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Early Diagnosis for Dengue Disease

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ABSTRACT

Dengue fever is a worldwide issue, especially in Yemen. Although early detection is critical to reducing dengue disease deaths, accurate dengue diagnosis requires a long time due to the numerous clinical examinations. Thus, this issue necessitates the development of a new diagnostic schema. The objective of this work is to develop a diagnostic model for the earlier diagnosis of dengue disease using Efficient Machine Learning Techniques (EMLT). This paper proposed prediction models for dengue disease based on EMLT. Five different efficient machine learning models, including K-Nearest Neighbor (KNN), Gradient Boosting Classifier (GBC), Extra Tree Classifier (ETC), eXtreme Gradient Boosting (XGB), and Light Gradient Boosting Machine (LightGBM). All classifiers are trained and tested on the dataset using 10-Fold CrossValidation and Holdout Cross-Validation approaches. On a test set, all models were evaluated using different metrics: accuracy, F1-sore, Recall, Precision, AUC, and operating time. Based on the findings, the ETC model achieved the highest accuracy in Hold-out and 10-fold cross-validation, with 99.12 % and 99.03 %, respectively. In the Holdout cross-validation approach, we conclude that the best classifier with high accuracy is ETC, which achieved 99.12 %. Finally, the experimental results indicate that classifier performance in holdout cross-validation outperforms 10-fold cross-validation. Accordingly, the proposed dengue prediction system demonstrates its efficacy and effectiveness in assisting doctors in accurately predicting dengue disease.

1. INTRODUCTION

Dengue fever is a mosquito-borne viral disease that spreads quickly in warm weather.

Dengue fever is a critical global health issue, particularly in regions like Yemen, where timely diagnosis is essential to reduce mortality

Traditional methods rely on lengthy clinical examinations, which delay treatment. It aims to develop an efficient diagnostic model using Machine Learning (ML) to enable early detection of dengue disease.

In recent years, artificial intelligence has been increasingly utilized in the field of medical data mining, and numerous decision support systems have been developed by leveraging machine learning and deep learning.

Existing System

The existing system for early diagnosis of Dengue disease prediction using efficient machine learning techniques based on clinical data typically involves the collection of patient data such as symptoms, medical history, and laboratory test results.

It use features like decision trees, support vector machines, or neural networks to provide early warning and assist healthcare professionals in timely intervention and patient management.

Proposed System

The proposed system for early diagnosis of Dengue disease prediction is designed to tackle existing challenges comprehensively.It entails the implementation of a robust data collection

framework to ensure high-quality, diverse clinical data, including an array of patient information and laboratory tests. Model explainability, employing interpretable machine learning models or providing clear explanations.

2.REQUIREMENT ANALYSIS

Functional Requirements

The system is designed to manage user interactions for early diagnosis and treatment of dengue, specifically through scheduling and managing appointments with doctors. It supports three user roles: **User (Patient)**, **Admin**, and **Doctor**, each with different access rights and functions.

The Early Diagnosis For dengue Disease consists of the following modules:

1. User
2. Admin
3. Docter

Non-Functional Requirements:

- **Security** : The system must protect sensitive patient data and user credentials through encryption and secure authentication mechanisms.
- **Scalability** : The system should be able to handle increased user loads and data volume during dengue outbreaks without performance degradation.
- **Usability** : Interfaces must be intuitive and accessible to allow users of all literacy levels to register, book appointments, and access results easily.
- **Maintainability** : The system should have modular code and documentation to support easy updates, bug fixes, and feature enhancements.
- **Performance** : The system should provide fast response times for appointment booking, data retrieval, and user interaction, even under load.
- **Availability** : The system must ensure high uptime and reliability to support continuous access, especially during health emergencies.

