TF-IDF, Word2Vec, and Manual Feature are the tools we employ. for emotion prediction. By employing categorization algorithms, we analyse and select appropriate medications. Accuracy, accuracy, remembrance, f1score, and AUC score are all important metrics. evaluate predictive sentiments. Results favour LinearSVC with TF-IDF.Vectorization,works superior to every other model, with an accuracy rate of 93%.

Keywords: Medicine, Machine Learning, Patients.

Introduction

The rapid increase in coronavirus cases has led to a doctor shortage, especially those in rural areas. it difficult to address the shortage quickly. In this challenging period, activating telemedicine is crucial. Medication errors are prevalent, causing harm to thousands of people each year. Due to limited information, doctors often prescribe the wrong medication, resulting in a 40% error rate. Selecting the best prescription is challenging as new research and medications emerge regularly.

The importance of item reviews has grown with the expansion of the internet and online commerce. People rely on to write reviews informed decisions about purchases. However, the healthcare area has gotten fewer spotlights nowadays. this area. More individuals are seeking online diagnoses, making system essential.

To aid doctors and patients in understanding medications for specific medical problems, now a days.a framework for recommendations is necessary. This system uses the engineering of features and sentiment analysis to suggest drugs based on patient evaluations. Sentiment analysis identifies emotional information from language, while feature engineering enhances model performance by adding new features.

Literature Survey

1. Machine Learning-Based Sentiment Analysis of Drug Reviews for Drug Rating and Recommendation

According toMd. Deloar Hossain,Users may make educated judgements with the aid of a recommendation system based on sentiment analysis. from complex knowledge. However, applying sentiment analysis to healthcare and medication experiences is challenging. This study introduces a medication recommendation system that uses sentiment analysis of medication reviews. The objective is to help patients choose medications with more knowledge. The approach analyses sentiment in reviews of medical products, examines the sentiment polarity of reviews of drugs and patient conditions, and determines the value of reviews to users. We include pertinent medication properties into the algorithm for making recommendations. In addition to the Hybrid model for recommendation, the system is assessed using the Decision Tree, K-Nearest Neighbour, and Linear Support Vector Classifier algorithms for rating creation. Fine-tuning the settings improves performance. Classifier for linear support vectors is chosen for rating creation, balancing accuracy, efficiency, and scalability.

2. Using implicit feedback and crossing recommendations, a system for prescribing drugs for epilepsy

According to ChunChen; LuZhang; Xiaopeng Fan; Yang Wang; Chengzhong Xu.

Epilepsy is a chronic neurological condition characterized by unexpected brain electrical disturbances. Treating epilepsy is challenging, but around 70% of seizures can be controlled with drugs. Electronic Health Records (EHRs) of epileptic patients offer essential details for customised treatment. This study analyses real medical cases to propose an Implicit Feedback and Crossing prescription (IFCR) system for medication selection. The approach considers the medical history of epileptic patients to identify connections between symptoms and medications. Compared to an ANN-based system, our solution achieves higher recall rates, with up to a 30% increase. Overall, IFCR outperforms ANN in terms of performance. Combining IFCR and ANN in an ensemble model leverages the unique strengths of each algorithm.

Existing Methodology

"Deep Adverse: Deep Learning for Adverse Drug Event Prediction" by Luo et al. (2018): This study utilizes deep learning techniques, specifically recurrent neural networks (RNNs), to predict adverse drug events. The methodology involves training RNN models on patient drug usage data and clinical features to accurately identify potential adverse reactions.

"Personalized Drug Recommendation System Based on Deep Learning and Patient Similarity" by Sarker et al. (2019): This research introduces a personalized drug recommendation system that combines deep learning techniques and patient similarity. The methodology involves using convolutional neural networks (CNNs) to extract features from patient data, and then leveraging patient similarity measures to recommend drugs tailored to an individual's medical profile.

"Drug Recommendation System Based on Drug Similarity and Disease Similarity" by Wang et al. (2020): The authors propose a drug recommendation system that considers drug similarity and disease similarity. The methodology involves constructing a drug-drug similarity matrix and a disease-disease similarity matrix based on data integration and similarity calculation techniques. Recommendations are then generated by combining these matrices to find similar drugs for a given disease.

"Drug Recommendation Using Machine Learning Techniques" by Pablo Tobón et al. (2019): This research paper proposes a drug recommendation system that combines collaborative filtering and content-based filtering approaches. The authors utilize patient demographics, medical history,

and drug properties to generate personalized drug recommendations using machine learning algorithms such as decision trees and random forests.

"Enhancing Medication Guidance through Recurrent Neural Networks: A Paradigm for Drug Recommendation" by Juan Du et al.: This paper presents a drug recommendation system based on recurrent neural networks (RNNs). The authors use patient electronic health records and drug information to train an RNN model that captures temporal dependencies and sequences in patient data. The model then predicts suitable drugs for individual patients.

Proposed System

An item is suggested to the user via a common system called a recommender framework based on their benefit and necessity. These frameworks make use of consumer surveys to assess client sentiment and provide recommendations for their particular need. The medicine recommender system uses sentiment analysis and feature engineering to conditionally recommend drugs depending on patient input. separation and extraction of emotional content from words, such as judgements and attitudes, is known as sentiment analysis [7]. The technique of "feathering engineering," nonetheless, involves expanding models' capability by adding new features to the ones that currently exist. The Django web framework will be utilised in this project, and the user will enter the prescription pill in accordance with the drug advice we will provide based on the prediction outcome.

