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24/7 ICARE: DISEASE PREDICTION APPLICATION USING MACHINE LEARNING

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Abstract—**This project is a basic industrial project to develop domain skills in the field of Web development and Machine Learning. It requires a basic skill of front-end knowledge to build basic and interactive web applications and backend knowledge for handling the database. We will use some frameworks like Bootstrap and JQuery to make it more beautiful. We will try to make our application responsive so that it will be comfortable for every user in any application like Android, tablet, PC, and many others applications.**

Keywords— **Machine Learning, Healthcare, Disease, Prediction, Appointment, Online Application, Hospital, User Experience, Internet Connection, User-Friendly**

I. INTRODUCTION

Introducing "24/7 ICare", a groundbreaking website application that leverages the power of machine learning to redefine disease prediction and enhance healthcare accessibility. In today's fast-paced world, where immediate and accurate healthcare solutions are paramount, 24/7 ICare stands at the forefront, offering personalized suggestions and reliable information at users' fingertips.

Driven by cutting-edge machine learning algorithms, 24/7 ICare introduces a novel approach to disease prediction. Users can simply input their symptoms, and the application will provide tailored recommendations for home remedies. This initial step not only ensures immediate relief but also empowers individuals to take control of their health by providing actionable insights and guidance. No longer do users have to rely on vague internet searches or self-diagnosis methods; 24/7 ICare delivers personalized information that is both reliable and easily accessible.

goes above and beyond by curating a comprehensive list of suitable doctors for further diagnosis and treatment. This invaluable resource connects users with a network of healthcare professionals who specialize in their specific needs. The application takes healthcare accessibility to new heights by enabling users to seamlessly schedule appointments with these doctors, eliminating the traditional hassles of phone calls and lengthy wait times.

II. LITERATURE SURVEY

1. Disease Prediction using Machine Learning:
Prediction using Random Forest: - Prediction done by Random Forest Model using Flask framework model trained by training chronic disease dataset.

2. Medical Data Classification with Naive Bayes Approach:
For this study, the authors compared Nave Baeyes to five other classifiers: LR, KStar (K*), Decision Tree (DT), Neural Network (NN), and a basic rule-based algorithm (ZeroR).
The efficiency of all algorithms was evaluated using 15 real-world medical problems from the UCI machine learning repository (Asuncion and Newman, 2007).

3. The prediction of disease using machine learning:
By using linear regression and decision tree we are predicting diseases like Diabetes, Malaria, Jaundice, Dengue, and Tuberculosis

4. Disease Prediction Application Using Machine Learning:
Web application for Detecting disease using logistic regression, Random forest

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5. Disease Prediction using ML:
The proposed algorithm is more accurate with 94.8% calculation accuracy and faster convergence speed than other typical estimation algorithms as compared to CNN-based unimodal disease prediction.

III. PROPOSED METHODOLOGY

The proposed methodology for the "24/7 ICare" project involves the following steps:

1. Data Collection: Gather a comprehensive dataset comprising symptoms, diseases, home remedies, and doctor information. Acquire this data from reliable sources such as medical literature, healthcare databases, and verified medical professionals to ensure accuracy and reliability.

2. Data Preprocessing: Cleanse and preprocess the collected data by removing duplicates, handling missing values, and standardizing the format. Convert textual data into numerical representations suitable for machine learning algorithms.

3. Feature Selection: Identify relevant features that contribute to accurate disease prediction. Utilize techniques such as statistical analysis, correlation analysis, and domain expertise to select key features from the collected dataset.

4. Machine Learning Model Development: Train and test machine learning models to predict diseases based on input symptoms.

Explore algorithms like decision trees, support vector machines, or neural networks to develop an accurate predictive model.

Optimize the model using techniques like cross-validation, hyperparameter tuning, and feature engineering.

5. Home Remedy Recommendation: Develop an algorithm that matches symptoms inputted by users with corresponding home remedies from the dataset. Implement a logical mechanism to suggest the most appropriate remedies based on symptom severity and effectiveness.

