A Systematic Literature Surveyon A Smart Multidisease Prediction and Doctor Recommendations using ML

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***Abstract*-Smart multidisease prediction and doctor recommendations using machine learning is a growing field of research. The proposed methodology seeks to deliver precise illness prediction for several diseases, which may have important repercussions for enhancing the precision and timeli- ness of medical diagnostics and improving patient outcomes. Machine learning algorithms like Naive Bayesian networks,CNN, KNN are used to properly predict and classify diseases based on patient symptoms and medical data analysis. Several studies have proposed models that can predict multiple diseases such as diabetes, heart disease, chronic kidney disease, and cancer. The ultimate goal is to provide healthcare practitioners with the tools to make educated decisions and deliver improved patient care. This paper presents a survey of research papers and articles on the topic of smart multidisease prediction and doctor recommendations using machine learning.**

***Keywords*-Machine Learning, CNN, Python-Flask**

I. INTRODUCTION

In recent years, the healthcare landscape has beenundergoing a profound transformation with the infusion of cutting-edge technologies, and one such groundbreaking advancement is the integration of Machine Learning (ML) in disease prediction and healthcare recommendations. This survey paper aims to explore and synthesize the current state of a Smart Multidisease Prediction and Doctor Recommendations System, a revolutionary approach that leverages the power of ML algorithms and data analytics to enhance the precision and efficiency of healthcare delivery. With traditional healthcare systems facing challenges in timely diagnosis and personalized treatment plans, this survey dives into the potential of ML to provide proactive and preventive healthcare solutions.

The scope of this survey is to offer a comprehensive overview of existing multidisease prediction systems and doctor recommendation models based on machine learning. By consolidating insights from diverse research

endeavors, the goal is to shed light on the advancements, challenges, and future directions within this rapidly evolving field. The exploration encompasses the diverse spectrum of machine learning algorithms employed in multidisease prediction, ranging from conventional classifiers to state-of-the-art deep learning models. Additionally, the survey investigates how these systems extend beyond prediction to recommend suitable healthcare professionals based on patient profiles, medical histories, and practitioner expertise

II. Literature Survey

Disease Prediction and Treatment Recommendation Using Machine Learning:The research published in the International Journal for Research in Applied Sci- ence

and Engineering Technology (IJRA) focused on using machine learning algorithms for disease prediction and treatment recommendation. The study proposed a novel approach leveraging the C-nearest Neighbors algorithm to an- alyze patient symptoms and predict diseases with high accuracy. The research involved the collection of a dataset, preprocessing steps, and the implemen- tation of seven machine-learning algorithms. The results indicated that CNN performed the best among the algorithms tested. The study emphasized the potential of machine learning in transforming healthcare by enabling early diag- nosis and improving patient outcomes.[1]

Disease Prediction and Doctor Rec- ommendation System using Machine Learning Approaches:Datasets for training included information on diabetes, heart disease, and liver disease from verified repositories. Various machine learning algorithms, such as Logistic Regression, Random Forest, Na¨ive Bayes, and CNN, were used for disease prediction.The Front End included sections for general and specific disease prediction, data col- lection, and doctor recommendations. The proposed system aimed to overcome existing limitations in healthcare prediction by providing a more user-friendly and accurate platform. The potential advantages included reducing medical errors, improving patient outcomes, and increasing user accessibility.[2]

Disease Prediction and Doctor Recommendation System: The proposed work aimed to provide a comprehensive solution for efficient disease prediction and doctor recommendations. The implementation involved using Na¨ive Bayes for disease prediction, Weka libraries for implementation, and CoreNLP for pro- cessing user reviews. The system achieved a high accuracy rate, and the re- search concluded by discussing potential enhancements, such as incorporat- ing wearable device data for improved predictions and expanding the system's capabilities.[3]

Multiple Disease Prediction System Using Machine Learning: The paper, "Mul- tiple Disease Prediction System Using Machine Learning," published in Vol. 72 No. 1 (2023), addresses healthcare challenges by proposing a dynamic system for simultaneous prediction of diseases using machine learning. Au- thored by Mohammed Asrarulhaq Khadir et al., the system covers Heart dis- ease, Diabetes, Liver disease, Hepatitis, Jaundice, and Parkinson's. It em- ploys algorithms like Logistic Regression and K-Nearest Neighbour, providing accurate predictions based on user-input parameters. The GUI enables user-friendly interactions, promoting health monitoring. Future work involves ex- panding disease coverage, integrating real-time data, refining algorithms, gath- ering user feedback, mobile app development, andcollaboration with health- care providers.[4]

A Smart Healthcare Recommendation System for Multidisci- plinary Diabetes Patients with Data Fusion Based on Deep Ensemble Learning: The increasing im- portance of smart healthcare recommendation systems, par- ticularly in predicting and diagnosing life-threatening diseases, is emphasized. This involves the integration of electronic health records and wearable sen- sor data, with data fusion techniques applied for better results and ac- curate predictions. The text outlines related work in the field, summarizing diverse machine learning models and techniques used for diabetes prediction. Addi- tionally, it introduces a proposed smart healthcare recommendation system for multidisciplinary diabetes patients, highlighting the significance of data fusion and preprocessing steps in achieving accurate predictions. The overall organiza- tion of the paper involves detailing recent developments, research methodology, dataset selection, and results, concluding with future work considerations.[5]

