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Smart Health Disease Prediction System

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ABSTRACT—

A "Smart Health Disease Prediction System" provides a user-friendly and easily understandable GUI to users to easily get instant guidance on their health issues through an intelligent health care system online. The main objective of the System is to predict disease according to symptoms and also suggest a list of nearby doctors. The project has a wide scope, as it is not intended for a particular organization. This project is going to develop generic software, which can be applied by any healthcare organization and provides facilities to its users, also the software is going to provide a huge amount of summary data.

This project aims to address this challenge by leveraging the capabilities of Python, Django, and Machine Learning. By inputting a set of symptoms, the system can predict the potential disease, acting as a preliminary diagnostic tool. This not only provides immediate insight but also aids in making informed decisions regarding the next steps in healthcare, while this tool is not a replacement for professional medical advice, it serves as a beneficial starting point in the journey of healthcare.

Keywords- Symptoms, Disease, Diagnostic tool, Python.

1. INTRODUCTION

It has happened so many times that we or some of us need doctor help immediately, but they are not available due to some reason. The Health Prediction system is an end-user support and online consultation project. We propose a system that allows users to get instant guidance on their health issues through an intelligent healthcare system online. The system is fed with various symptoms and the disease/illness associated with those symptoms. The system allows user to share their symptoms and issues. It then processes the user's symptoms to check for various illnesses that could be associated with it. We use some intelligent data mining techniques to guess the most accurate illness that could be associated with a patient's symptoms. In the doctor module when a doctor login to the system doctor can view his patient details and the report of that patient.

Doctors can view details about the patient search that what patient searched for according to their prediction. A doctor can also view their personal details.

Admin can add new disease details by specifying the type and symptoms of the disease in the database. Based on the name of the disease and symptom the data mining algorithm works. Admin can view various diseases and symptoms stored in a database. This system will provide proper guidance when the user specifies the symptoms of his illness.

The primary goal of the system is to provide users with instantaneous insights into potential health issues based on the symptoms they input. This immediate guidance is especially crucial in situations where professional medical advice is not readily available or when individuals seek a preliminary understanding of their health conditions.

The motivation behind this project lies in the empowerment of individuals through information. By leveraging machine learning algorithms, the system aims to offer users a preliminary diagnostic tool enabling them to make informed decisions about their health. This approach aligns with the broader trend of utilizing technology to enhance healthcare outcomes and make healthcare information more accessible.

Fig.1 Home Page

The system is designed to suggest nearby doctors based on the predicted diseases, facilitating prompt and relevant medical assistance. This not only enhances the efficiency of healthcare delivery but also ensures that users can take proactive measures towards their well-being. In the subsequent chapters, we delve into the specific objectives, motivations, uses, limitations, and existing technologies that shape the foundation of the Smart Health Disease Prediction system. Through this comprehensive exploration, we aim to convey the significance of this project in contributing to a more informed, accessible, and efficient healthcare landscape.

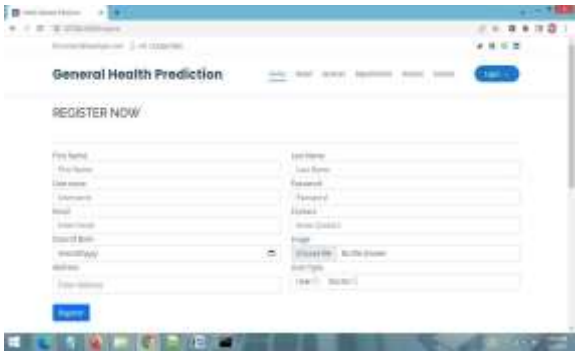

Fig.2 Signup Page

2. LITERATURE REVIEW

There have been numerous studies done related to predicting the disease using different machine learning techniques and algorithms that can be used by medical institutions. **Naveen Kumar and his colleague have proposed a system of health prediction** using machine learning algorithms. In the prediction of the system, he used different algorithms like Naive Bayes, K-Nearest Neighbor, and Decision Tree. This proposed system had an accuracy of 94%[1].

Aditi Gavhane and her colleague suggested a prediction for heart disease that utilizes Machine Learning. The Multi-Layer Perceptron model is used in this system. This system predicts heart disease based on basic symptoms like age, sex, pulse rate, etc. The accuracy of this suggested system is 91% [2].

Gupta A. and his colleague proposed a system for heart prediction that makes use of a naive Bayes algorithm. The accuracy of the naive Bayes algorithm is 97%. This system predicts heart diseases based on basic symptoms of chest pain, the pain of discomfort in jaw, and neck, and shortness of breathing [3].