6. Doctor Recommendation: Implement a recommendation system to match users with suitable

IV. MAJOR MODULES

1. Login Credentials: - Users can create accounts or log in securely to access the application's features. - Ensures privacy and confidentiality of personal health information.

2. Symptom Disease Prediction: - Allows users to input their symptoms and receive a preliminary prediction of potential diseases or conditions. - Provides information based on symptom analysis, aiding users in understanding possible health concerns.

3. Health Tips/First Aid Remedies: - Offers a repository of health tips and first aid remedies for common ailments or emergencies. - Helps users with immediate guidance and suggestions for self-care or initial treatment before seeking professional help.

4. Doctor Consultation List: - Provides a comprehensive list of available doctors or healthcare professionals for online consultation. - Enables users to schedule appointments, communicate with healthcare providers, and seek expert advice remotely.

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V. USE CASE AND ITS DESCRIPTION

The use cases for an online healthcare application involving two actors, the User, and the System:

1. User Registration:
- Actor: User
- Description: The user creates an account on the healthcare application by providing necessary details like name, email, contact information, etc.

2. Enter Symptoms:
- Actor: User
- Description: Users input their symptoms into the system, detailing any discomfort, pain, or health issues they're experiencing.

3. Disease Prediction:
- Actor: System
- Description: Based on the symptoms provided by the user, the system analyzes the data to predict potential diseases or conditions.

4. Preprocessing:
- Actor: System
- Description: The system preprocesses the symptom data, organizing and cleaning it to ensure efficient analysis for disease prediction.

5. Classification:
- Actor: System
- Description: The system employs machine learning or algorithmic techniques to classify and match the entered symptoms with potential diseases or health conditions.

6. First Aid Remedy:
- Actor: System
- Description: Once a potential disease or condition is

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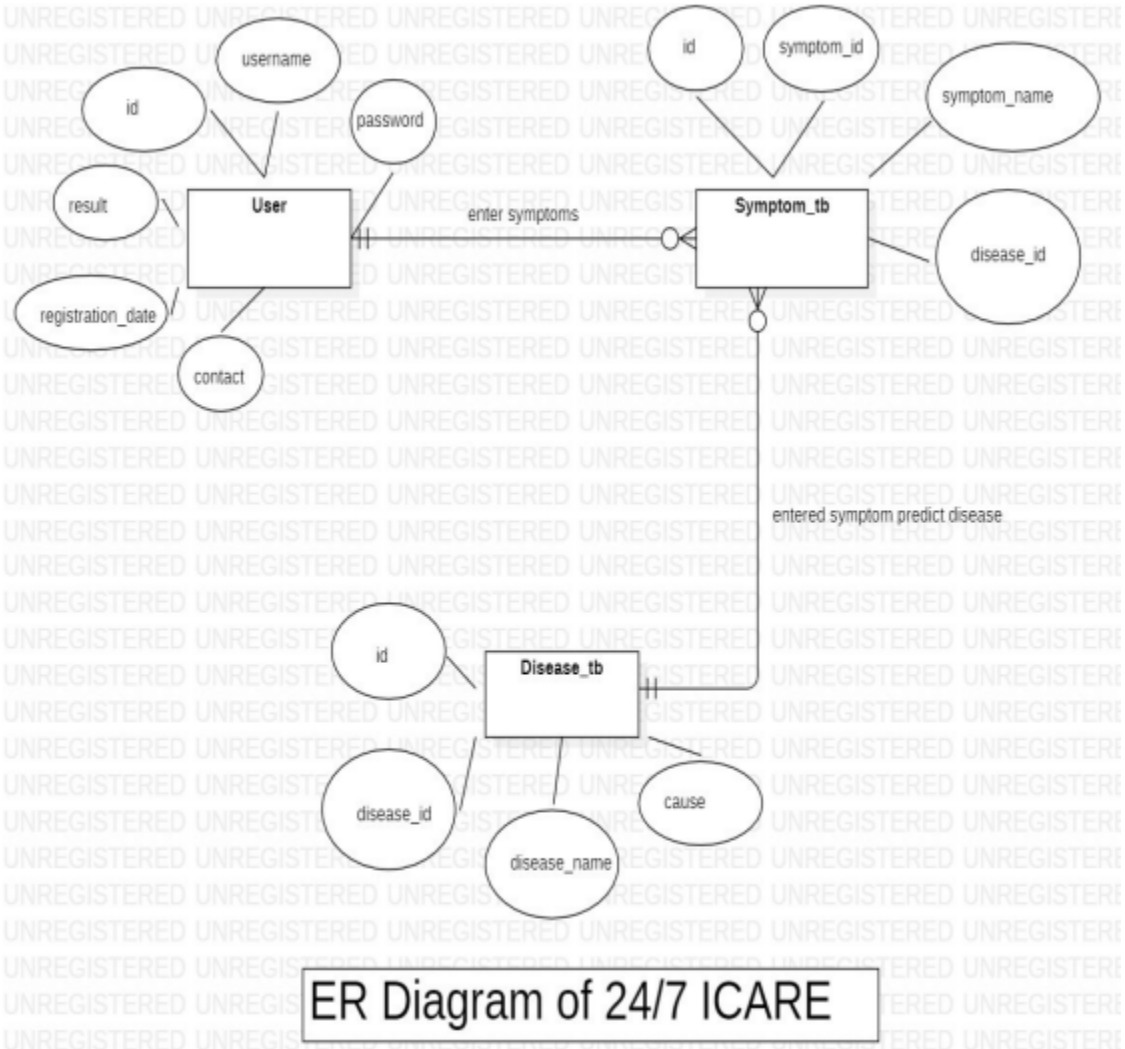
identified, the system provides first aid or initial remedy suggestions to the user. This might include general advice, emergency contacts, or immediate steps to take before seeking professional medical help.