Software Requirments:

Operating system : Windows 10
IDE : Anaconda Prompt
Programming Language : Python 3.12
Front-end : HTML, CSS, java script
Database : SQLite

Hardware Requirements:

Processor : Intel i5
RAM : 8 GB
Hard Disk : 500 GB

3.DESIGN

Project architecture represents number of components we are using as a part of our project and the flow of request processing i.e. what components in processing the request and in which order. An architecture description is a formal description and representation of a system organized in a way that supports reasoning about the structure of the system.

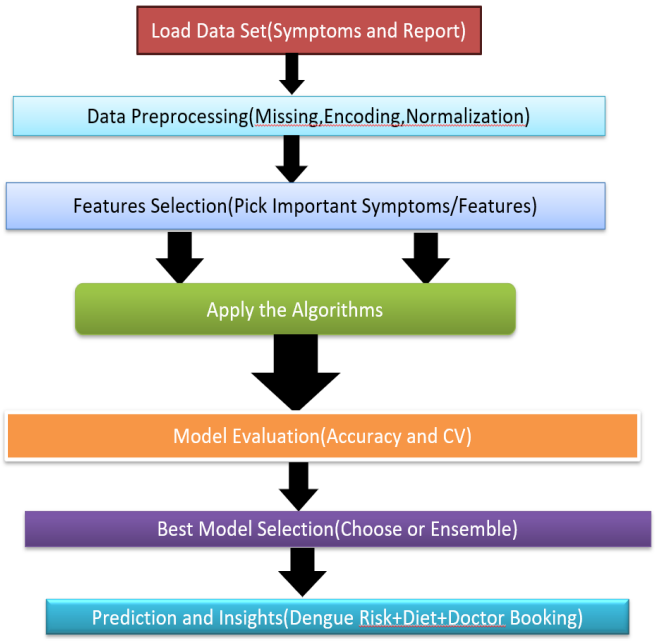


Fig 1 Data Flow Diagram

Technical Architecture

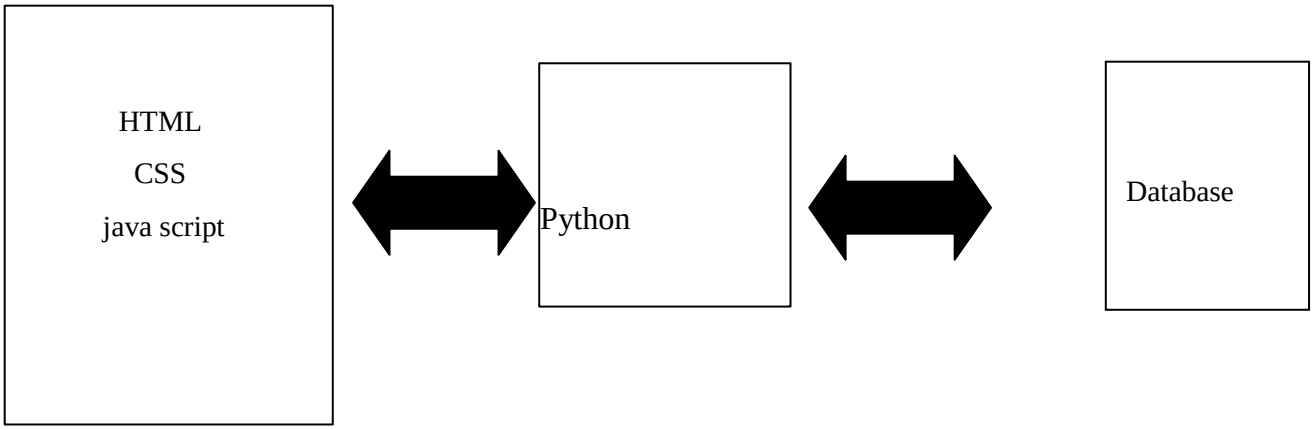


Fig. 2 Technical Architecture

4.IMPLEMENTATION

This system is developed using the Python programming language along with popular libraries for image processing and graphical interface development.

Python

Python is an easy-to-learn, high-level programming language. It is known for its clear and simple syntax, which makes it a popular choice for beginners as well as experienced developers. Python is widely used in various fields such as web development, data science, artificial intelligence, machine learning, and image processing.

