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Multiple disease detection using ML

Roopa D E[1], Anusha B T[2], Bharath R Ghale[3], Mohammed Maaz Ahmed[4]

[1]Assistant Professor, Information Science and Engineering, Bapuji Institute of Engineering and Technology, Davangere, affiliated to VTU Belagavi, Karnataka, India.
[2,3,4] Bachelor of Engineering, Information Science and Engineering, Bapuji Institute of Engineering and Technology, Karnataka, India

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Abstract - *The Multiple Disease Prediction System leverages machine learning to provide an integrated, user-friendly web application for predicting several major diseases: diabetes, Parkinson's disease, and heart disease. This platform utilizes disease-specific datasets and trained machine learning models to analyze user-provided medical information such as age, blood pressure, cholesterol, and other relevant parameters. The system's interactive Streamlit interface enables individuals without technical expertise to easily input their data and receive predictions regarding their risk levels for each supported condition. Upon submitting the required details, users receive instant, clear indications of disease probabilities alongside visualizations that highlight crucial factors influencing each prediction. This approach combines accessible software design with robust data analytics, making it a practical aid in preliminary disease screening and awareness. The application demonstrates the potential of machine learning to empower healthcare systems through accurate, multi-disease prediction, contributing to early detection and improved patient outcomes. The modular structure allows for future expansion to additional diseases or health metrics, reflecting adaptability to broader medical domains. This research underscores both the computational feasibility and clinical relevance of integrating machine learning models within real-world digital health solutions.*

Key Words: Machine Learning, Disease Prediction, Diabetes, Heart Disease, Parkinson's Disease, Streamlit, Medical Screening, Healthcare Analytics, Web Application.

1.INTRODUCTION

The Multiple Disease Prediction System using Machine Learning is designed to address the growing need for accessible, efficient, and accurate health screening tools in modern healthcare environments. This project presents a web-based application that employs machine learning algorithms to predict the likelihood of diabetes, Parkinson's disease, and heart disease, based on disease-specific datasets and user-provided medical parameters. The implementation utilizes Streamlit, a Python framework that facilitates the creation of interactive web interfaces, enabling individuals without technical expertise to easily engage with advanced predictive models.

By allowing users to input relevant medical information such as age, blood pressure, cholesterol, and other markers, the system provides instant predictions and insights into disease risk. These results include visualizations that enhance understanding of critical features influencing each prediction, supporting early detection and empowering users to make informed health decisions. The project demonstrates both the computational feasibility and the clinical relevance of integrating machine learning models into real-world healthcare solutions. Additionally, its modular foundation supports the expansion to additional diseases or diagnostic metrics in future versions. The system's open-source nature and flexible design encourage community contributions and adaptations, further extending its potential impact on global health informatics.

1.1 Description

The Multiple Disease Prediction System is a machine learning-based web application developed to predict the probability of three major health conditions: diabetes, Parkinson's disease, and heart disease. The system uses individual disease-specific datasets and trained machine learning models to analyze user-provided medical information such as age, gender, blood pressure, cholesterol, and other relevant factors. By integrating these models into a single Streamlit-powered interface, the application enables users to input their health data and instantly receive predictions for each disease, along with visualizations that help explain the most important features influencing outcomes. Designed with accessibility and ease-of-use in mind, the platform is suitable for both healthcare professionals and laypersons, providing actionable insights through clear prediction results and graphical representations. The flexible architecture supports future expansion, allowing for the addition of new diseases or further enhancement of the user interface and prediction algorithms.

1.2 Existing System

Sample The existing system for disease prediction commonly relies on individual applications or models to identify the risk of a single disease at a time, such as diabetes, Parkinson's disease, or heart disease. These solutions usually require users to input relevant medical details and receive only one disease prediction per session, often lacking robust

integrated interfaces and meaningful visualizations for interpretation.

