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Smart Healthcare Prediction Using Machine Learning

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Abstract - In this paper, the utilization of machine learning techniques in the healthcare system is introduced. As the healthcare industry generates increasingly vast amounts of data daily, manual processing by humans becomes impractical for prompt disease diagnosis and treatment decisions. To address this challenge, data management techniques and machine learning algorithms are explored in healthcare applications to facilitate more accurate decision-making processes. Detailed descriptions of medical data are provided, enhancing various facets of healthcare applications through the adoption of this cutting-edge technology. Naïve Bayes machine learning algorithm is employed to train the machine for predicting various diseases, extracting new patterns from extensive datasets to enable predictive analysis and derive knowledge linked to these patterns. A key focus lies in acquiring data automatically or semi-automatically, highlighting the significance of this process.

Key Words: Machine Learning, Healthcare, Naïve Bayes Algorithm, Predictive Models, Data prediction.

1.INTRODUCTION

In our daily lives, there are instances where immediate medical assistance is required, but doctors may not be readily available. This can often lead to neglecting health issues due to various other pressing concerns. To address this, we have created a user-friendly website aimed at providing instant guidance to users facing health-related issues. Our innovative approach involves the implementation of an online intelligent healthcare system that offers immediate support and guidance on a variety of health concerns. The healthcare domain is vast, encompassing diverse disease characteristics and prediction techniques with varying efficiencies. It is crucial to enhance and optimize these techniques for better outcomes. Smart health prediction plays a pivotal role in diagnosing multiple diseases by analyzing various symptoms through machine learning algorithms. The utilization of machine learning technology provides a robust platform in the medical sector for predicting health conditions based on user experiences and patient data. By employing machine learning, we can systematically track symptoms and diseases, enabling predictive models to swiftly analyze data and deliver efficient results in a timely manner.

2. LITERATURE SURVEY

The prediction of diseases has been challenging task for the system. The goal of this paper is to develop machine learning algorithms for prediction of diseases. Wecarry out a medical observation for some time for prediction purpose. The machine learning consists of analysis of large amount of data available in healthcare field and obtains the useful information. The information can be converted to knowledge using different algorithms.

Divya Tomar and Sonali Agarwal have presented a concise presentation of machine learning techniques in healthcare area. This contains additional features, applications, difficulties and future scope of machine learning techniques. [1]

Priyanka Pawar, Megha Walunj and Pallavi chitte presented a procedure to anticipate elements in view of client input side effects. They have assembled a model to exhibit the effectiveness of these techniques which will guide clients about their problems which they are experiencing. It predicts possible illness by data collections and gives proposed specialists and medicalarrangements. [2]

Divya Jain presents a review of the implementation of machine learning algorithm on datasets. It states the details of the idea on two-step frequent data items using machine learning rules. [3]

In this paper, we set out to identify efficient algorithm for results. We can create different types of applications for healthcare industry so as to fulfill by using all these predictive analysis and machine learning algorithms.

3.EXISTING SYSTEM

The current healthcare prediction systems often rely on conventional statistical methods, which may have limitations in analyzing complex datasets and recognizing intricate patterns. Many systems overlook integrating real-time data, leading to prediction delays and possibly affecting patient care. Additionally, challenges like data privacy, integration of diverse health records, and the necessity for user-friendly interfaces persist as significant obstacles. The fundamental issue addressed by a Smart Healthcare Prediction System

employing machine learning is to enhance predictive accuracy and efficiency in diagnosing patients and providing treatment recommendations. Through the utilization of advanced algorithms, this system strives to scrutinize extensive historical and real-time health data, empowering healthcare providers to make informed decisions, enhance patient outcomes, optimize resource allocation, and uphold data security and user accessibility standards.

4.METHODOLOGY

Naïve Bayes Algorithm:

The framework proposed entails the utilization of the Naïve Bayes algorithm for its development. Naïve Bayes is a straightforward technique employed in building models to assign class labels to instances within a given problem domain. These class labels are selected from the problem set. Naïve Bayes belongs to a family of algorithms that adhere to a fundamental principle rather than a specific algorithm. As per this principle, each feature's function in all Naïve Bayes classifiers is assumed to be independent of the values of other features. This characteristic enables efficient disease prediction within a short timeframe and at a minimal cost. While various probability models exist, the Naïve Bayes algorithm excels in certain supervised learning scenarios.

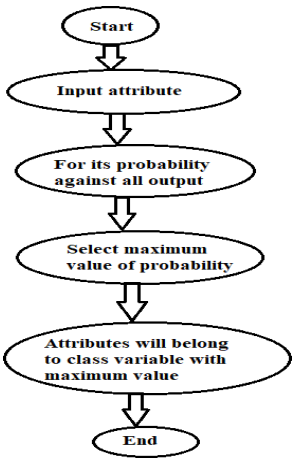

Fig3.1 Naïve Bayes Algorithm steps

Following advances are actualized in Bayes calculation:Bayes Theorem: P(c|x) = P(x|c) P(c) / P(x)

where, P(c|x) = Posterior probability

P(c) = Prior probability

P(x|c) = Probability of predictor

P(x)= Predictor's prior probability

In the program, various types of medical data were collected and organized using data indexes to determine the probabilities of different classes for each condition. The results were stored in the database, and when test data was provided, probabilities for various classes related to the specific symptom were obtained. Based on this information, we deduced the class with the highest probability, following a Naïve Bayes approach. Initially, individual probabilities for all possible traits related to the target disease were calculated. These probabilities encompassed all characteristics of that particular ailment. The potential probabilities for all conditions were then recorded, with the division into two cases: one for Y and the other for N. Consequently, if the probability of P1 surpasses that of P2, the conclusion is drawn that the patient does not have the illness.

