A

Project Report

On

PERSONAL HEALTH CARE MANAGEMENT SYSTEM USING MACHINE LEARNING

Submitted to

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR,

ANANTHAPURAMU

In Partial Fulfillment of the Requirements for the Award of the Degree of

BACHELOR OF TECHNOLOGY
IN
COMPUTER SCIENCE AND ENGINEERING

Submitted by

AREM TEJA	(209E1A0509)
AVULAPATI NIRANJAN	(209E1A0511)
CHITTAMURI POOJITHA	(209E1A0544)
GEDDAM MOUNIKA	(209E1A0562)

Under the Guidance of

Mrs. I. Madhavilatha, M.Tech.,

Assistant Professor,CSE

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SRI VENKATESWARA ENGINEERING COLLEGE

(Approved by AICTE, New Delhi, NBA & NAAC Accredited Institution with UGC section 2(f) & 12(b) & Affiliated to JNTUA, Anantapuramu)

Karakambadi Road, Tirupati - 517507

(2020-2024)

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CERTIFICATE

This is to certify that the Project report entitled "PERSONAL HEALTH CARE MANAGEMENT USING MACHINE LEARNING" is the bonafide work carried out by

AREM TEJA	**(209E1A0509)**
AVULAPATI NIRANJAN	**(209E1A0511)**
CHITTAMURI POOJITHA	**(209E1A0544)**
GEDDAM MOUNIKA	**(209E1A0562)**

Towards the partial fulfilment of the requirements for the award of the degree of
BACHELOR OF TECHNOLOGY in COMPUTER SCIENCE & ENGINEERING
*from **JNTUA,** Ananthapuramu during the year 2020 – 2024.*

GUIDE: **HEAD OF THE DEPARTMENT:**

External Viva – Voce held on _____

INTERNAL EXAMINER **EXTERNAL EXAMINER**

DECLARATION

We hereby declare that the project report entitled "**PERSONAL HEALTH CARE MANAGEMENT SYSTEM USING MACHINE LEARNING"** done by us under the guidance of **Mrs. I. Madhavilatha,** and is submitted in partial fulfillment of the requirements for the award of the bachelor's degree in **Computer Science and Engineering.** This project is the result of our **own effort,** and it has not been submitted to any other University or Institution for the award of any degree or diploma other than specified above.

AREM TEJA (209E1A0509)

AVULAPATI NIRANJAN (209E1A0511)

CHITTAMURI POOJITHA (209E1A0544)

GEDDAM MOUNIKA (209E1A0562)

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AREM TEJA (209E1A0509)
AVULAPATI NIRANJAN (209E1A0511)
CHITTAMURI POOJITHA (209E1A0544)
GEDDAM MOUNIKA (209E1A0562)

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ABSTRACT

The Personal Health Management System seamlessly blends machine learning and web development to empower users in tracking and enhancing their well- being. The journey begins with a straightforward registration process, where users provide essential details like Username, Password, Name, Date of Birth, Gender, Weight and Height. Upon successful registration, users proceed to the login page, where they enter their username and password. Once authenticated, they gain access to the home page-a hub of diverse health metrics. Users can input data on heart rate, Weight, sleep duration. The innovative aspect of the project lies in its machine learning capabilities. The system analyses the entered health data and provides personalized insights. The results are categorized as the score, offering users a clear snapshot of their well-being. This project not only emphasizes active user participation in health tracking but introduces stars as a motivational element, promoting daily logins for sustained engagement. The incorporation the Health Score feature adds a gamified and personalized dimension to the user's health management experience.

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AVULAPATI NIRANJAN (209E1A0511)
CHITTAMURI POOJITHA (209E1A0544)
GEDDAM MOUNIKA (209E1A0562)

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CHAPTER – 1
INTRODUCTION

In the realm of healthcare, the integration of Artificial Intelligence (AI) and machine learning techniques has sparked a wave of innovation, particularly in emergency medicine. Our project delves into this burgeoning field, aiming to leverage AI advancements to enhance medical decision-making processes.

At its core, our project encompasses a comprehensive platform designed to streamline healthcare operations. Anchored by a robust Django framework, the platform features essential components including registration and login pages, a user-friendly dashboard, and intuitive data entry interfaces. This infrastructure serves as the foundation for deploying advanced AI algorithms aimed at improved Healthcare awareness among people.

Central to our endeavor is the development of a machine learning model adept at predicting patient outcomes based on vital health metrics. By harnessing inputs such as heart rate, Body Mass Index (BMI), gender, sleep patterns, and age, our model generates categorical outputs indicative of varying health conditions. This predictive capability holds immense potential for assisting healthcare providers in making timely and informed decisions, particularly in emergency scenarios.

However, as with any AI-driven endeavor, the efficacy of our model hinges on the quality and quantity of data available. Just as the reference introduction emphasizes the critical importance of data in AI applications within emergency medicine, our project underscores the necessity for rigorous validation and continual improvement. Through meticulous analysis and iterative refinement, we strive to augment the accuracy and reliability of our predictive model, ultimately contributing to the advancement of emergency medical care.

In summary, our project represents a proactive foray into the intersection of AI, machine learning, and healthcare. By amalgamating sophisticated technology with real-world medical insights, we aim to pave the way for a future where data-driven decision-making enhances patient outcomes and optimizes emergency medical response.

CHAPTER – 2
PROJECT DESCRIPTION

PROJECT DEFINITION

Our project revolves around the creation of a comprehensive health monitoring platform tailored for individuals keen on proactive health management. Unlike traditional healthcare systems solely catering to patient needs, our platform targets a broader audience encompassing individuals who prioritize monitoring and optimizing their own health.

At its essence, our project is defined by the integration of cutting-edge technology and user- centric design, culminating in a robust Django-based framework. This framework facilitates seamless user interaction through intuitive features including registration and login pages, a personalized dashboard, and user-friendly data entry interfaces.

Central to our endeavor is the implementation of a sophisticated machine learning model designed to analyze vital health metrics and provide actionable insights. By incorporating inputs such as heart rate, Body Mass Index (BMI), gender, sleep patterns, and age, our model delivers categorical outputs indicative of various health conditions. This predictive capability empowers users to proactively monitor their health status and take preemptive measures as necessary.

Importantly, our project is distinguished by its focus on preventive healthcare and individual empowerment. Beyond merely reacting to medical emergencies, our platform empowers users to take proactive control of their health journey, enabling informed decision-making and lifestyle adjustments to optimize well-being.

Our project redefines healthcare engagement by catering exclusively to individuals committed to monitoring and improving their health proactively. By harnessing the power of AI and MI, we aim to empower users with the knowledge and tools necessary to embark on a journey of holistic health and well-being.

PROJECT DETAILS

The project involves several key components:

Data Collection:

Gathering comprehensive datasets containing patient information, including demographics, medical history, clinical observations, and outcomes, from diverse emergency medical settings.

Data Preprocessing:

Cleaning and preprocessing the collected data to handle missing values, outliers, and inconsistencies. This step may also involve feature engineering to extract relevant information and reduce dimensionality.

Model Selection:

Evaluating and selecting appropriate machine learning algorithms for building the predictive model. This may include traditional methods like logistic regression, decision trees, and support vector machines, as well as more advanced techniques such as random forests, artificial neural networks, and deep learning models like LSTM.

Model Training:

Training the selected machine learning models on the preprocessed data to learn patterns and relationships between input features and patient outcomes. This step involves optimizing model parameters and hyperparameters to improve performance.

Model Evaluation:

Assessing the performance of the trained models using appropriate metrics, such as accuracy, precision, recall, and F1-score. Cross-validation techniques may be employed to ensure robustness and generalizability.

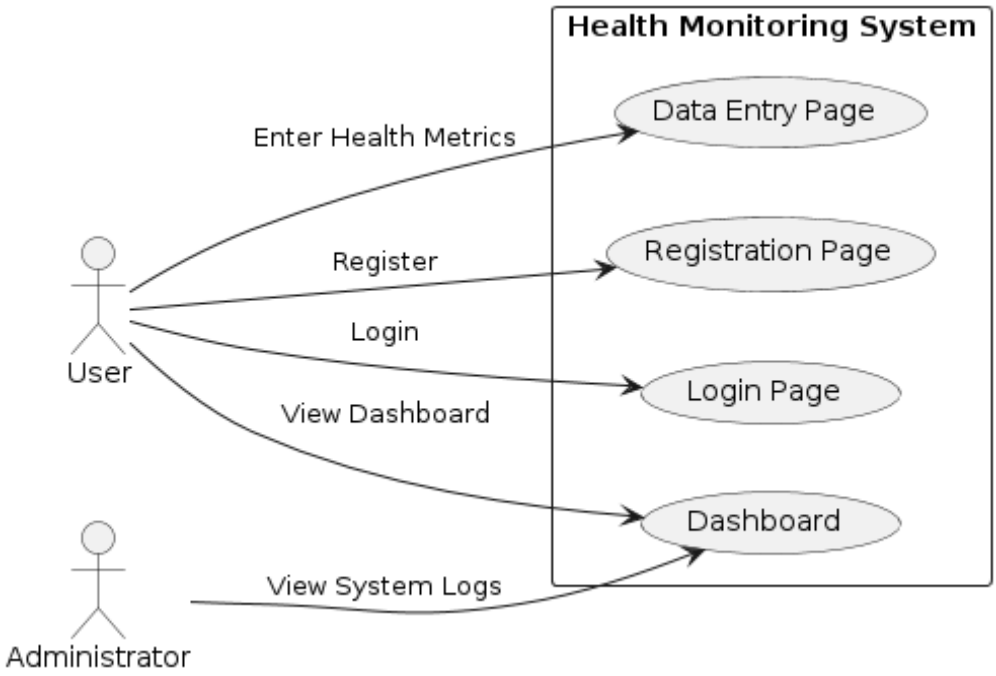
Deployment and Integration:

Integrating the developed predictive model into existing hospital systems or emergency medical workflow to assist medical professionals in prioritizing patient admissions. This may involve developing user interfaces or APIs for seamless interaction with the model.

Monitoring and Improvement:

Continuously monitoring the performance of the deployed model in real-world settings and incorporating feedback to improve its accuracy, reliability, and fairness overtime. This iterative process may involve retraining the model with updated data or refining its algorithms and features.

Overall, the project aims to leverage machine learning techniques to enhance emergency medical practices by optimizing hospital admission prioritization and ensuring timely.



CHAPTER – 3

COMPUTATIONAL ENVIRONMENT

HARDWARE REQUIREMENTS

- Processor - I7/Intel Processor
- Hard Disk - 160GB
- Key Board - Standard Windows Keyboard
- Mouse - Two or Three Button Mouse
- Monitor - SVGA
- RAM - 8GB

SOFTWARE REQUIREMENTS

- Operating System : Windows 11
- Server-side Script : HTML, CSS, JS
- Programming : Python
- Libraries : Django, Pandas , MySQL , OS , Smtplib , NumPy
- IDE/Workbench : VS CODE
- Technology : Python 3.6+

SOFTWARE FEATURES

Operating System

The software is designed to run on the Windows 11 operating system, providing a stable and modern platform for executing the application. Windows 11 offers support for the latest hardware and software technologies, ensuring compatibility and reliability.

