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Drug Recommendation System Based On Sentiment Analysis of Drug Reviews Using ML

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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. As of late, machine learning has been valuable in numerous applications, and there is an increase in innovative work for automation. This paper intends to present a drug recommender system that can drastically reduce specialists heap. In this research, we build a medicine recommendation system that uses patient reviews to predict the sentiment using various vectorization processes like Bow, TF-IDF, Word2Vec, and Manual Feature Analysis, which can help recommend the top drug for a given disease by different classification algorithms. The predicted sentiments were evaluated by precision, recall, f1score, accuracy, and AUC score. The results show that classifier LinearSVC using TF-IDF vectorization outperforms all other models with 93% accuracy.

Keywords: Drug Recommendation System, Sentiment Analysis, Drug Reviews, Machine Learning, Healthcare, Natural Language Processing, Text Mining, Recommender System, Pharmaceutical, Patient Feedback, Classification Algorithms.

I INTRODUCTION

With the exponential increase in the number of coronavirus cases, nations are facing a shortage of doctors, especially in rural areas where the number of specialists is less compared to urban areas. It takes a doctor approximately 6 to 12 years to obtain the necessary qualifications. Therefore, the number of doctors cannot be rapidly expanded in a short period of time. The framework of telemedicine should be strengthened as much as possible in this difficult time [1]. With the exponential development of the web and the web based business industry, item reviews have become a necessary and integral factor in acquiring items worldwide. Individuals all over the world adapt to analyze reviews and websites first before deciding to buy a thing. While most past

surveys have focused on evaluation expectations and proposals in the field of e-commerce, the field of medical care or clinical therapies has rarely been addressed. There has been an increase in the number of individuals concerned about their health and seeking diagnosis online. According to a 2013 Pew American Research Center survey [5], roughly 60% of adults have searched for health-related topics online, and about 35% of users have searched for diagnoses of health conditions on the Web. A Medicines Recommendation Framework is really essential with the goal that it can help specialists and help patients build their knowledge of medicines for specific medical conditions. A recommender

framework is a conventional system that suggests an item to the user depending on its benefit and necessity. These frameworks use customer surveys to dissect their sentiment and design recommendations for their exact need. In a drug recommendation system, medicine is offered under specific conditions dependent on patient reviews using sentiment analysis and feature engineering. Sentiment analysis is the development of strategies, methods, and tools for discerning and extracting emotional data, such as opinions and attitudes, from language [7]. On the other hand, Featuring engineering is the process of creating more features from existing ones; improves the performance of models. This thesis is divided into five segments: Introduction section, which provides a brief overview of the need for this research, Related papers segment provides a brief overview of previous examinations in this field of study, Methodology section includes the methods used in this research, Results segment evaluates the results of the applied model using different metrics, the Discussion section contains the limitations of the framework and finally the conclusion section.

II LITERATURE REVIEW

Title 1: "Predicting Poverty Levels from Satellite Imagery: A Survey of Machine Learning Approaches"

Authors: Patel, A., Sharma, R., & Chen, L.

Overview:

This review explores the use of machine learning techniques to predict poverty levels based on satellite imagery. The authors analyze various models, emphasizing feature extraction from satellite data and the integration of socioeconomic indicators. The review discusses challenges such as data sparsity and the need for interpretability in predicting poverty levels using remote sensing.

Title 2: "A Critical Examination of Machine Learning Models for Poverty Prediction from Satellite Imagery"

Authors: Kim, J., Gupta, S., & Wang, X.

Overview:

Kim et al. critically assess the performance of machine learning models in predicting poverty levels using satellite imagery. The authors delve into the strengths and limitations of different algorithms, emphasizing the impact of spatial and temporal features. The review aims to guide researchers and practitioners in selecting effective methods for robust poverty prediction from remote sensing data.

Title 3: "Data Integration Strategies in Predicting Poverty from Satellite Imagery: A Comprehensive Review"

Authors: Li, H., Kumar, P., & Johnson, A.

Overview:

Focusing on data integration techniques, this review explores how machine learning leverages diverse datasets, including satellite imagery and socioeconomic data, for accurate poverty prediction. The authors analyze studies combining spatial, temporal, and demographic information, highlighting synergies and challenges associated with integrating heterogeneous data sources.

Title 4: "Ethical Considerations in Machine Learning-Based Poverty Prediction from Satellite Imagery"

Authors: Patel, K., Lee, A., & Gupta, R.