D Dahiwade and his colleague designed a model for the prediction of the disease using approaches of machine learning and techniques like KNN and CNN. This paper suggests disease prediction i.e. based on the patient's symptoms. The accuracy of KNN is 95% and the accuracy of CNN is 98%[4].

N. Shabaz Ali and his colleague designed a model for the prediction of diseases using a data mining technique. This paper is made on how data mining techniques are used along with machine learning to predict diseases based on the user symptoms[5].

H. Pandey and his colleague make use of IoT and machine learning for healthcare monitoring. The Internet of Things (IoT) has enabled the invention of smart health monitoring systems. These health monitoring systems can track a person's mental and physical wellness on the basis of the stress level, anxiety level, and hypertension of a particular patient[6].

Shubham Salunke and his colleague have designed a system for identifying the diseases that patients are suffering from on the basis of a naive Bayes algorithm[7].

Monika Gandhi and her colleague have proposed a system for predicting heart diseases using data mining techniques. In this paper, data mining methods namely, Naive Bayes, Neural network, and Decision tree algorithm are analyzed on medical data sets using algorithms[8].

S. Ananth and his colleague have proposed a system for health prediction using IoT which has enabled invention in healthcare. The accuracy of the system is about 82%[9].

S.S. and his colleague proposed a model for the health and disease prognosis system. For the prediction of diseases, different machine learning algorithms such as Random Forest, Naive Bayes, Logistic Regression, Support Vector Machine, K-Nearest Neighbours, Decision Tree, and Gradient Boosting are compared to predict in an efficacious manner with better accuracy. The best accuracy model is saved for disease prediction. This system is especially used for early prediction of disease[10]

Rudra A. and his colleague have proposed a system for multiple disease prediction. This system has the additional appearance of consulting drugs and medication of disease expected which is the biggest drawback of the model. The accuracy of the system is about 85%[11]

M. Asia and his colleague tried to find a scalable solution that could predict different diseases utilizing the Random Forest Algorithm. This system presents a comparison against the Naïve-Bayes classifier but Random Forest gives more accurate results with an accuracy of 98%[12].

Sneha R. and his colleague have designed a system named disease prediction based on the classification algorithm. Classification algorithms such as Decision Tree, Support Vector Machine(SVM), K Nearest Neighbour(KNN), Random Forest, Logistic Regression, and Naive Bayes are used for building this disease prediction model. The Naive Bayes provides the highest accuracy 97% and hence is used for prediction of the diseases[13].

Farooqui and his colleague have designed a health prediction system using a support vector machine and multilinear regression. The result generated by the proposed system has an accuracy of up to 87%[14].

3. Future Enhancements

Scalability:

Design the system architecture to allow for future scalability.

Plan for the integration of additional features and modules.

AI/ML Model Improvement:

Establish a mechanism for continuous improvement of machine learning models.

Consider periodic model retraining based on new data.

Mobile Application:

Explore the development of a mobile application for enhanced user accessibility.

4. Methodology

Creating a Smart Health Disease Prediction System using Python, Django, and machine learning involves a combination of web development, data processing, and machine learning components. Here's a step-by-step methodology for such a project:

1. **Problem Definition and Domain Understanding:**

Clearly define the specific health problem or diseases the system will predict.

Understand the medical domain, relevant clinical factors, and available data sources.

2. **Data Collection and Integration:-**

Gather relevant healthcare data from various sources, such as electronic health records (EHRs), wearable devices, surveys, and public health databases.

Ensure data quality and integrate disparate data sources.

3. **Data Preprocessing:**

Clean and preprocess the data to handle missing values, outliers, and noise

Normalize and transform the data as necessary.

4. Feature Selection and Engineering:

Identify and select relevant features (attributes) from the data.

Create new features through feature engineering if needed.

5. Model Development:

Choose and develop machine learning models for disease prediction using Python libraries like Scikit-learn, TensorFlow, and PyTorch.