Server-side Scripting

HTML, CSS, and JavaScript are utilized for developing the front-end user interface and interactive elements of the web application. These technologies enable the creation of dynamic and visually appealing web pages that enhance user experience and engagement.

Programming Language

Python is the primary programming language used for developing the application's back-end logic, data processing algorithms, and machine learning models. Python's simplicity, readability, and extensive libraries make it well-suited for a wide range of tasks, including web development and data analysis.

Libraries

The software relies on several Python libraries for various functionalities:

Django

Django is a high-level web framework that simplifies the development of complex web applications by providing built-in features for URL routing, database management, and user authentication.

Pandas

Pandas is a powerful data manipulation library that offers data structures and functions for analyzing and manipulating structured data, such as tabular datasets.

MySQL

MySQL is a popular relational database management system used for storing and managing structured data. It provides scalability, reliability, and performance for handling large datasets.

OS

The OS module in Python provides functions for interacting with the operating system, such as file operations, directory manipulation, and environment variables.

NumPy

NumPy is a fundamental library for scientific computing in Python, providing support for multidimensional arrays, mathematical functions, and linear algebra operations.

IDE/Workbench

Visual Studio Code is recommended as the integrated development environment (IDE) or workbench for writing, editing, and debugging Python code. Visual Studio Code offers a lightweight and extensible platform with features such as syntax highlighting, code completion, and integrated terminal, making it suitable for Python development.

Technology

The software is developed using Python 3.6 or higher to leverage the latest language features and enhancements. Python 3.6+ ensures compatibility with modern Python libraries and frameworks, enabling efficient development and deployment of the software.

CHAPTER – 4

FEASIBILITY STUDY

TECHINCAL FEASIBILTY:

Data Availability

Assess the availability and accessibility of relevant datasets required for training machine learning models, including Heartbeat, Age, Gender, Height, Weight, Sleep-time.

Algorithm Selection

Evaluate the feasibility of implementing machine learning algorithms for predicting patient outcomes and prioritizing Healthcare rating. Consider the complexity and computational requirements of algorithms such as logistic regression, random forests, support vector machines (SVM), multilayer perceptron (MLP).

SOCIAL FEASIBILTY:

Stakeholder Engagement

Engage key stakeholders, including General people who are interested to take care of their health.

Public Perception

Consider public perceptions and attitudes towards using machine learning in healthcare, particularly in the context of Health care management. Educate the public about the potential benefits, risks, and safeguards associated with the prioritization system to build trust and acceptance.

Ethical Considerations

Address ethical concerns related to patient privacy, data security, and algorithmic bias. Ensure transparency, fairness, and accountability in the development and deployment of the prioritization system to uphold ethical standards and maintain public trust.

ECONOMIC FEASIBILITY:

Cost-Benefit Analysis

Conduct a cost-benefit analysis to assess the financial feasibility of implementing the machine learning-based prioritization system. Consider the initial investment required for system development, data acquisition, hardware, software licenses, and personnel training.

Return on Investment (ROI)

Estimate the potential ROI from implementing the prioritization system, taking into account potential cost savings from improved resource allocation, reduced patient waits times, better patient outcomes, and increased operational efficiency.

Budgetary Constraints

Evaluate the organization's financial resources and budgetary constraints to determine the feasibility of funding the implementation and maintenance of the system, we can efficiently develop a website with the following budget constraints.

CHAPTER – 5
SYSTEM ANALYSIS

EXISTING SYSTEM

In the existing system, Patients should manually visit hospitals for regular healthcare check-up. Most of the people who are unaware of the balanced ranged of health values have a difficulty in approximating whether their health is good condition or not.

DISADVANTAGES OF HOSPITALS:

Expenses:
Many Hospitals charges much more amount than an average middle-class income. This has become burden for the middle-class people in the sector of health-care.

Accessibility:
Accessing the hospitals for the people who are busy at their life and the people who are in remote places has been a promising problem to reach out and monitor their health.

PROPOSED SYSTEM

Proposed several machine learning models to classify the Personal Health Care Management System, though a online website which can tackle the problem in an efficient way using Machine Learning and web development together to give a health rating out of 5 stars for a better understandability of medically uneducated people.

ADVANTAGES

Web page-based service:
Creating a Dynamic webpage which can use ML in the back-end which is a cross platform supported format can approach the problem in a very subtle way.

Efficiency ML Model:
Using Machine Learning algorithms, we can train the model for better pattern predicting and estimating the rating of the people.

CHAPTER – 6
SYSTEM DESIGN

INTRODUCTION TO INPUT DESIGN:

Within our health monitoring platform, input design plays a pivotal role in ensuring the seamless capture and processing of user-generated data, which ultimately drives the generation of actionable insights. Input, in this context, refers to the raw health metrics and information provided by users through various input devices such as personal computers, mobile devices, or wearable sensors.

The quality of input directly influences the quality of the output, making it imperative to design input interfaces that exhibit the following characteristics:

I. Purposeful Effectiveness: Input forms and screens should efficiently serve their intended purposes, whether it's storing, recording, or retrieving health- related information.

II. Accuracy and Completion: Emphasis is placed on ensuring that input data is accurately and completely captured, minimizing errors and discrepancies.

III. Ease of Use: Input interfaces should be user-friendly, making it easy for individuals to input their health data without encountering complexities.

IV. Attention to User Experience: Design considerations prioritize user attention, consistency, and simplicity to enhance the overall user experience.

Achieving these objectives necessitates a thorough understanding of the following:

I. The specific health metrics and information required for effective health monitoring.

II. User preferences and responses to different elements of input forms and screens.

Objectives for Input Design:

1.Designing Intuitive Data Entry Procedures:

Develop user-friendly input interfaces tailored to the needs of health-conscious individuals, ensuring ease of use and seamless interaction.

2.Streamlining Input Volume:

Focus on capturing essential health data while minimizing redundancy, optimizing the efficiency of data entry processes.

3.Implementing Validation Checks:

Ensure the accuracy and reliability of user- provided health data by incorporating validation checks and effective input controls.

4.Enhancing User Experience:

Prioritize user satisfaction by designing input forms and screens that are easy to navigate, visually appealing, and aligned with user preferences.

Objectives for Output Design:

1.Tailoring Outputs to User Needs:

Develop output designs that align with users' needs and preferences, ensuring relevance and usefulness in decision-making processes.

2.Maximizing User Satisfaction:

Deliver outputs rated on a 5-star scale, aiming to provide clear and insightful presentations of health insights derived from processed data.

3.Ensuring Clarity and Accessibility:

Format outputs in a clear and understandable manner, utilizing appropriate visualizations and directing them to the appropriate individuals or channels for easy access.

4.Timely Availability of Outputs:

Ensure outputs are available in a timely manner, facilitating prompt decision-making and proactive health management for users.

Output:

In our health monitoring platform, output refers to the presentation of insights and recommendations derived from processed health data. This includes visualizations such as charts, graphs, and ratings presented to users through the platform's interface. The output aims to provide actionable insights and recommendations to users, empowering them to make informed decisions about their health and well-being.

UML DIAGRAMS

Use Case Diagram:

In the context of our health monitoring platform, a use case diagram serves as a visual representation of the functionality provided by the system, focusing on the interactions between actors (such as users) and the system itself. It illustrates the various tasks or goals (use cases) that users can perform within the system and any dependencies between these tasks. Actors may include individuals monitoring their health, healthcare providers, and administrators. The diagram highlights the roles of these actors in the system and the functions they perform.

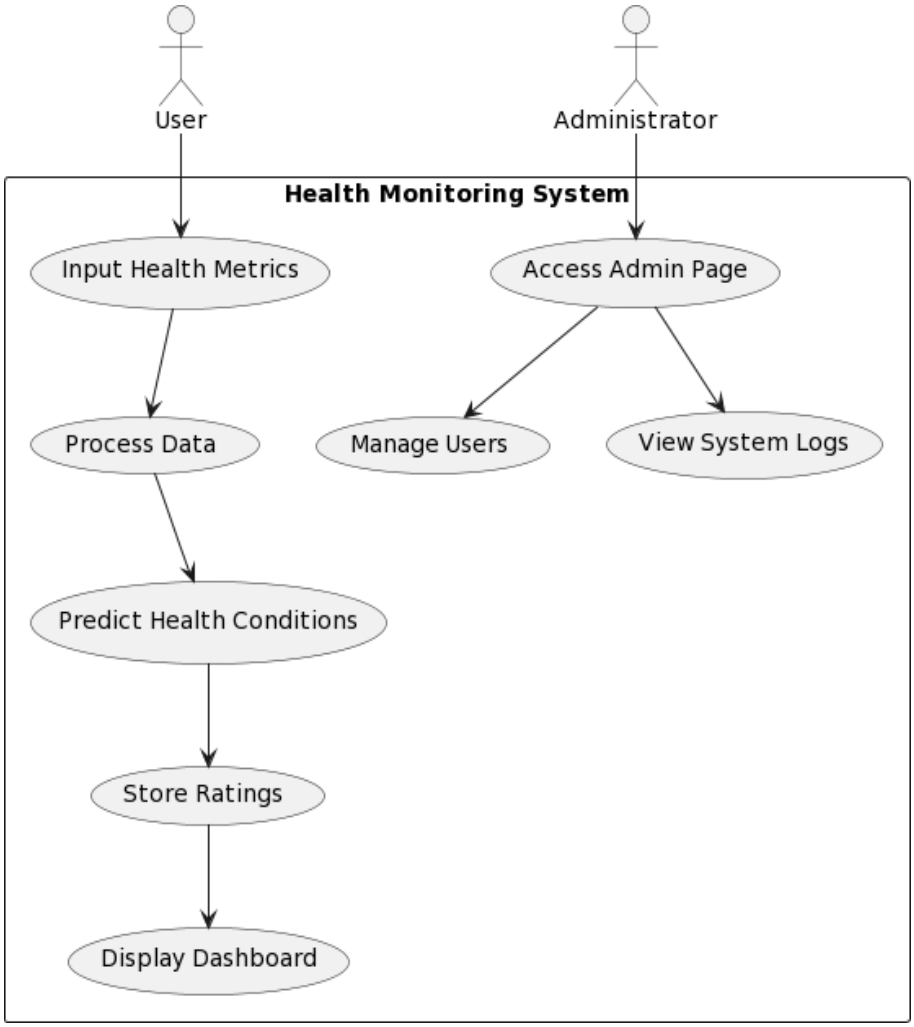


FIG - 6.1.1 USE CASE DIAGRAM

Class Diagram:

Within our health monitoring platform, a class diagram depicts the static structure of the system by illustrating the classes, attributes, and relationships among them. It provides a detailed overview of the system's components, including user profiles, health metrics, data processing modules, and visualization components. By showing how these classes are organized and interconnected, the diagram helps to clarify the system's architecture and data model.