Electronic Health Record Monitoring System and Data Security Using Blockchain Technology: Health Record (EHR) system. integrating

blockchain technology,

specifically smart contracts, to enhance data security, authenticity, and time management in managing healthcare data. The researchers designed a se- cure EHR platform using a decentralized and immutable ledger system, ensur- ing separate profiles for patients and doctors. Patients could create accounts with unique addresses, guaranteeing privacy and security.[6]

Multi Disease Prediction Model by using Machine Learning and Flask API: The text outlines a proposed healthcare analysis system that criticizes existing models for focusing on one disease at a time. It recounts a personal experience high- lighting the consequences of not identifying multiple diseases in patients. The proposed system aims to predict diabetes, diabetic retinopathy, heart disease,and cancer concurrently, with flexibility for future disease inclusions. Various datasets, including live hospital data, are used. The system shifts from deploy- ing multiple models for different diseases to a multi-disease prediction model, employing machine learning and deep learning techniques. Python pickling is crucial for saving model behaviors. The article concludes by emphasizing the reduction in time and mortality rates through the proposed model[7]

Disease prediction and medication advice using machine learning algorithms: The literature high- lighted different methodologies, such as an automated disease prediction system with a chatbot, data mining techniques like K-Nearest Neighbour (KNN) and Convolutional Neural Network (CNN), and the integration of machine learning in computer-aided diagnosis (CAD). The studies emphasized the advantages of accurate analysis for early disease identification, improved patient care, and specific disease predictions. However, challenges such as data requirements and potential biases were recognized.[8]

III. CHALLENGES

There are several challenges associated with the develop- ment and implementation of smart multidisease prediction and doctor recommendations using machine learning. One of the primary challenges is the availability and quality of data. Machine learning algorithms require large amounts of high-quality data to train and develop accurate models. However, healthcare data is often fragmented, incomplete, and inconsistent, making it challenging to develop accu- rate models. Another challenge is the interpretability of machine learning models. Healthcare practitioners need to understand how the models arrive at their predictions and recommendations to make informed decisions. However, many machine learning models are complex and difficult to interpret, making it challenging for healthcare practitioners to trust and use them. Additionally, there are ethical and legal concerns associated with the use of machine learning in healthcare. For example, there are concerns about data privacy, bias, and discrimination. Healthcare practitioners need to ensure that the use of machine learning does not violate patient privacy or discriminate against certain groups of patients.

IV. METHODOLOGIES

Methodologies for Smart Multidisease Prediction and Doctor Recommendations using Machine Learning:

A. Naive Bayesian Networks:

This methodology uses Naive Bayesian networks, a prob- abilistic modeling approach, to predict the presence of multiple diseases independently. It is extensively employed in the healthcare industry and aims to deliver an extensive and precise illness prediction model for various diseases

B. Data Fusion

This methodology combines data from various sources, such as electronic health records (EHR), medical data, and sensor data, to create a comprehensive dataset for disease prediction. Data fusion eliminates irrelevant data and increases the computational capabilities of the system,leading to more accurate predictions

C. *ANFIS and CNN*

This methodology uses artificial neural fuzzy inference systems (ANFIS) and convolutional neural networks (CNN) to create a broad disease prediction based on patient symp- toms. It is particularly useful for early disease detection and can be used to predict multiple diseases

D. *KNN, DT, Random Forest, and SVM*

This methodology uses various machine learning algo- rithms, such as K-Nearest Neighbors (KNN), Decision Trees (DT), Random Forest, and Support Vector Machines (SVM), to predict multiple diseases. It integrates a module for doctor recommendation to improve patient outcomes and address the issue of trust in existing disease prediction systems

E. *MetaMask*

It's a point of entry that allows you to view the decentral- ized web of the future in real time within your browser. It removes the requirement that decentralized Ethereum apps require you to create a full Ethereum node in your browser.

V. CONCLUSION

In conclusion, the exploration of a Smart Multidis- ease Prediction and Doctor Recommendations sys- tem using Machine Learning represents a pivotal stride towards the realization of intelligent, patient- centric healthcare solu- tions. The challenges and op- portunities delineated in this research underscore the complexity of integrating advanced technology into the intricate landscape of medical decision- making. The identified challenges, ranging from data qual- ity and privacy concerns to the interpretability of machine learning models, illuminate the multifaceted nature of de- ploying such systems in real-world health- care scenarios. These challenges necessitate ongoing research efforts to enhance data infrastructure, refine model transparency, and develop privacy-preserving mechanisms. However, amid these challenges lie promising re- search directions that can shape the future of health- care technology. Innovations in data integration, ex- plainable AI, and privacy-preserving machine learn- ing can pave the way for more robust, ethical, and widely accepted systems. Moreover, addressing bi- ases in predictive models and fostering collaboration between human practitioners and AI systems are in- tegral to ensuring equitable healthcare outcomes.

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