In this project, Python is widely used in the **implementation of early diagnosis systems for dengue** (and other diseases) because of its powerful ecosystem for **data handling**, **machine learning**, and **backend development**.

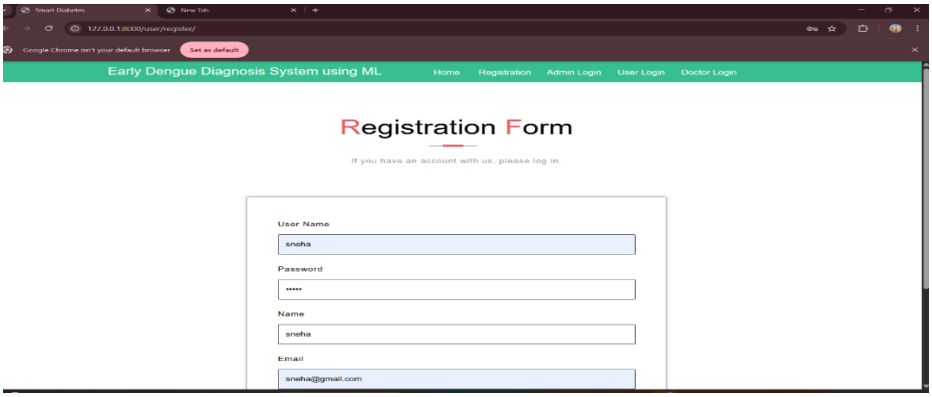
For writing and testing the Python code, **Testing in Python** is crucial for verifying the accuracy, stability, and reliability of code—especially in health-related systems like **early dengue diagnosis**.

5. SCREENSHOTS

In home page users will get registered and then login.

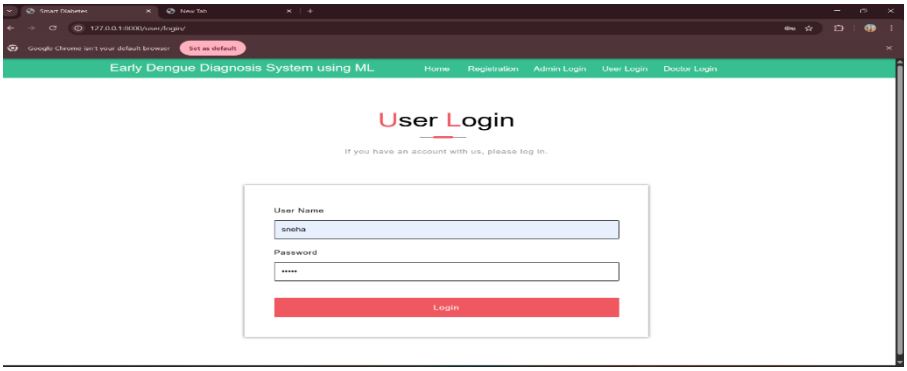
Screenshot 6.1: Home page

In the registration page users will be registered with their details.



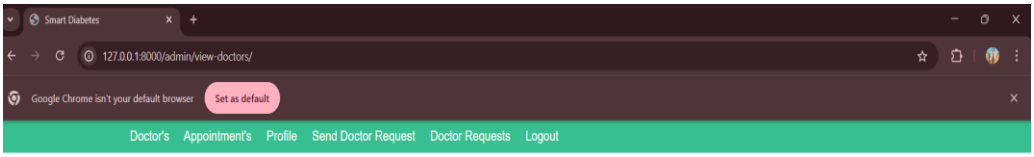
Screenshot 2: User Registration Form

Users will login by adding their username and password.



Screenshot 3 : User Login

After login doctor slot will be opened.