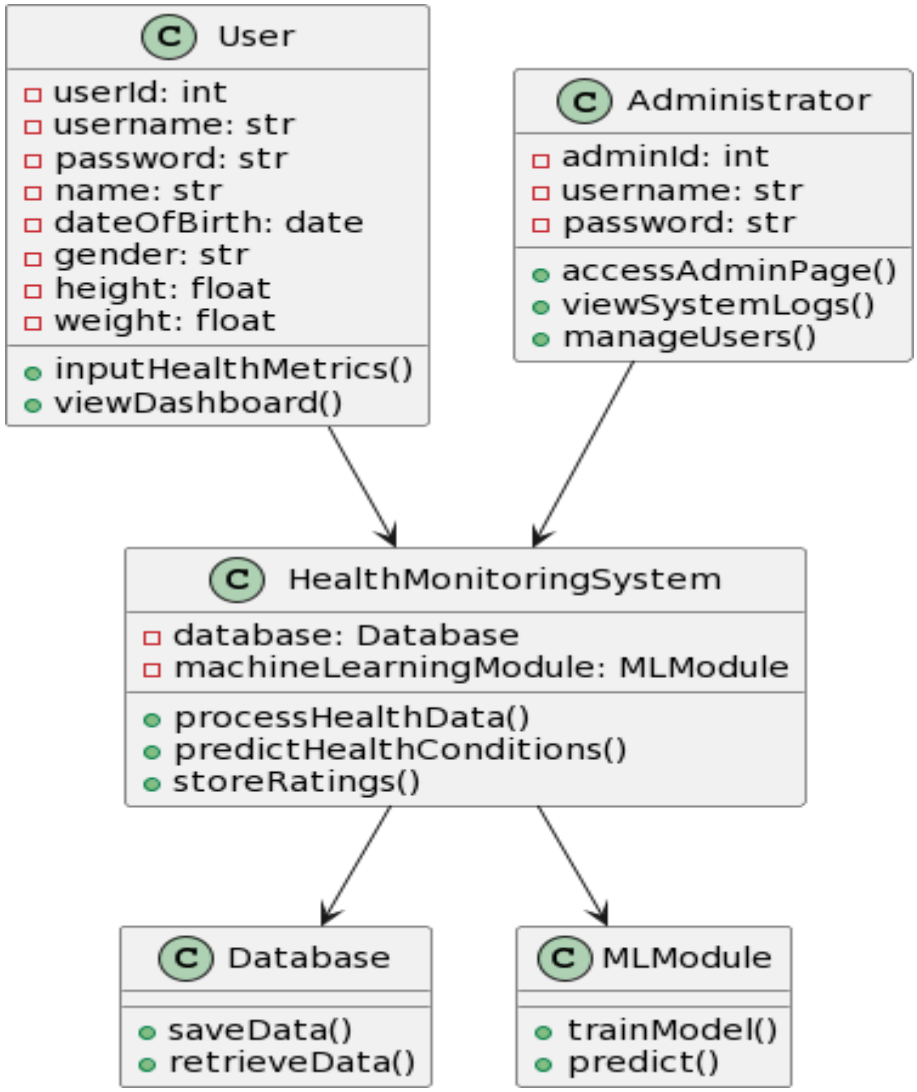


FIG - 6.1.2 CLASS DIAGRAM

Sequence Diagram:

In our health monitoring platform, a sequence diagram illustrates the interactions between various processes and components, showcasing the flow of control and communication among them. It demonstrates how users interact with the system to input their health data, how the data is processed and analyzed, and how the results are presented back to the users. By visualizing the sequence of events, the diagram provides insights into the system's behavior and functionality.

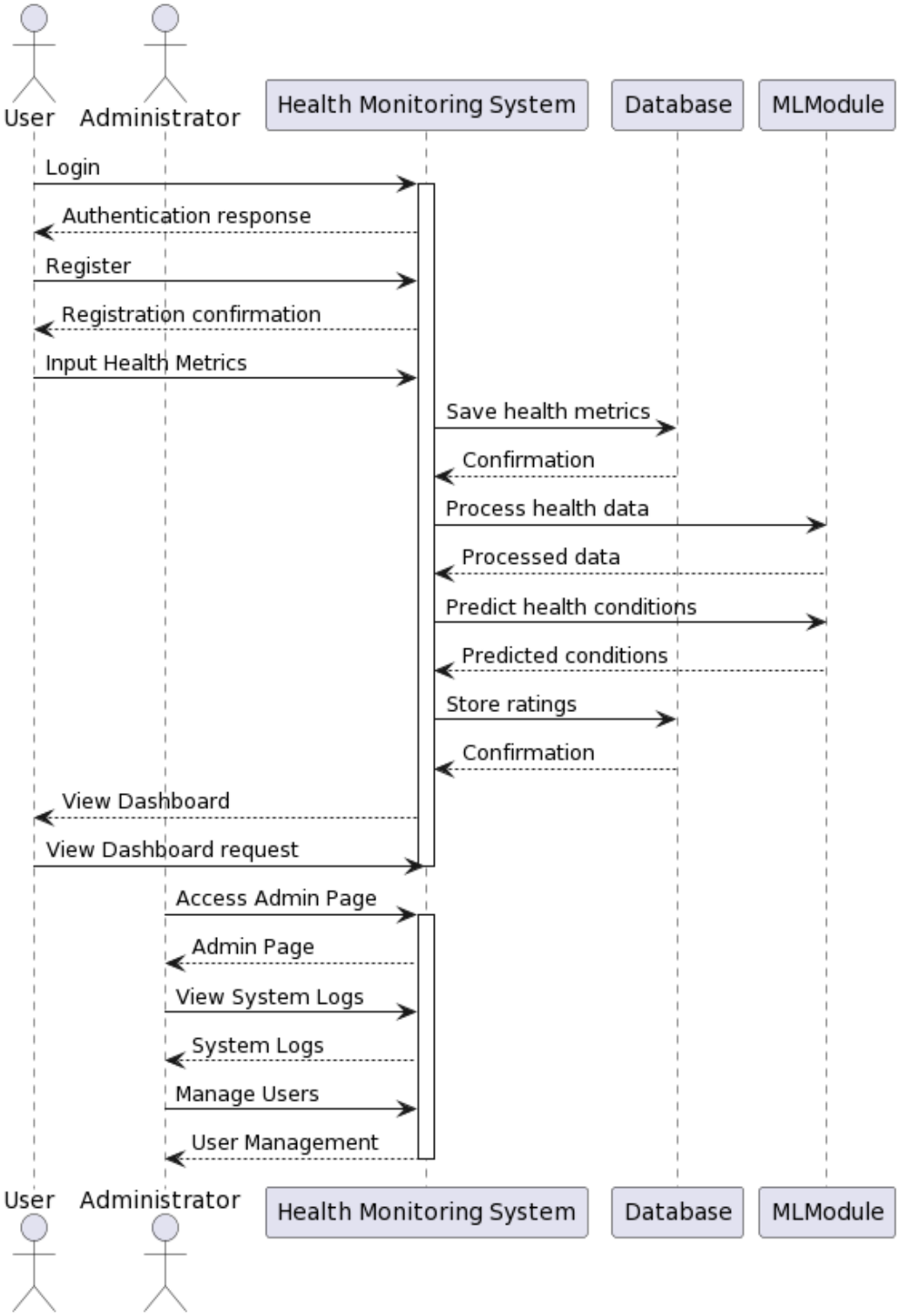


FIG – 6.1.3 SEQUENCE DIAGRAM

Deployment Diagram

In our health monitoring platform, a deployment diagram represents the physical deploymentof components and nodes in the system architecture. It illustrates how the software components are deployed onto physical hardware nodes, such as servers or devices. The diagram helps to visualize the distribution of components across the network infrastructure, ensuring efficient deployment and scalability of the system.

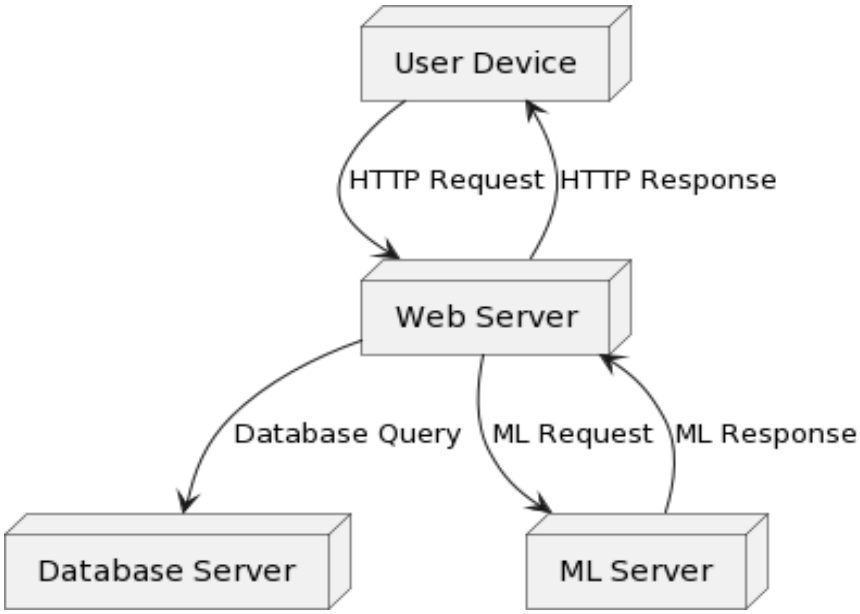


FIG – 6.1.4 DEPLOYMENT DIAGRAM

Collaboration Diagram

In collaboration diagram the method call sequence is indicated by some numbering techniqueas shown below. The number indicates how the methods are called one after another. We have taken the same order management system to describe the collaboration diagram. The methodcalls are similar to that of a sequence diagram. But the difference is that the sequence diagramdoes not describe the object organization whereas the collaboration diagram shows the object organization.