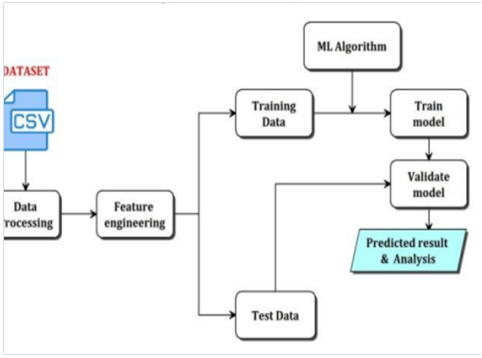

Figure 1 Proposed Architecture

Machine learning may be used to create a drug recommendation system that will help doctors choose the best treatments for their patients. The following process is suggested for creating such a system:

Data Collection: assemble an extensive dataset with details on individuals' health problems, histories of treatments, the success of their medications, any negative side effects, and any additional pertinent factors. Electronic health records, clinical studies, medical literature, and other trustworthy sources are good places to find this information.

Data Preprocessing: Clean the collected data by removing any inconsistencies, errors, or missing values. Perform data normalization and feature engineering to prepare the dataset for machine learning algorithms.

Feature Selection: Decide which aspects of the drug recommendation process are most important. Statistical analysis, domain knowledge, or feature selection techniques can all be used to do this. Patient demographics, medical history, symptoms, genetic data, and lab test findings can all be significant factors.

Result

Several performance metrics, including as accuracy, precision, recall, F1 score, and AUC-ROC, may be used to assess drug recommendation systems. rigorous confirmation techniques such as dataset splitting, cross-validation, and user studies are crucial to ensure meaningful results. Expert recommendations and feedback from healthcare professionals can be used for comparison and assessment. Developing a drug recommendation system requires collaboration between domain experts, data scientists, and healthcare professionals. Continuous monitoring, refinement, and updating with new data are essential to improve accuracy and relevance over time.

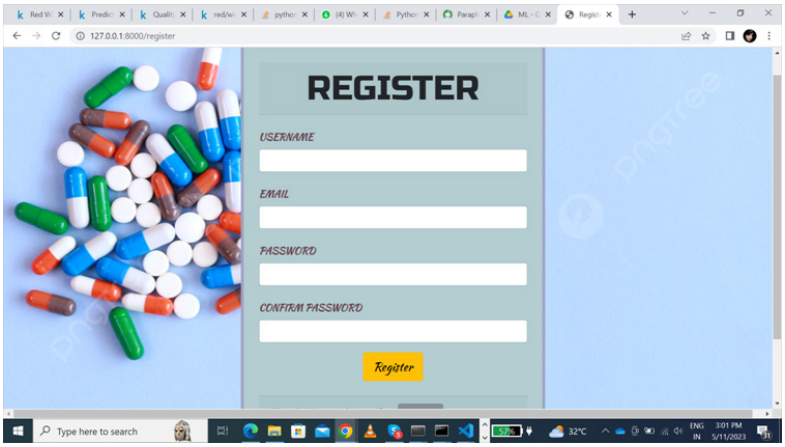

Figure 2 Registration Page

Figure 2 shows the register page of drug recommender system.

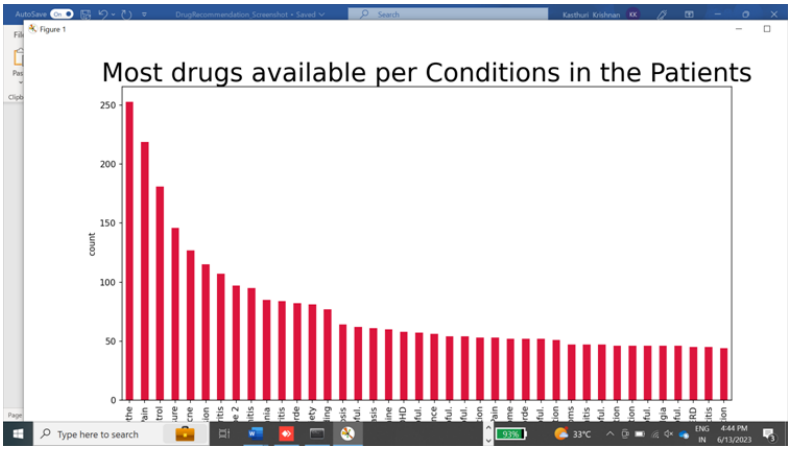

Figure 3 Drugs Available Per Conditions in the Patients

Figure 3 shows the most drugs available per conditions in the patients.

Conclusion

Drug recommendation systems using machine learning have emerged as a promising approach to assist healthcare professionals in making personalized and effective drug recommendations. The

methodologies employed in these systems vary but often involve collaborative filtering, content-based filtering, knowledge-based approaches, hybrid models, deep learning techniques, and graph-based methods.

Machine learning algorithms analyse large-scale patient data, electronic health records, drug properties, and domain knowledge to generate accurate and tailored drug recommendations. These systems leverage patient similarities, drug attributes, historical data, and complex patterns to provide personalized suggestions, considering factors such as drug efficacy, safety, and patient-specific characteristics.

The use of machine learning in drug recommendation systems has the potential to enhance patient outcomes, improve treatment adherence, and reduce adverse drug events. However, challenges such as data quality, interpretability, scalability, and integration with clinical workflows need to be addressed for widespread adoption.

Further research and development are required to refine and validate these systems, considering real-world evidence, heterogeneous data sources, and the unique needs of diverse patient populations. By continuously advancing the methodologies and incorporating new data sources, machine learning-based drug recommendation systems hold great promise for revolutionizing personalized medicine and optimizing patient care.

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