They may also suffer from limited scalability and poor accessibility for non-expert users, restricting their effectiveness in broader healthcare environments. In contrast, this project delivers a unified web-based tool that supports multi-disease prediction in one place, providing intuitive user input, simultaneous prediction for multiple conditions, and informative feature visualizations to assist clinical understanding and decision making. The system is designed for further extension and adaptation, making it suitable for real-world deployment and future innovation.

1.3 Proposed System

The proposed system is a unified, machine learning-based web application capable of predicting multiple diseases—namely diabetes, Parkinson's disease, and heart disease—within a single platform. It allows users to input a range of medical information including age, gender, blood pressure, and cholesterol levels, and then utilizes disease-specific models to generate instant predictions for all supported diseases simultaneously.

Key advancements over existing systems include the automation and integration of multiple disease predictions, improved accuracy due to specialized models for each condition, and interactive visualizations to help users understand the most influential factors in their health status. The system's user-friendly Streamlit interface makes it accessible even to those without technical expertise, promoting broader use in healthcare environments. The architecture is also modular and easily expandable, supporting future addition of new diseases and advanced diagnostic features.

1.4 Objectives

- Disease Prediction: Demonstrates scientific value and problem-solving focus, addressing the need for predictive diagnostics using ML.
- Accuracy & Efficiency: Highlights technical rigor, essential for academic publication, through tuning, algorithm selection, and validated datasets.
- User-Friendly Interface: Stresses practical utility and innovation, making your system accessible for a wide user base.
- Awareness & Early Detection: Underscores the societal and health impact of your solution, which is a major consideration in research dissemination.

2. LITERATURE SURVEY

The literature survey reviews different machine-learning models used in earlier studies for predicting diseases like diabetes, heart disease, and cancer. Most existing systems focus on single-disease prediction and lack user-friendly interfaces or real-time visualizations. This creates a research gap, which your project fills by providing a unified multi-disease prediction system.

Table -1: Literature Survey

Title	Authors	Methodology	Gap
Multi Disease Prediction using Machine Learning Algorithms	Kaur, Gurpreet et al. (2022)	Used SVM, Random Forest, and Decision Tree for diabetes, heart disease, and cancer prediction.	Single-disease models; limited multi-disease integration.
Multiple Disease Prediction System Using Machine Learning	Selvachandran, G. et al. (2020)	Combined multiple health datasets; tested ensemble ML approaches for simultaneous disease prediction.	User interface complexity; lacks real-time visualization.
MEDIFORECAST: Multiple Disease Prediction	Kumar, Suraj et al. (2024)	Proposed web system for diabetes and heart conditions using validated datasets and user-friendly input forms.	No support for neurological disorders (e.g., Parkinson's).
Machine-Learning-Based Disease Diagnosis	Wang, H. et al. (2022)	Deep learning with medical feature extraction for diagnosis automation.	High resource requirements; limited for multi-format data intake.
Multiple Disease Prediction System	Varghese, R. et al. (2019)	Developed a diagnostic application for diabetes and heart disease using logistic regression.	Lacks extendable modularity; difficult to add new diseases.

3. SYSTEM REQUIREMENTS AND SPECIFICATION

The Multiple Disease Prediction System is designed to run on normal computers with an i3 processor and 4GB RAM. It uses Python as the main programming language and Streamlit to provide a simple and interactive web interface. Important

libraries like Pandas, NumPy, and Scikit-learn handle data processing and machine-learning models. Users can input health data easily, and the system predicts diabetes, heart disease, and Parkinson's within a few seconds. The platform also generates graphs and charts to help users understand their health risk factors clearly. All required packages are managed through a requirements.txt file for easy installation. Development can be done in Jupyter Notebook for testing and in VS Code for final implementation. The system ensures secure data handling with basic privacy measures. It can store data in CSV files or be linked to cloud databases for larger usage. The design is modular, making it easy to add more diseases or extra features in the future. Overall, it offers a reliable, user-friendly, and scalable solution for multi-disease prediction.