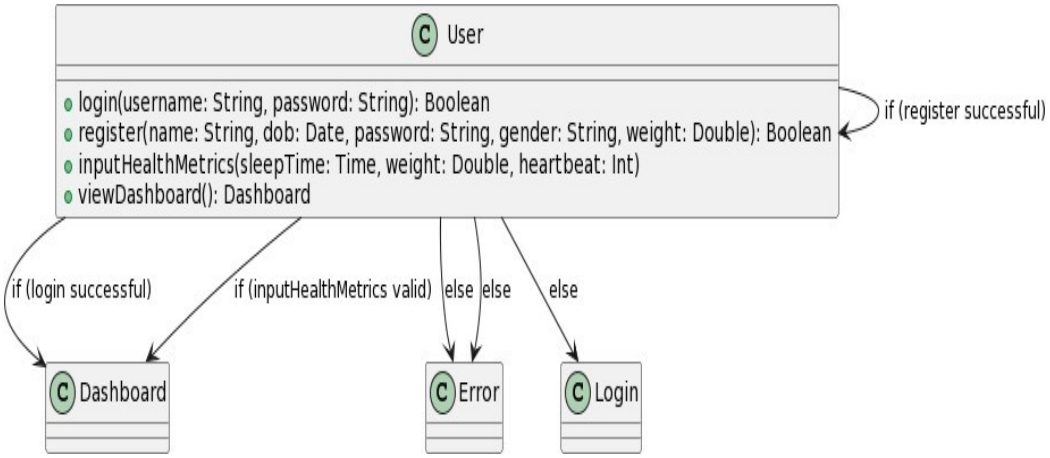


FIG – 6.1.5 COLLABORATION DIAGRAM

Activity Diagram:

In our health monitoring platform, a deployment diagram represents the physical deployment of components and nodes in the system architecture. It illustrates how the software components are deployed onto physical hardware nodes, such as servers or devices. The diagram helps to visualize the distribution of components across the network infrastructure, ensuring efficient deployment and scalability of the system.

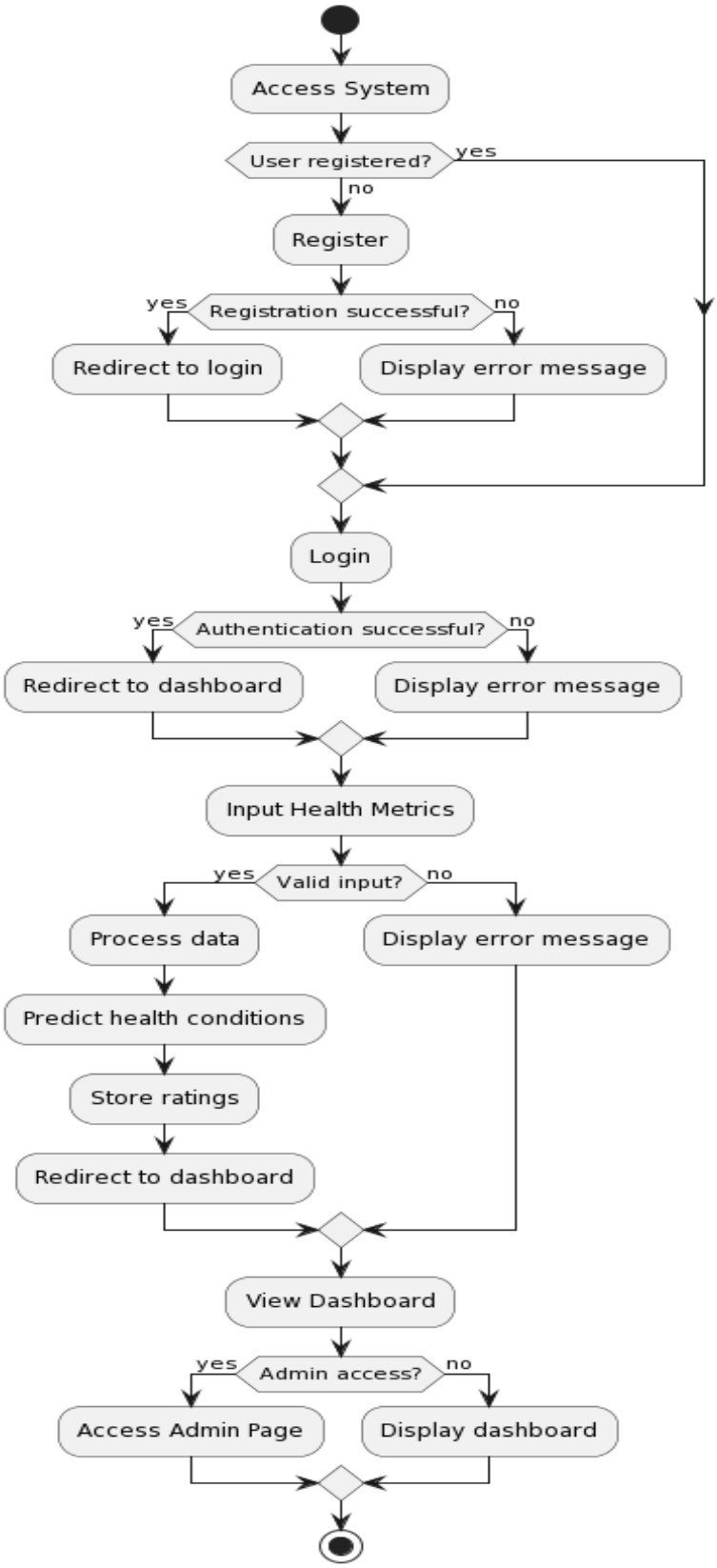


FIG – 6.1.6 ACTIVITY DIAGRAM

Component Diagram:

For our health monitoring platform, a component diagram describes the organization and wiring of physical components, including software modules and hardware devices. It illustrates how the system's components are structured and interconnected to fulfil the system's functionalities. By visualizing the component architecture, the diagram helps to ensure that all aspects of the system's required functions are covered and well-planned.

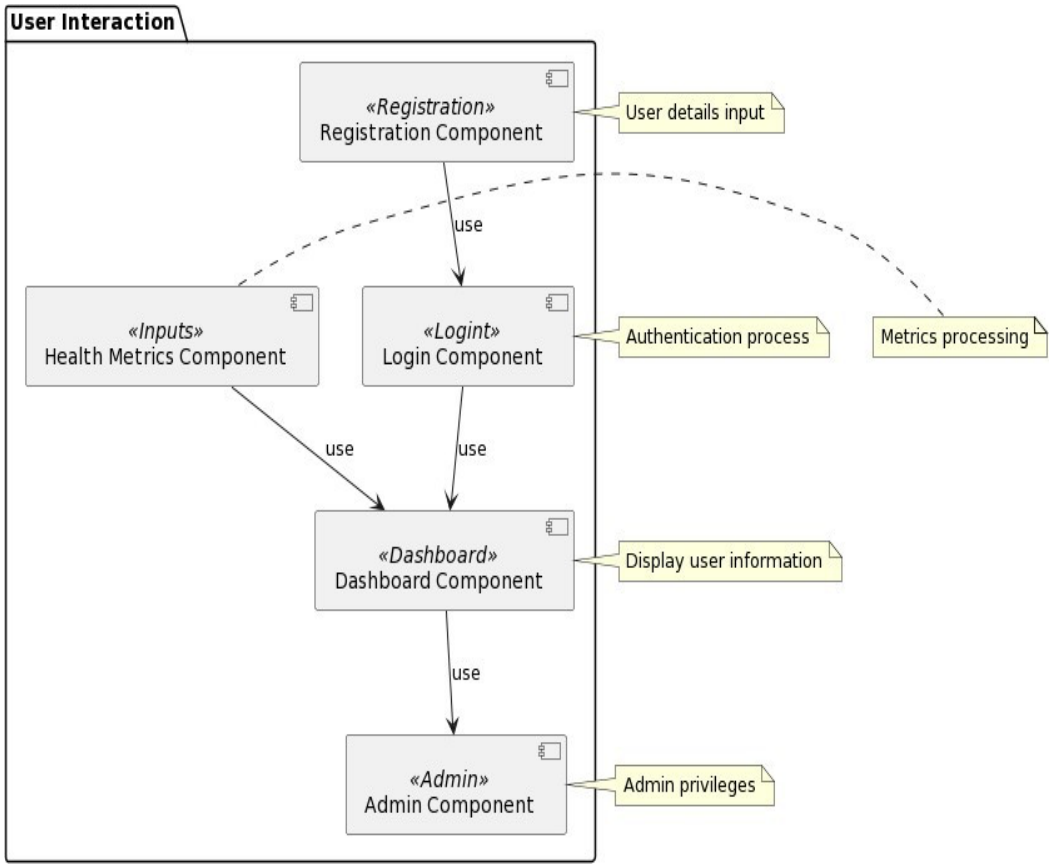


FIG – 6.1.7 COMPONENT DIAGRAM

ER Diagram:

In the context of our health monitoring platform, an ER diagram depicts the logical structure of the database used to store health-related data. It illustrates the relationships among entity sets, such as user profiles, health metrics, and medical history. By showing the entity relationships and attributes, the diagram provides a blueprint for the database design, ensuring efficient storage and retrieval of health data.

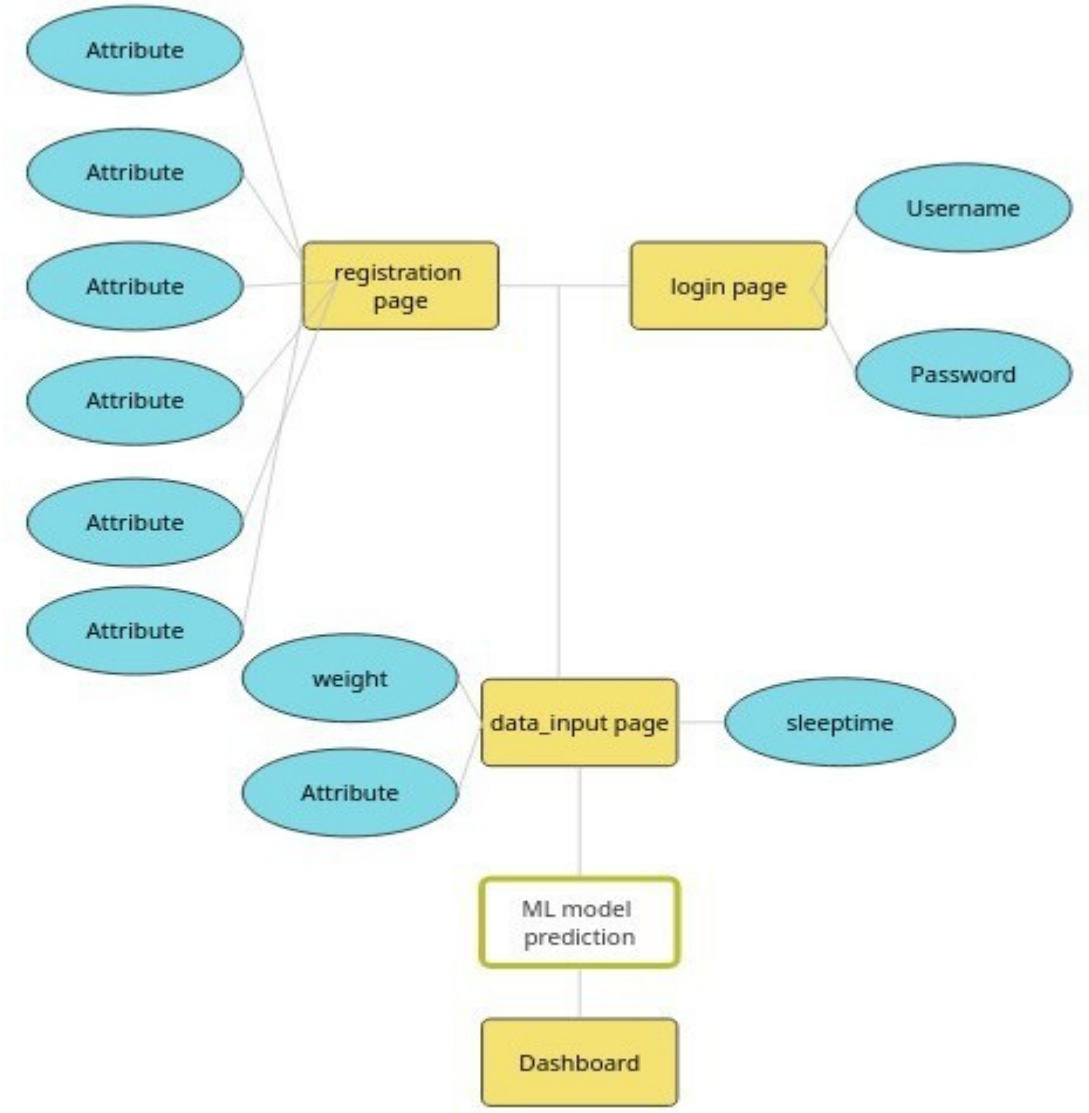


FIG – 6.1.8 ER DIAGRAM

DFD Diagram:

In the context of our health monitoring platform, a Data Flow Diagram (DFD) serves as a powerful tool to visualize the flow of information within the system. It illustrates how data enters and exits the system, undergoes transformations, and is stored or processed. Whether manual, automated, or a combination of both, a well-designed DFD provides insights into the system's scope, boundaries, and information flow dynamics. This graphical representation acts as a communication tool between system analysts and stakeholders, aiding in system understanding and redesign efforts.

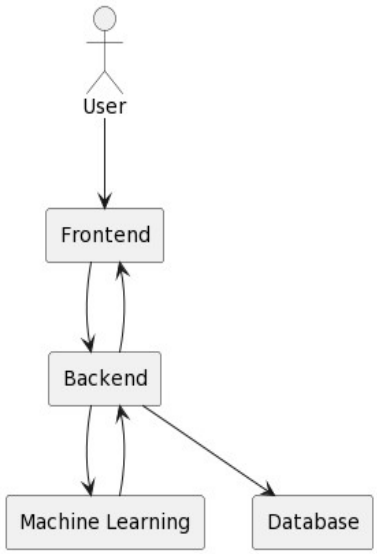


FIG – 6.1.9 DFD DIAGRAM

Level 1 Diagram:

At Level 1, the DFD provides an overview of the entire health monitoring system, depicting major processes and data flows at a high level of abstraction. It showcases the primary functions of the system, such as data input, processing, analysis, and output, along with the interactions between these components.

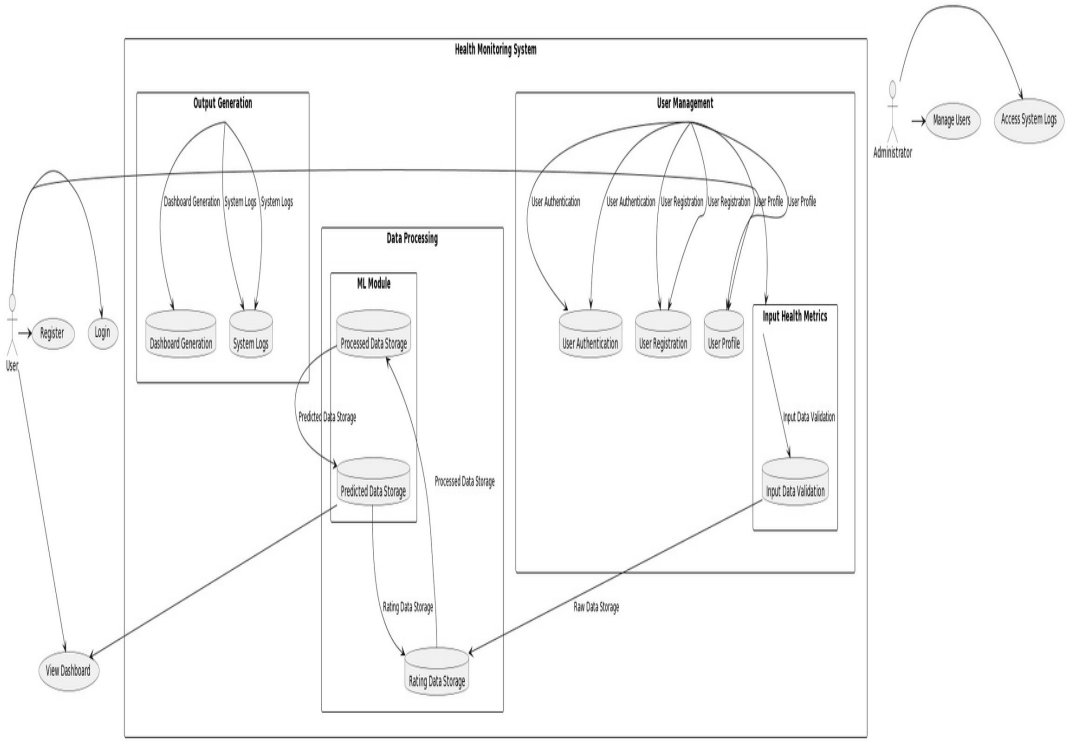


FIG – 6.1.9.1 LEVEL-1 DIAGRAM

Level 2 Diagram:

At Level 2, the DFD delves deeper into specific processes and data flows identified in the Level 1 diagram. It provides a more detailed view of how information flows between subsystems or modules within the system, capturing finer-grained interactions and transformations of data.

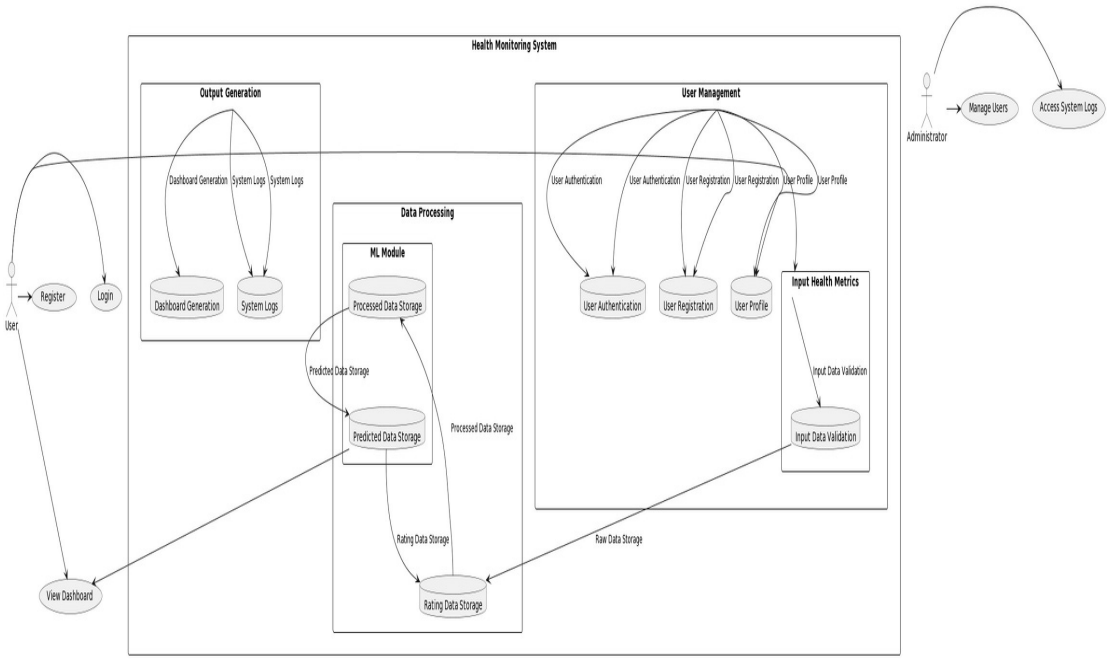


FIG – 6.1.9.2 LEVEL-2 DIAGRAM

BLOCK DIAGRAM:

The block diagram offers a visual representation of the system's components and their interconnections. It highlights the major blocks or modules comprising the health monitoring platform, illustrating how they interact and collaborate to fulfil the system's functionalities. This diagram provides a high-level overview of the system architecture, facilitating understanding and communication among stakeholders.

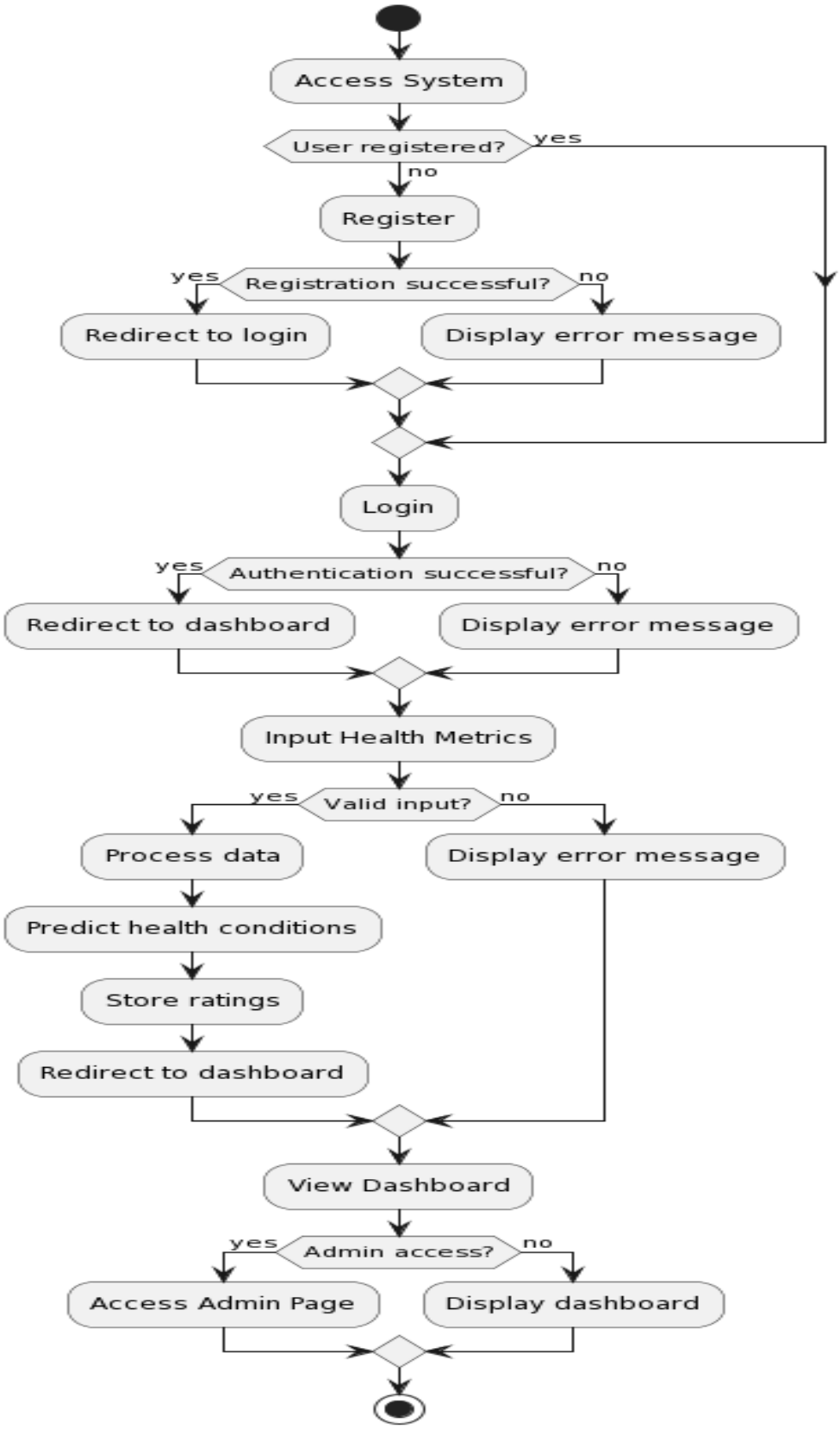


FIG – 6.2 BLOCK DIAGRAM

ARCHITECTURE:

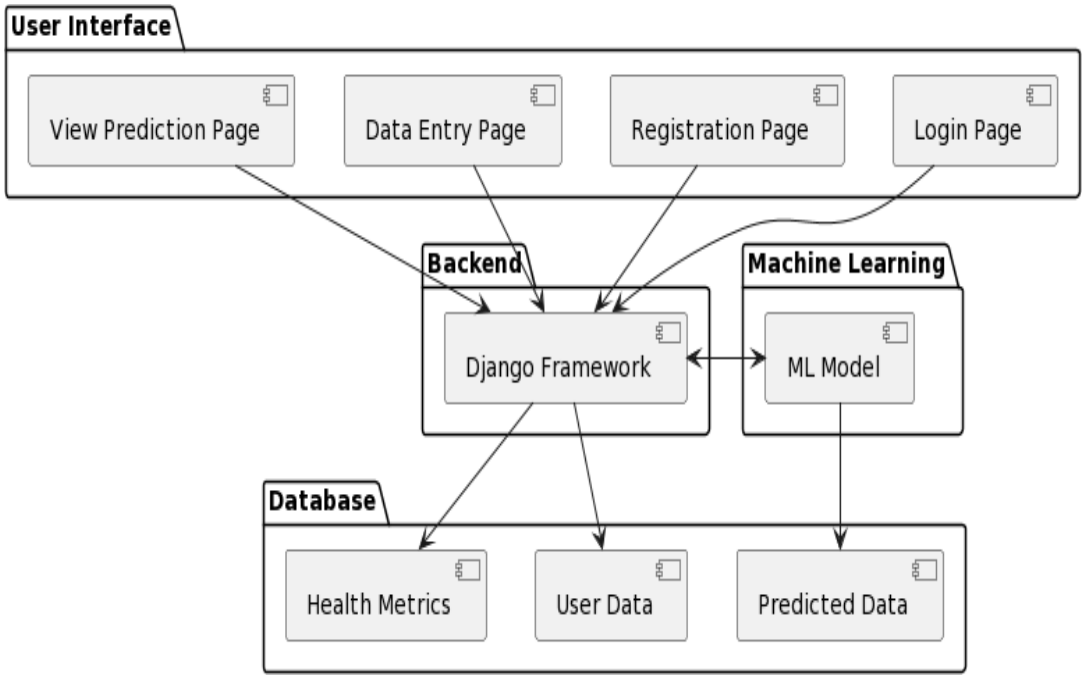


FIG – 6.3 ARCHITECTURE

CHAPTER-7
METHODOLOGIES AND ALGORITHMS

Neural Networks:

Unlike traditional machine learning algorithms such as decision trees or support vector machines, neural networks exhibit a remarkable capacity to capture nonlinear relationships and hierarchies in data. This flexibility is especially crucial in healthcare applications, where the relationships between input features and health outcomes are often multifaceted and nonlinear in nature.

Moreover, neural networks excel in tasks requiring feature extraction and representation learning. By automatically extracting relevant features from raw data, neural networks alleviate the burden of manual feature engineering, enabling the model to learn discriminative features directly from the data. This is particularly advantageous in our context, where health-related data such as blood pressure, BMI, and sleep time are inherently complex and multifaceted.

Furthermore, the ability of neural networks to generalize well to unseen data is paramount in healthcare applications, where model robustness and reliability are of utmost importance. Through regularization techniques and architectural enhancements, neural networks can mitigate issues such as overfitting and generalize effectively to new instances, thereby enhancing prediction accuracy and reliability.

Key Components of Our ML Model:

1. Feature Selection:

Our model relies on a carefully curated set of input features that are highly relevant to predicting health scores. These features include 'BloodPressure', 'BMI', 'Gender', 'SleepTime', and 'Age_'.

2. Data Preprocessing:

Prior to model training, the input data undergoes preprocessing steps to ensure uniformity and compatibility with the model. This includes standardization using the StandardScaler to scale the features to a common range.

3. Model Architecture:

The core of our model is its neural network architecture, comprising multiple layers of interconnected neurons. The architecture includes:

- **Input Layer:** Receives feature vectors representing health metrics.
- **Hidden Layers**: Process the input data through nonlinear transformations to extract meaningful representations.
- **Output Layer:** Produces predictions for the health scores, with 8 units representing the 8 health score categories.

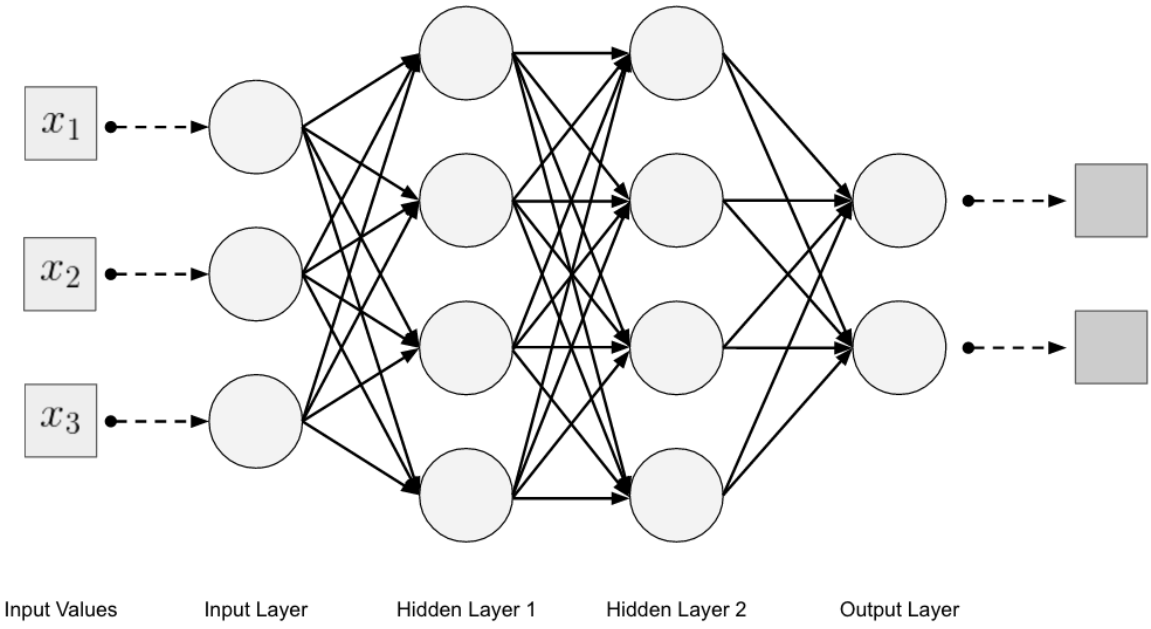


Fig 7.1 Neural Network

4. Training Strategy:

Our model is trained using a combination of training and validation data, with an 80-20 split. During training, we utilize the Adam optimizer and sparse categorical crossentropy loss function to optimize the model parameters.

5. Evaluation Metrics:

To assess the model's performance, we monitor both training and validation accuracy and loss. These metrics provide insights into the model's ability to learn from the data and generalize to unseen instances.

6. Visualization:

Visualizing the model's performance through plots of accuracy and loss over epochs aids in identifying potential issues such as overfitting or underfitting. These visualizations serve as valuable tools for model evaluation and refinement.

7. Iterative Refinement:

Our model development process is iterative, with periodic evaluations leading to adjustments and refinements in the model architecture and training strategies. This iterative approach ensures continual improvement in prediction accuracy and robustness.

Sequential:

In the context of our machine learning model, "Sequential" refers to the type of model architecture we're utilizing. The Sequential model is a linear stack of layers, where each layer has exactly one input tensor and one output tensor. Layers are added sequentially, one on top of the other, allowing for easy construction of simple neural network architectures. It's suitable for most common use cases in deep learning, where data flows straightforwardly from input to output.

Model:

In machine learning, a "Model" refers to the representation of a real-world process or system that a machine learning algorithm learns from data. In our case, the model represents the neural network architecture we've designed for predicting health scores based on input features like blood pressure, BMI, gender, sleep time, and age. The model comprises layers of neurons organized in a sequential manner, with each layer performing specific computations on the input data to produce the desired output.

ReLU (Rectified Linear Activation):

ReLU, short for Rectified Linear Unit, is an activation function commonly used in neural networks. It introduces non-linearity into the model by outputting the input directly if it is positive, and zero otherwise. Mathematically, it can be defined as f(x) = max(0, x). ReLU activation is preferred in many cases due to its simplicity and effectiveness in mitigating the vanishing gradient problem, which can occur with other activation functions like sigmoid or tanh.

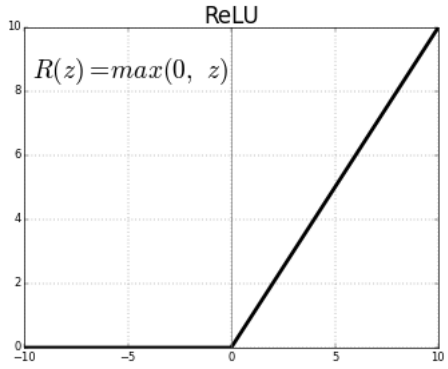


Fig-7.2 ReLu

Sigmoid:

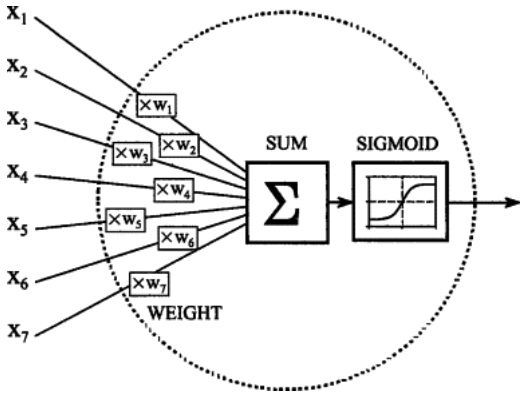


Fig – 7.3 Sigmoid

Sigmoid is another type of activation function used in neural networks. It squashes the input values between 0 and 1, making it suitable for binary classification tasks or tasks where the output needs to be interpreted as a probability. The sigmoid function is mathematically defined as f(x) = 1 / (1 + exp(-x)). In our model, we use the sigmoid

activation function in the output layer to produce probabilities for each health score category.