These use cases outline the interactions between the User and the System within the online healthcare application, encompassing registration, symptom input, disease prediction, data processing, classification of symptoms, and providing initial remedies or suggestions based on the analysis.

VI. ER DIAGRAM



VII. ALGORITHM TECHNIQUE

NAIVE BAYES:

Naive Bayes is an easy but amazingly powerful rule of probabilistic classifiers . It is called 'naive' as it is the independence assumption that allows decomposing joint likelihood into a product of marginal likelihoods.

This simplified Bayesian classifier is called naive Bayes. The Naive Bayes classifier assumes the presence of a particular feature in a class is unrelated to the presence of any other feature. Naive Bayes is a supervised learning model. Bayes theorem provides some way of calculative posterior chance P(b|a) from P(b), P(a) and P(a|b). Look at the equation below:

P(b v a)= P(a v b)P(b)/P(a)

Above,

P(b|a) is the posterior chance of class (b, target) given

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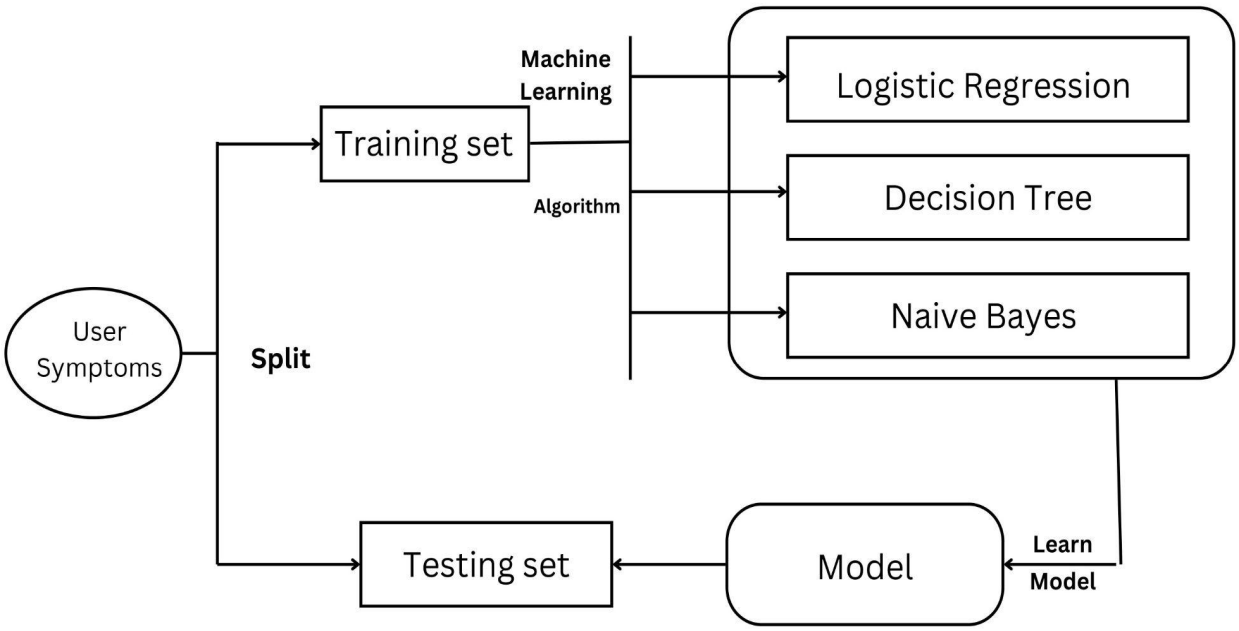
predictor (a, attributes). P(b) is the a priori probability of class.
P(a|c) is that chance that is that the chance of the predictor given class. P(a) is the a priori probability of a predictor. In our system, Naïve Bayes decides which symptom is to put in the classifier and which is not.