When comparing the accuracy and efficiency of Naïve Bayes against other algorithms, Naïve Bayes demonstrates higher accuracy levels compared to the alternative algorithms.

5.SYSTEM DESIGN

The process of disease prediction through machine learning involves anticipating the user's potential illness based on provided symptoms and information. The smart healthcare system utilizes machine learning algorithms with a structure comprising diverse datasets to match and analyze user symptoms for accurate predictions. Following user input, the system feeds this data into a disease prediction model. The amalgamation of user-provided data and processed information undergoes comparison within the system's prediction model, culminating in the determination of the specific disease. An architecture diagram visually represents the system's components, concepts, and elements, offering an overview of the system. The system employs Naive Bayes classifier, Random Forest, and linear regression algorithms in its operations.

A. Data Collection: The dataset for the system is collected from the kaggle website. The dataset has 132 features(symptoms).
B. Preprocessing step: Preprocessing of information are taken into consideration important step system mastering stage. Preprocessing is including ideal set of information, lacking values & removing functionality.
C. Linear regression: Linear Regression is for predicting continuous values using a straight-line relationship.
D. Random Forest: uses multiple decision trees to improve prediction accuracy by combining the results.
E. Naive Bayes is a classification algorithm based on probability and assumes features are independent of each other.

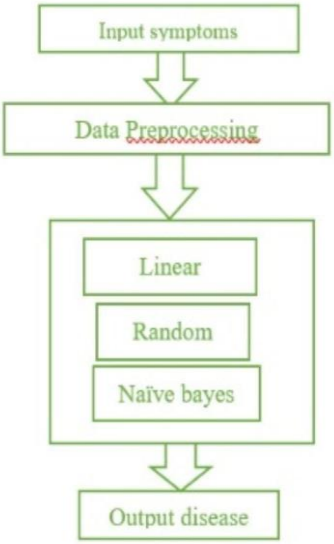

Fig-1. Steps in proposed system

6.RESULT AND DISCUSSION

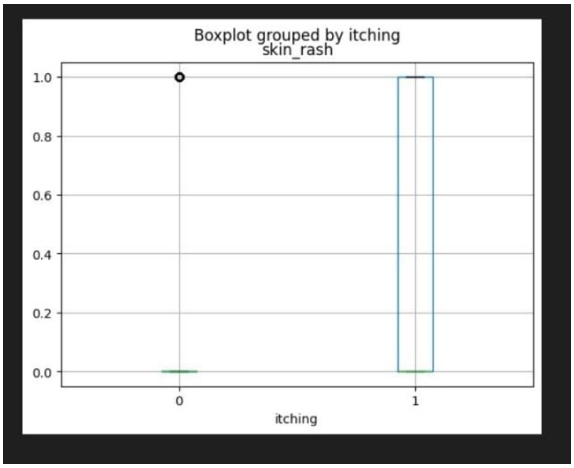

Fig-2. Related disease

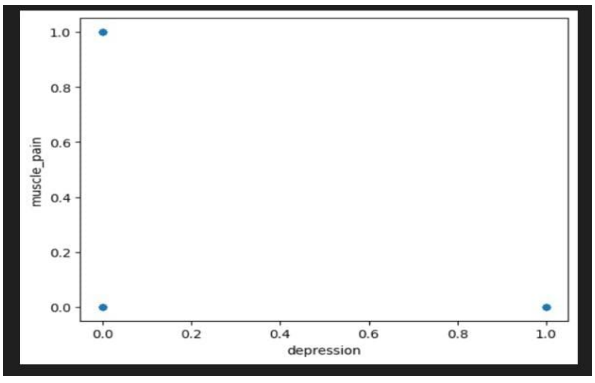

Fig-3. Non-Related disease

The model presented is tailored for a health prediction system that utilizes symptoms with a commendable level of accuracy. An algorithm is employed to enhance precision. Leveraging the dataset of symptoms available and the user's input, the system predicts the disease. Machine learning acts as an interactive tool facilitating early diagnosis for patients.

7.CONCLUSION

The proposed system will be useful in emergency cases where patient is unable to reachdoctor, for emergency cases that do not have doctors in an area, during late night emergencies and also for preliminary examination of patients. With this automatic system there would be straightforwardness for users to perceive the medical problems. The further enhancements that can be done would be integrating this web application in an Android application. This will be available to users on their mobilesand its use can be further increased and will become more user-friendly. Also, in future we make this application available in the villages also where medical facilities are not so good. In this way, there is a research work andscope available in this application.

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