Adam (Adaptive Moment Estimation):

Adam is an optimization algorithm commonly used to update the parameters of neural network models during training. It combines ideas from both momentum optimization and RMSProp (Root Mean Square Propagation) algorithms. Adam adapts the learning rate for each parameter based on the first and second moments of the gradients, allowing for faster convergence and better performance on a wide range of optimization problems. In our model, we use the Adam optimizer to minimize the loss function and update the model parameters.

$$\nu_t = \beta_1 * \nu_{t-1} - (1 - \beta_1) * g_t$$

$$s_t = \beta_2 * s_{t-1} - (1 - \beta_2) * g_t^2$$

$$\Delta\omega_t = -\eta \frac{\nu_t}{\sqrt{s_t + \epsilon}} * g_t$$

$$\omega_{t+1} = \omega_t + \Delta\omega_t$$

$\eta : Initial\ Learning\ rate$
$g_t : Gradient\ at\ time\ t\ along\ \omega^j$
$\nu_t : Exponential\ Average\ of\ gradients\ along\ \omega_j$
$s_t : Exponential\ Average\ of\ squares\ of\ gradients\ along\ \omega_j$
$\beta_1, \beta_2 : Hyperparameters$

Sparse Categorical Crossentropy:

Sparse Categorical Crossentropy is a loss function used for multi-class classification tasks where the target labels are integers (e.g., class indices) rather than one-hot encoded vectors. It computes the cross-entropy loss between the true labels and the

predicted probability distribution across all classes. In our model, we use sparse categorical crossentropy as the loss function to measure the difference between the predicted health score categories and the actual labels during training.

$$\text{Loss} = -\frac{1}{\substack{\text{output} \\ \text{size}}} \sum_{i=1}^{\substack{\text{output} \\ \text{size}}} y_i \cdot \log \hat{y}_i + (1 - y_i) \cdot \log (1 - \hat{y}_i)$$

Accuracy:

Accuracy is a metric commonly used to evaluate the performance of classification models. It measures the proportion of correctly classified instances out of the total number of instances. In the context of our health score prediction model, accuracy represents the percentage of correctly predicted health scores compared to the total number of instances in the validation or test dataset. Maximizing accuracy is one of the primary objectives during model training, indicating how well the model is performing in predicting health scores.

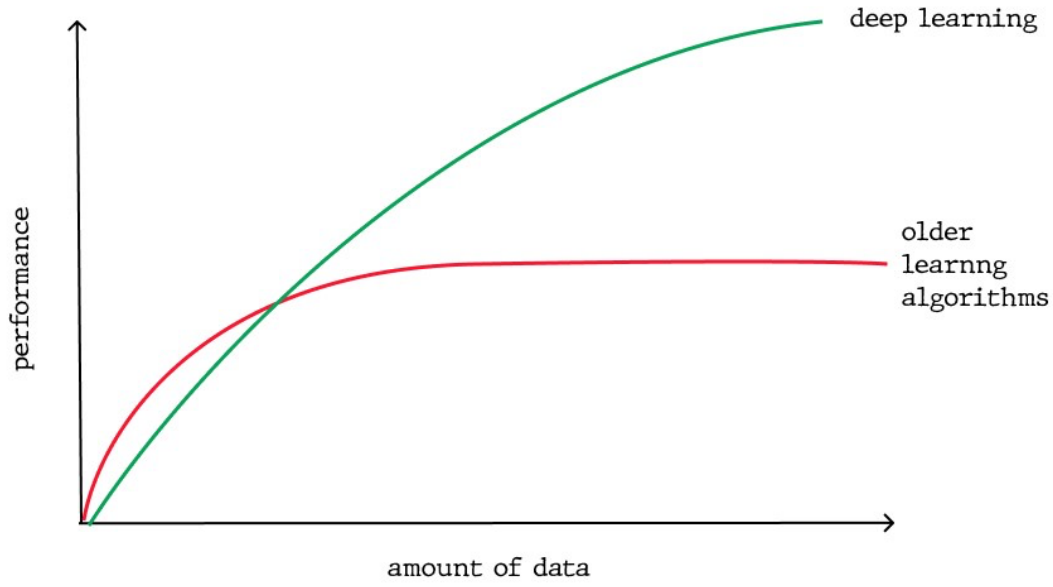


Fig – 7.4 Accuracy

CHAPTER 8

SYSTEM IMPLEMENTATION

IMPLEMENTATION PROCESS

Implementation is the stage of the project when the theoretical design is turned out into a working system. Thus, it can be considered to be the most critical stage in achieving a successful new system and in giving the user, confidence that the new system will work and be effective.

The implementation stage involves careful planning, investigation of the existing system and its constraints on implementation, designing of methods to achieve changeover and evaluationof changeover methods.

Our project focuses on a comprehensive health monitoring system, incorporating features suchas registration, login, dashboard, and data entry pages. Built on the Django framework, it integrates a machine learning model, specifically utilizing the Random Forest algorithm, to provide predictive insights based on user-input health metrics, including heart rate, BMI, gender, sleep time, and age. The model outputs categorical values ranging from 1 to 5, indicating varying levels of health conditions.

Modules:

1. User Management:

Registration: Users can register for the health monitoring platform, providing necessary details.

Login: Registered users gain access to their personalized dashboard.

2. Data Handling:

Upload: Users can upload datasets, potentially sourced from platforms likeKaggle.

View Data: Before preprocessing, users can inspect the raw data for analysis.

3. Preprocessing:

Data Cleaning: Identifying and handling missing values using techniques like front fill (ffill)

Training Data Preparation: Splitting the dataset into training and testing subsetsfor model training and evaluation.

4. Model Prediction:

Input: Users input their health metrics for prediction.

Result History: The model predicts health conditions based on the providedinputs, offering insights into emergency cases and non-emergency cases.

Data Collection:

- Datasets are sourced from Kaggle, encompassing diverse health-related metrics such asheart rate, BMI, sleep time, gender, and age.
- Additional datasets may be combined to enrich the dataset, providing a comprehensiveset of features for analysis.

Data Cleaning and Preprocessing:

- Initial data exploration is conducted to identify missing values and outliers.
- Missing values are addressed using techniques like front fill (ffill), ensuring dataintegrity.
- Data is standardized and normalized to mitigate variations and ensure consistencyacross features.
- Categorical variables encoded using techniques like one-hot encoding for compatibilitywith machine learning algorithms.

Feature Engineering:

- Feature selection techniques are applied to identify the most relevant features forpredicting health conditions.
- New features may be derived from existing ones to capture additional insights,enhancing the predictive power of the model.

Model Selection:

- The Random Forest algorithm is chosen for its robustness and ability to handle complexdatasets with high dimensionality.
- Hyperparameter tuning performed to optimize model performance, ensuring the bestpossible accuracy and generalization.

Model Training:

- The dataset is split into training and testing subsets, typically using a 80-20 split.
- The Random Forest model is trained on the training subset using the .fit() method, learning patterns and relationships within the data.

Model Evaluation:

- The trained model is evaluated on the testing subset to assess its performance andgeneralization ability.
- Metrics such as accuracy are calculated to measure the model's effectiveness inpredicting health conditions.

Model Deployment:

- Once the model achieves satisfactory performance, it is deployed into the production environment.
- Integration with the Django framework allows seamless incorporation into the health monitoring platform, enabling real-time predictions for users.

Monitoring and Maintenance:

- Continuous monitoring of the deployed model is essential to ensure its ongoingperformance and reliability.
- Regular updates and retraining may be conducted to adapt to changing data distributions and maintain model accuracy over time.

CHAPTER 9

TESTING

Types of Tests

Unit Testing

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of theapplication .it is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/orsystem configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expectedresults.

Integration Testing

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components wereindividually satisfaction, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components. Software integration testing is the incremental integration testing of two or more integrated software components on a single platform to produce failures caused by interface defects.

The task of the integration test is to check that components or software applications, e.g., components in a software system or – one step up – software applications at the company level – interact without error.

Test Results:

All the test cases mentioned above passed successfully. No defects encountered.

Acceptance Testing

User Acceptance Testing is a critical phase of any project and requires significant participationby the end user. It also ensures that the system meets the functional requirements.

Functional testing

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals.

Functional testing is centered on the following items:

Valid Input : identified classes of valid input must be accepted. Invalid
Input : identified classes of invalid input must be rejected.Functions
: identified functions must be exercised.
Output : identified classes of application outputs must be exercised.

Systems/Procedures: interfacing systems or procedures must be invoked.
Organization and preparation of functional tests is focused on requirements, key functions,or special test cases.

White Box Testing

White Box Testing is a testing in which in which the software tester has knowledge of the inner workings, structure and language of the software, or at least its purpose. It is purpose. Itis used to test areas that cannot be reached from a black box level.

Black Box Testing

Black Box Testing is testing the software without any knowledge of the inner workings, structure or language of the module being tested. Black box tests, as most

other kinds of tests,must be written from a definitive source document, such as specification or

requirements document, such as specification or requirements document. It is a testing in which the software under test is treated, as a black box. You cannot “see” into it.

Test Objectives

All field entries must work properly.

Pages must be activated from the identified link.

The entry screen, messages and responses must not be delayed.

Features to be tested

Verify that the entries are of the correct formatNo duplicate entries should be allowed

All links should take the user to the correct page.