Experiment with different algorithms and hyperparameters

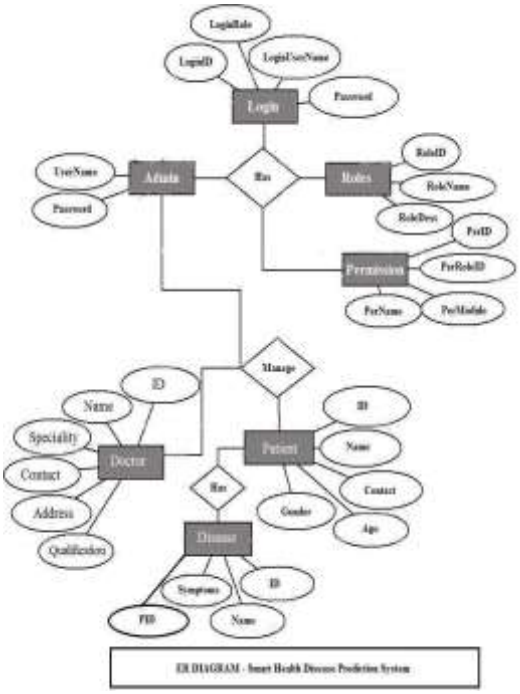

Fig.3 ER Diagram

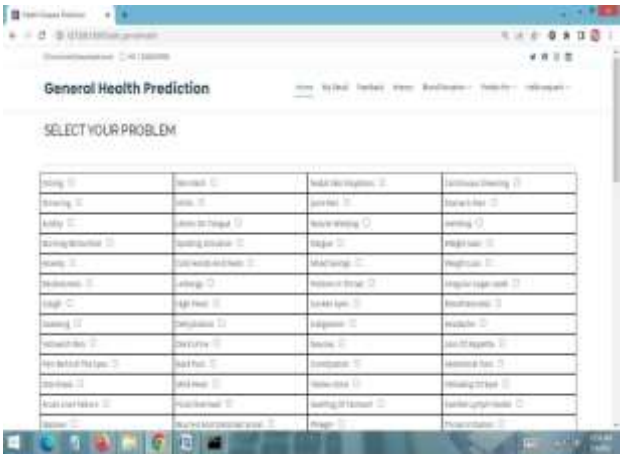

Fig.4 INPUT USER HEALTH PARAMETES PAGE

5. Results

Finally, the system was built and is working and fulfilling the expected output with all details and required outputs

Fig.5 PREDICTION HISTORY PAGE

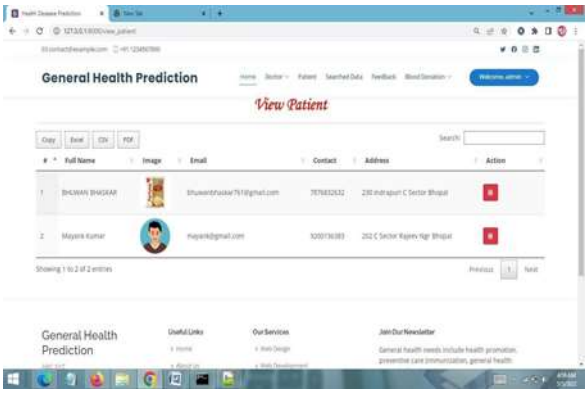

Fig.6 PATIENTS DETAIL

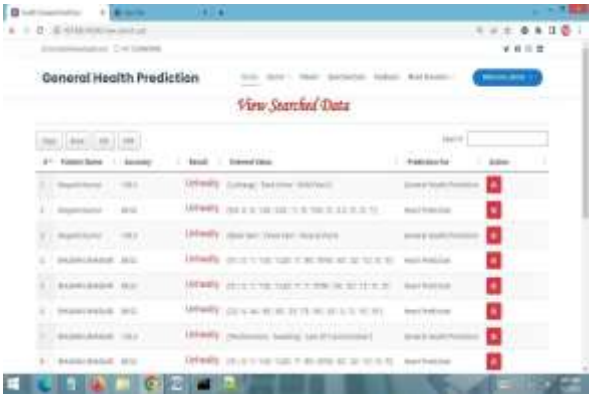

Fig.7 Searched Data Page

6. Conclusion

There is no wealth more than a Healthy life. As a part of serving the common people and solving their health-related problems was our motto throughout the Development of this project. We developed this Web app for predicting and analyzing diseases using various Machine Learning Algorithms for early cure and ailment of diseases based on the symptoms provided by the user which indeed became very fruitful and successful by providing the highest accuracy and accurate prediction. We also facilitated our users with live consultations with doctors during the ongoing pandemic so that they could get proper medical care from their homes.

This project is a well-planned Combo for Generic Health care with the best optimal solutions be it in predicting a disease and analyzing it. Also getting the information on the risks associated with other organs of the body from predicted disease. This project also recommended a Specialist Doctor for communication and getting a cure as early as possible. This project involved our immense and rigorous efforts for development and resolving the hurdles

in day-to-day health problems of people. We would like to do more Projects for the help of needy people and also for the upliftment of society in the future.

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