LOGISTIC REGRESSION
Logistic regression could be a supervised learning classification algorithm which allow to predict the chance of a target variable that is Disease.

DECISION TREE
A decision tree is a structure that can be used to divide up huge collection of records into smaller sets of records by applying a sequence of simple decision tree. With each successive division, the members of the resulting sets become more and more similar to each other. A decision tree model consists of a set of rules for dividing a large heterogeneous population into smaller, more homogeneous (mutually exclusive) groups with respect to a particular target. The target variable is usually categorical and the decision tree is used either to:
Calculate the probability that a given record belong to each of the category and, To classify the record by assigning it to the most likely class (or category). In this disease prediction system, decision tree divides the symptoms as per its category and reduces the dataset difficulty.

VIII. FUNCTIONALITIES

The main functionalities of the "24/7 ICare" project include:
1. Disease Prediction: The project utilizes machine learning algorithms to predict diseases based on the symptoms entered by the user. It provides accurate and personalized predictions to help individuals understand potential health conditions.
2. Home Remedy Suggestions: Upon receiving the user's symptoms, the application suggests appropriate home remedies that can provide immediate relief. These suggestions are tailored based on the specific symptoms and their severity.
3. Doctor Recommendations: The project offers a curated list of suitable doctors based on the diagnosed disease or symptoms. It enables users to browse through a network of healthcare professionals, read their profiles, and choose the most suitable doctor for further diagnosis and treatment.
4. User Profile Management: The project provides a feature to manage user profiles, allowing individuals to create accounts, save the history of their symptoms, and track their health conditions over time. This feature helps in maintaining a personalized health record.
5. Reliable Information: The application ensures the provision of reliable, up-to-date, and trustworthy information about diseases, symptoms, remedies, and doctors



IX. NON-FUNCTIONALITIES

Non-functional requirements for a symptoms disease prediction application typically involve aspects related to performance, security, usability, scalability, and reliability. Here are some examples:

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1. Performance:
- Response Time: The system should provide quick responses to user inputs, ensuring minimal delay in predicting diseases based on symptoms.
- Scalability: The application should handle an increasing number of users and symptom data without significant performance degradation.

2. Security:
- Data Privacy: Ensuring the confidentiality of user data and medical information by employing robust encryption methods and access control mechanisms.
- Secure Authentication: Implementing secure login procedures to prevent unauthorized access to user accounts and sensitive health data.

3. Usability:
- User-Friendly Interface: Designing an intuitive and easy-to-navigate interface for users to input symptoms and access disease predictions seamlessly.
- Accessibility: Ensuring the application is accessible to users with disabilities, complying with accessibility standards.

