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Predictive Analytics and Diagnosis for Diseases: A Machine Learning Approach

Prof. Rahul Samant, Prachi Sapkal, Vaishnavi Barsavade, Shravani Rakate
Department of Information Technology Engineering
NBN Sinhgad Technical Institutes Campus, Pune, India

Abstract: *Healthcare systems face significant challenges in early disease detection, misdiagnosis, and accessibility, particularly in resource-limited areas. This project proposes a disease prediction system utilizing Multinomial Naive Bayes (Multinomial NB) and Random Forest Classifier to address these issues. The system analyses patient symptoms and medical data to predict diseases and provide appropriate remedies, promoting timely interventions and better patient outcomes. The Multinomial Naive Bayes algorithm efficiently handles categorical symptom data through probabilistic modelling , making it well-suited for symptom-based inputs. The Random Forest Classifier, employing ensemble learning, enhances the accuracy and robustness of predictions, especially in handling complex datasets and missing data. Together, these algorithms form a reliable and scalable solution designed for real-world healthcare applications. The system follows a structured methodology: collecting and preprocessing medical datasets, implementing algorithms for disease prediction, and developing a user-friendly interface for patients and healthcare professionals. This interface facilitates symptom input, disease prediction, and remedy suggestions. Model evaluation metrics like accuracy and precision ensure the system's performance and scalability. Motivated by the need for accessible healthcare, this project aims to reduce diagnostic errors, improve decision-making, and support healthcare providers with data-driven tools. Future extensions include integrating wearable devices for real-time monitoring, telemedicine platforms for remote consultations, and advanced AI techniques like deep learning to enhance prediction capabilities. By leveraging machine learning, this system addresses critical gaps in healthcare, offering a scalable and efficient solution that enhances diagnostic accuracy, supports early detection, and improves global healthcare accessibility..*

Keywords: Disease prediction, Multinomial Naive Bayes, Random Forest Classifier, early detection, healthcare accessibility, machine learning, probabilistic modelling , ensemble learning, diagnostic accuracy, patient care, symptom analysis, scalable system, real-world healthcare, telemedicine, wearable devices integration