Doctor Slots

Name	Specialization	Qualification	Department	License No	Experience	Language	Services	Book Appointment
shankar	mphil	bipc	dental	1234567890	5	telugu,hindi	teeth replacement	book appointment
lubna	checks symptoms	mbbs	bipc	47626872918	5 years	english,hindi	check ups	book appointment

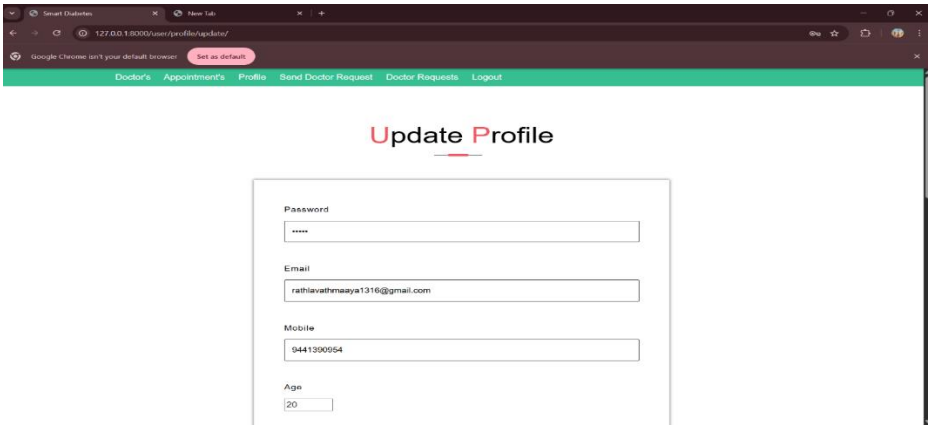
Screenshot 4 : Doctors slot User can view their appointments.

View Appointments

Patient	Doctor	Slot Timings	Date
maaya	shankar	02:30 - 02:45	May 31, 2025

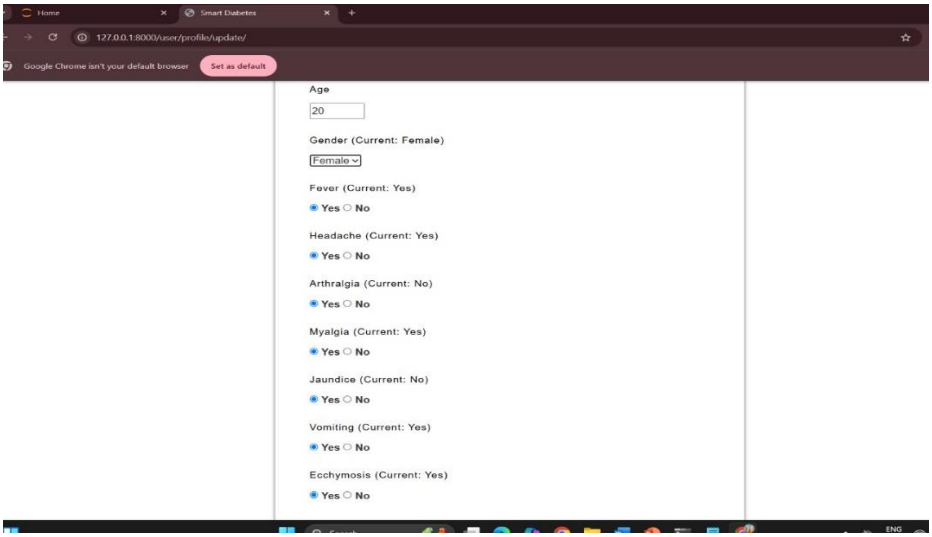
Screenshot 5: View Appointment

User can update their profile by adding their details.