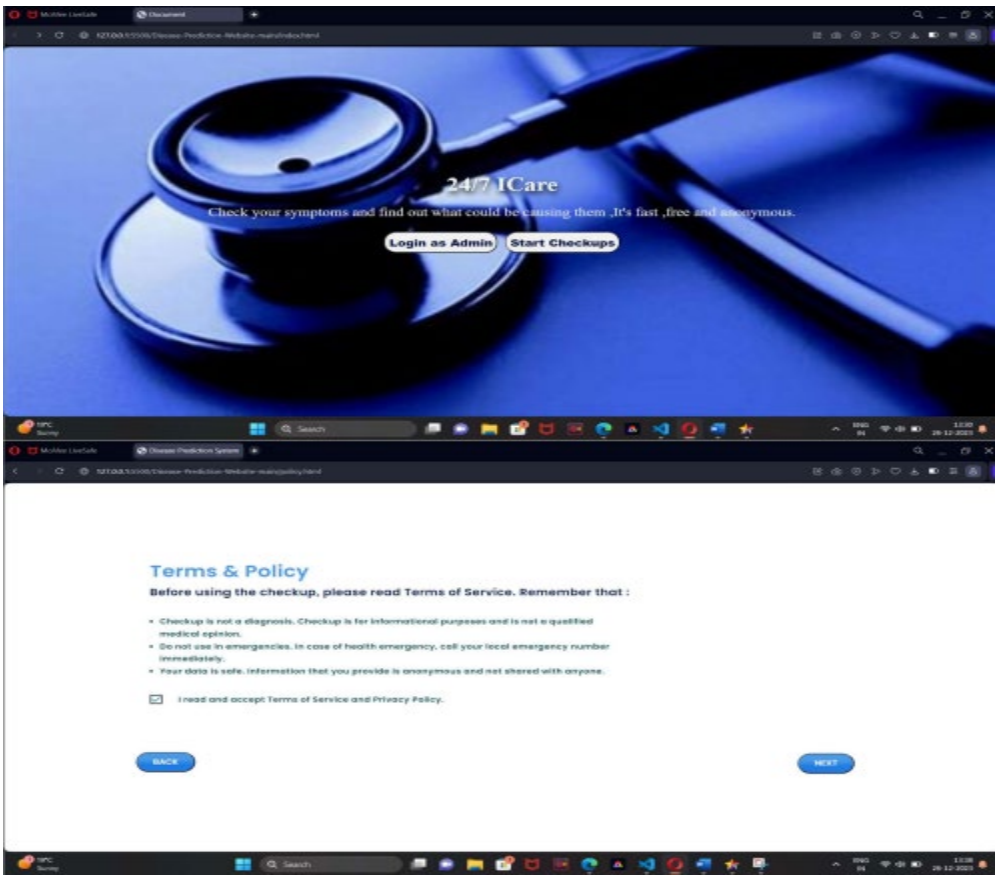
4. Reliability:
- Fault Tolerance: The system should continue functioning even in the event of minor failures or network interruptions, minimizing downtime.
- Accuracy: Ensuring the disease prediction model's accuracy and reliability by regularly updating and refining the prediction algorithms.

5. Compliance:
- Regulatory Compliance: Adhering to healthcare data protection regulations to maintain legal compliance and protect user data.

6. Interoperability:
- Integration: Supporting interoperability with other healthcare systems or applications to share data seamlessly, if required.

Addressing these non-functional requirements is crucial to ensure the effectiveness, security, and user-friendliness of the symptoms disease prediction application while maintaining compliance with regulations and industry standards.

X. RESULTS OUTPUTS & TESTING



XI. CONCLUSION

In conclusion, this review paper has elucidated the significant strides made in disease prediction systems through the lens of machine learning. The amalgamation of sophisticated algorithms, extensive datasets, and innovative technologies has propelled the field forward, enhancing our ability to foresee and manage various health conditions.

As we reflect on the collective findings from diverse studies, it becomes evident that machine learning models have demonstrated commendable efficacy in predicting diseases with the potential for transformative impacts on healthcare outcomes.

Amidst this evolving landscape, our website, ICARE, emerges as a beacon for those navigating the complexities of disease prediction.

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