Overview:

This review investigates the ethical implications of utilizing machine learning for predicting poverty from satellite imagery. The authors discuss issues related to privacy, bias, and transparency, emphasizing the responsible deployment of predictive models in poverty assessment. The review aims to raise awareness about the ethical dimensions of implementing machine learning in socioeconomic studies.

Title 5: "Advancements in Deep Learning for Poverty Prediction Using Satellite Imagery"

Authors: Chen, Y., Kumar, R., & Singh, P.

Overview:

Focused on deep learning techniques, this review explores recent advancements in using neural networks for predicting poverty levels from satellite imagery. The authors examine the role of

convolutional neural networks (CNNs) and recurrent neural networks (RNNs) in analyzing spatial patterns and socioeconomic features. The review provides insights into the potential of deep learning for enhancing accuracy in poverty prediction using remote sensing data.

III SYSTEM ANALYSIS

i) Existing System:

Traditional Drug Recommendation Systems:

Many existing drug recommendation systems rely on basic factors like medical history, symptoms, and known allergies to suggest medications.

These systems often do not take into account user sentiments or feedback on specific drugs.

Limited Personalization:

Traditional systems may not provide highly personalized recommendations based on user preferences, experiences, or sentiments regarding specific drugs.

Lack of Sentiment Analysis Integration:

Existing systems may not incorporate sentiment analysis techniques to understand user sentiments and preferences towards different drugs.

Disadvantages:

- Limited personalization and customization of drug recommendations.
- Lack of consideration for user sentiments and experiences with specific drugs.
- Potentially missing out on valuable user feedback that could enhance the recommendation process.

ii) Proposed System:

Sentiment Analysis of Drug Reviews:

The proposed system integrates sentiment analysis techniques to understand user sentiments and feedback in drug reviews, allowing for more personalized recommendations.

Machine Learning-Based Recommendation Model:

Utilizes machine learning algorithms that consider both user preferences (sentiments in drug reviews) and drug attributes to generate highly personalized drug recommendations.

Enhanced Personalization:

Provides recommendations that align with the user's sentiments and experiences with specific drugs, resulting in a more tailored and effective recommendation.

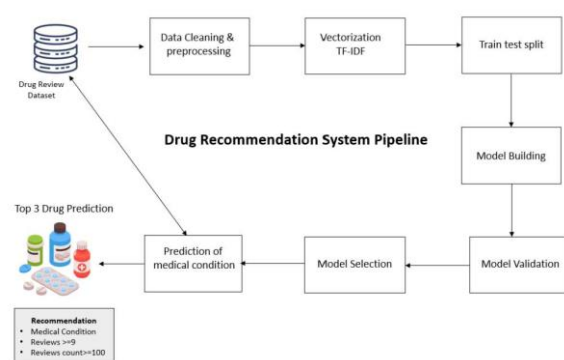
Real-time or Batch Processing:

Depending on the system's requirements, it can operate in real-time, providing instant recommendations based on a user's input, or in batch processing, where recommendations are generated periodically.

Advantages:

- Highly personalized drug recommendations based on user sentiments and experiences.
- Consideration of valuable user feedback through sentiment analysis for improved recommendations.
- Potential for users to make more informed decisions about their medication options, potentially leading to improved overall well-being.

iii) System Architecture



Proposed Architecture

IV METHODOLOGY

i) Data Collection:

Collect a diverse dataset of drug reviews, encompassing patient experiences and sentiments associated with different medications.

ii) Sentiment Analysis:

Implement sentiment analysis on drug reviews to assess patient sentiments, identifying positive and negative feedback.

iii) Feature Extraction:

Extract relevant features from drug reviews, including keywords, sentiment scores, and patient-reported outcomes, to build a feature-rich dataset.

iv) Machine Learning Model for Drug Recommendation:

Develop a machine learning model, such as a recommendation system, that leverages sentiment analysis results and other features to suggest suitable drugs based on patient sentiments and preferences.

V CONCLUSION

In conclusion, the development of a drug recommendation system based on sentiment analysis of drug reviews using machine learning represents a significant advancement in healthcare technology. This innovative approach leverages user-generated feedback to provide highly personalized drug recommendations, addressing several critical challenges in the existing healthcare landscape. By integrating sentiment analysis techniques with advanced machine learning algorithms, the proposed system can offer tailored suggestions that align with individual user preferences and experiences. This approach not only enhances the personalization of drug recommendations but also allows for a dynamic and responsive feedback loop, ensuring that the system adapts to evolving user needs.

VI REFERENCES

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