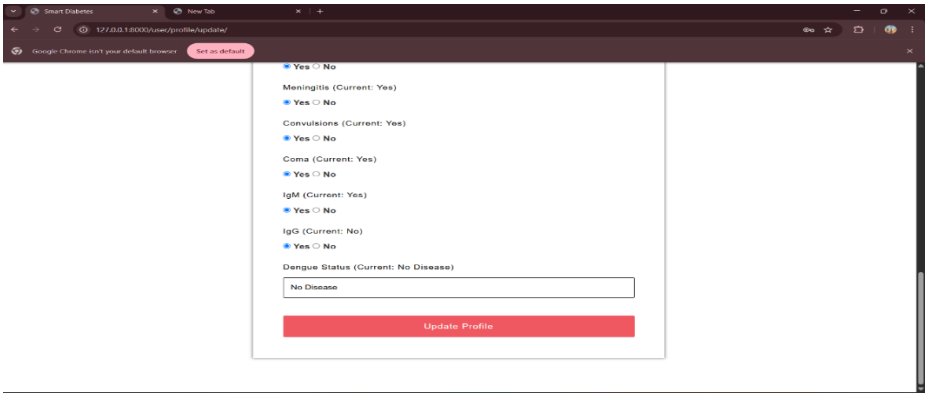
Screenshot 6: Update Profile

User needs to select their symptoms.



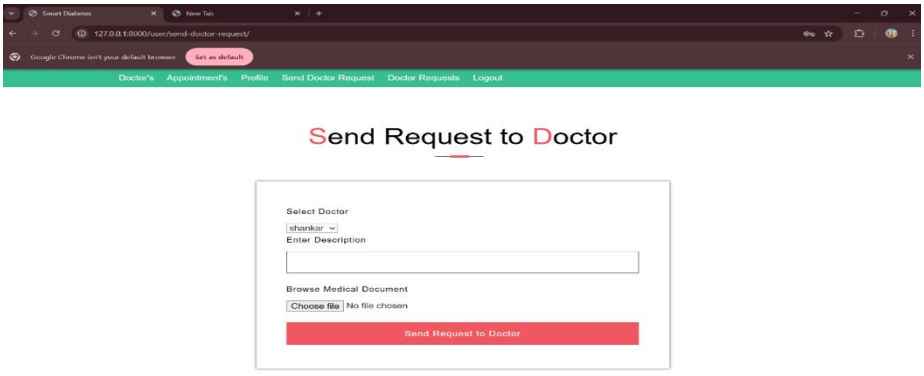
Screenshot 7: Update form

When user updates their profile then views Dengue status



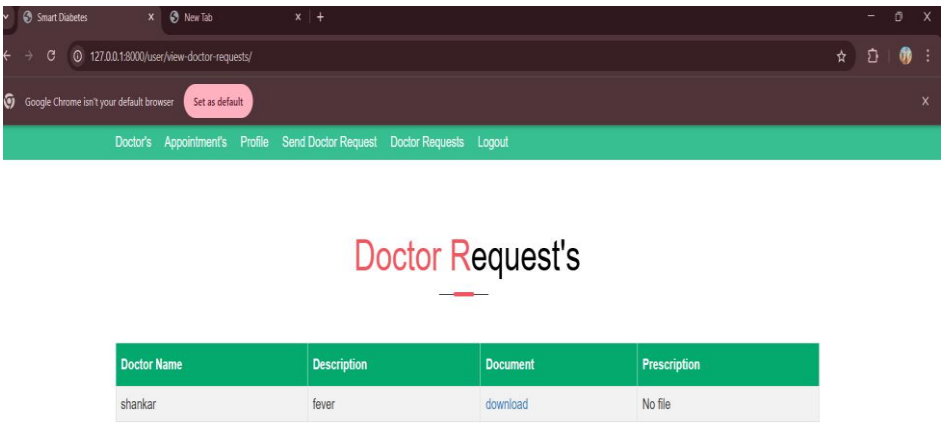
Screenshot 8:Views Dengue Status

User can send request to the doctor for the consultancy



Screenshot 9:Send Request to Doctor

We can see Doctor request



Screenshot 10:Doctor Request

6-CONCLUSION

Dengue infection is a global problem today. The early detection and prevention of dengue can help to avoid complications and save human lives.

It aims to develop an efficient diagnostic model using ML.

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