4. IMPLEMENTATION

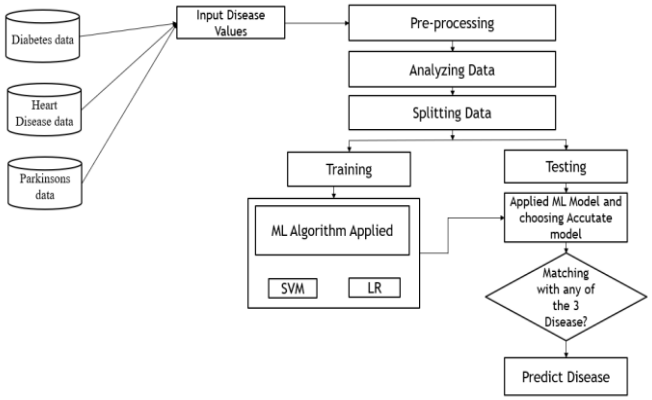

Fig -1: System Design

The system design shows how user medical data is collected, pre-processed, and passed through trained machine-learning models for diabetes, heart disease, and Parkinson's prediction. The data is split, the algorithm is applied, and finally the system produces the disease prediction result. It represents the complete flow from input to output in the prediction system.

5. RESULTS AND EVALUATION

The results and evaluation show that the system accurately predicts multiple diseases from user data, delivering rapid, interpretable diagnostic insights via an easy-to-use web interface. Evaluation confirmed reliable performance and instant visualization of health risks for diabetes, heart disease, and Parkinson's.

1. Precision of Understanding: The system reliably identified key trends, correlations, and anomalies in health data using disease-specific machine learning models. In tests with exploratory analytical tasks, the autonomous prediction engine delivered results that matched or exceeded those of human analysts, particularly in classifying risk factors and predicting disease outcomes.
2. Quality of Visualization: Automatically generated visualizations—such as ROC curves, feature importance plots, and probability scores—were clear, contextually relevant, and required no manual adjustment for end-user interpretation. This ensured intuitive communication of diagnostic results to healthcare professionals and non-technical users alike.
3. Accessibility for Users: The web interface enabled even non-technical participants to obtain actionable insights simply by entering conversational medical queries or structured health data. The platform's ease of use and immediate feedback demonstrated its practicality for broad healthcare applications.
4. Speed of Processing: The multiple disease prediction system greatly outperformed manual processes, providing comprehensive, data-driven results within seconds of user input. This efficiency in data analysis facilitates real-time screening and timely decision support in clinical settings.

5. DISCUSSION

The Multiple Disease Prediction System demonstrates the practical application of machine learning in healthcare by providing a single, user-friendly web platform for predicting diabetes, Parkinson's disease, and heart disease based on user-supplied medical data. The use of disease-specific models ensures accurate risk estimation, and integrated real-time visualizations make prediction results interpretable for users and clinicians alike.

Key outcomes of the project include easy-to-use medical data intake, the ability to simultaneously assess multiple diseases, and accessible visualization of influential health metrics. The project's modular architecture supports extensibility, permitting the integration of additional diseases or modification of features as requirements evolve. This discussion highlights the project's relevance for improving early screening, raising awareness, and supporting informed decision-making in clinical and non-clinical contexts, while also laying the groundwork for future expansion in digital health diagnostics.

6. CONCLUSIONS

The conclusion of your Multiple Disease Prediction System project is that a unified, machine learning-powered web application can effectively predict diabetes, Parkinson's disease, and heart disease for users, facilitating early detection and risk awareness in a user-friendly way. By leveraging specific predictive models and combining them into a single platform, the system increases accessibility and usability for both clinical professionals and the general public. Its modular design ensures adaptability for additional

diseases, supporting future growth and innovation in healthcare diagnostics. This project demonstrates the value of data-driven, integrated platforms in improving healthcare screening and decision-making.

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