TEST CASES:

Input	Output	Result
User Input	Input from the user to predict the rating	Success
Neural Network	Using Neural Network to predict the output of health prediction	Success
Prediction	Random Forest Model has to predict the output rating out of 5	Success

Table – 9.1 Test Case

Test cases Model building:

S.NO	Test cases	I/O	ExpectedO/P
1.	Load the Model	Path of the Model	Model loaded successfully
2.	Feeding user input data to the model	Input from the user to predict the rating	Data is supplied based on the predefined input data types.
3.	Predicting the output from the model using random forest model	Input from the user to predict the rating	Rating out of 5 which is appropriate for the provided input data from the user

Table 9.2 Test Cases Model Building

CHAPTER 10

SAMPLE SOURCE CODE

Login Page:

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Health Care</title>
    <!-- Latest compiled and minified CSS -->
    <link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/css/bootstrap.min.css"
rel="stylesheet" integrity="sha384-
QWTKZyjpPEjISv5WaRU9OFeRpok6YctnYmDr5pNlyT2bRjXh0JMhjY6hW+AL
EwIH" crossorigin="anonymous">
    <link rel="stylesheet" href="styles.css">
    <style>
        .h-20{
            height: 20rem;
        }
        .h-30{
            height:30rem;
        }
        body{
            background-image:url(https://wallpapercave.com/wp/wp9764093.jpg);
            background-size: cover;
            background-repeat: repeat;
            background-position: top;
        }
        .rating {
            unicode-bidi: bidi-override;
```

```
            direction: rtl;
            font-size: 25px;
        }
        .rating > span {
            display: inline-block;
            position: relative;
            width: 1.1em;
        }
        .custom-toggler .navbar-toggler-icon {
            color: red; /* Change color here */
        }
        .text-gold{
            color: gold;
        }
        .navbar-nav .nav-link {
        transition: padding 0.3s ease;
        }
        .navbar-nav .nav-link:hover {
            padding: 8px 20px; /* Change the padding values to whatever you prefer */
            background-color: rgba(32, 36, 43, 0.2); /* Change the background color to
whatever you prefer */
        }
    </style>
    <script src="https://cdn.jsdelivr.net/npm/chart.js"></script>
</head>
<body>
    <nav class="navbar navbar-expand-lg" style="background: linear-gradient(to
bottom, rgba(0,0,0,0.9) 0%,rgba(0, 0, 0, 0.2) 100%); padding: 5px 10px;">
        <div class="container-fluid">
            <a href="#" class="navbar-brand h1 text-white" style="font-size:
18px;">Health Care</a>
            <button class="navbar-toggler bg-white" type="button" data-bs-
toggle="collapse" data-bs-target="#navbarNav">
                <span class="navbar-toggler-icon" style="color: white;"></span>
```

```
        </button>
        <div class="collapse navbar-collapse justify-content-end" id="navbarNav">
          <ul class="navbar-nav" style="font-size: 14px;">
            <li class="nav-item">
              <a href="/admin/login/" class="nav-link text-white">Admin
Panel</a>
            </li>
            {% if user.is_authenticated %}
            <li class="nav-item">
              <a href="{% url 'patient_app:dashboard' %}" class="nav-link text-
white">Dashboard</a>
            </li>
            <li class="nav-item">
              <a href="{% url 'patient_app:data_entry' %}" class="nav-link text-
white">Health Data</a>
            </li>
            <li class="nav-item">
              <a href="{% url 'auth_app:logout' %}" class="nav-link text-
white">Logout</a>
            </li>
            {% else %}
            <li class="nav-item">
              <a href="{% url 'auth_app:registration' %}" class="nav-link text-
white">Register</a>
            </li>
            <li class="nav-item">
              <a href="{% url 'auth_app:login' %}" class="nav-link text-
white">Login</a>
            </li>
            {% endif %}
          </ul>
        </div>
      </div>
    </nav>
```

```
<div class="container-fluid" ;>
  <div class="row justify-content-center h-30 align-items-center">
    {% if user.is_authenticated %}
      <div class="col h4">You have already logged in.</div>
    {% else %}
      <div class="col-md-4">
        <form method="post" style="background-color: none; padding: 20px;
border-radius: 30px; border-color: aqua;">
          {% csrf_token %}
          <fieldset>
            <legend class="text-white" style="text-align: center; font-size:
50px; font-family:Georgia, 'Times New Roman', Times,
serif;">Login<br></legend>
            {% if error %}
              {{ error }}
            {% endif %}
            {% if form.username.errors %}
              {{ form.username.errors }}
            {% endif %}
            <div class="mb-3">
              <input type="text" id="id_username" placeholder="Enter
username" name="username" class="form-control" style="border-radius: 50px;
opacity: 80%;">
            </div>
            {% if form.password.errors %}
              {{ form.password.errors }}
            {% endif %}
            <div class="mb-3">
              <input type="password" id="id_pwd" placeholder="Enter
password" name="password" class="form-control" style="border-radius: 50px;
opacity: 80%;">
            </div>
          </fieldset>
          <div class="d-flex justify-content-center">
```

```
                    <button type="submit" class="btn btn-success" style="border-
radius: 50px; background-color: rgb(68, 117, 173); padding-inline:
50px;">Login</button>
                </div>
            </form>
        </div>
    {% endif %}
  </div>
 </div>
 <script src="https://cdn.jsdelivr.net/npm/jquery"></script>
 <!-- Latest compiled and minified JavaScript -->
 <script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/js/bootstrap.bundle.min.js"><
/script>
</body>
</html>
```

Registration Page:

```
<!DOCTYPE html>
<html lang="en">
<head>
 <meta charset="UTF-8">
 <meta name="viewport" content="width=device-width, initial-scale=1.0">
 <title>Health Care</title>
 <!-- Latest compiled and minified CSS -->
 <link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/css/bootstrap.min.css"
rel="stylesheet" integrity="sha384-
QWTKZyjpPEjISv5WaRU9OFeRpok6YctnYmDr5pNlyT2bRjXh0JMhjY6hW+AL
EwIH" crossorigin="anonymous">
 <link rel="stylesheet" href="styles.css">
 <style>
```

```
.h-20{
    height: 20rem;
}
.h-30{
    height:30rem;
}
body{
    background-image:url(https://wallpapercave.com/wp/wp9764093.jpg);
    background-size: cover;
    background-repeat: repeat;
    background-position: top;
}
.rating {
    unicode-bidi: bidi-override;
    direction: rtl;
    font-size: 25px;
}
.rating > span {
    display: inline-block;
    position: relative;
    width: 1.1em;
}
.custom-toggler .navbar-toggler-icon {
    color: red; /* Change color here */
}
.text-gold{
    color: gold;
}
.navbar-nav .nav-link {
transition: padding 0.3s ease;
}
.navbar-nav .nav-link:hover {
    padding: 8px 20px; /* Change the padding values to whatever you prefer */
```

```
        background-color: rgba(32, 36, 43, 0.2); /* Change the background color to
whatever you prefer */
    }
    .form-control{
        border-radius: 50px;
        opacity: 80%;
    }
  </style>
  <script src="https://cdn.jsdelivr.net/npm/chart.js"></script>
</head>
<body>
  <nav class="navbar navbar-expand-lg" style="background: linear-gradient(to
bottom, rgba(0,0,0,0.9) 0%,rgba(0, 0, 0, 0.2) 100%); padding: 5px 10px;">
    <div class="container-fluid">
      <a href="#" class="navbar-brand h1 text-white" style="font-size:
18px;">Health Care</a>
      <button class="navbar-toggler bg-white" type="button" data-bs-
toggle="collapse" data-bs-target="#navbarNav">
        <span class="navbar-toggler-icon" style="color: white;"></span>
      </button>
      <div class="collapse navbar-collapse justify-content-end" id="navbarNav">
        <ul class="navbar-nav" style="font-size: 14px;">
          <li class="nav-item">
            <a href="/admin/login/" class="nav-link text-white">Admin
Panel</a>
          </li>
          {% if user.is_authenticated %}
          <li class="nav-item">
            <a href="{% url 'patient_app:dashboard' %}" class="nav-link text-
white">Dashboard</a>
          </li>
          <li class="nav-item">
            <a href="{% url 'patient_app:data_entry' %}" class="nav-link text-
white">Health Data</a>
```

```
                </li>
                <li class="nav-item">
                    <a href="{% url 'auth_app:logout' %}" class="nav-link text-
white">Logout</a>
                </li>
                {% else %}
                <li class="nav-item">
                    <a href="{% url 'auth_app:registration' %}" class="nav-link text-
white">Register</a>
                </li>
                <li class="nav-item">
                    <a href="{% url 'auth_app:login' %}" class="nav-link text-
white">Login</a>
                </li>
                {% endif %}
            </ul>
        </div>
    </div>
</nav>
<div class="container">
    <div class="row justify-content-center">
        {% if user.is_authenticated %}
            <div class="col h3">You have already registered</div>
        {% else %}
            <div class="col-md-6">
                <form method="post">
                    {% csrf_token %}
                    <fieldset>
                        <legend class="text-white" style="text-align: center; font-size:
40px; font-family:Georgia, 'Times New Roman', Times,
serif;">Register<br><br></legend>
                        {% if error %}
                            {{error}}
                        {% endif %}
```

```
                {% if form.username.errors %}
                    {{form.username.errors}}
                {% endif %}
                <div class="mb-3">
                    <input type="text" id="id_username" name="username"
class="form-control" placeholder="Enter your username" >
                </div>
                {% if form.password.errors %}
                    {{form.password.errors}}
                {% endif %}
                <div class="mb-3">
                    <input type="password" id="id_pwd" name="password"
class="form-control" placeholder="Enter your password" >
                </div>
                {% if form.name.errors %}
                    {{form.name.errors}}
                {% endif %}
                <div class="mb-3">
                    <input type="text" id="id_name" name="name" class="form-
control" placeholder="Enter you name">
                </div>
                {% if form.dob.errors %}
                    {{form.dob.errors}}
                {% endif %}
                <div class="mb-3">
                    <input type="date" id="id_dob" name="dob" class="form-
control">
                </div>
                {% if form.gender.errors %}
                    {{form.gender.errors}}
                {% endif %}
                <div class="mb-3">
                    <select name="gender" id="id_gender" class="form-select"
style="border-radius: 50px;opacity: 80%;">
```

```
                        <option selected>Select the gender</option>
                        <option value1="M">Male</option>
                        <option value="F">Female</option>
                    </select>
                </div>
                {% if form.height.errors %}
                    {{form.height.errors}}
                {% endif %}
                <div class="mb-3">
                    <input type="integer" id="id_height" name="height"
class="form-control" placeholder="Enter height in cm" >
                </div>
                {% if form.weight.errors %}
                    {{form.weight.errors}}
                {% endif %}
                <div class="mb-3">
                    <input type="integer" id="id_weight" name="weight"
class="form-control" placeholder="Enter weight in Kg" >
                </div>
            </fieldset>
            <div class="d-flex justify-content-center">
                <button type="submit" class="btn btn-success" style="border-
radius: 50px; background-color: rgb(68, 117, 173); padding-inline:
50px;">Login</button>
            </div>
        </form>
    </div>
    {% endif %}
  </div>
</div>
<script src="https://cdn.jsdelivr.net/npm/jquery"></script>
<!-- Latest compiled and minified JavaScript -->
```

```
    <script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/js/bootstrap.bundle.min.js"><
/script>
</body>
</html>
```

Views.py

```
from django.shortcuts import render
from .models import User
from .forms import PatientRegistrationForm, LoginForm
from django.shortcuts import redirect
from django.urls import reverse
from django.contrib.auth import login, authenticate, logout
def patient_registration(request):
    if request.method == "POST":
        form = PatientRegistrationForm(request.POST)
        if form.is_valid():
            try:
                User.objects.create_user(**form.cleaned_data)
                return redirect(reverse('auth_app:login'))
            except :
                return render(request, 'auth_app/registration.html', {'form':form,
'error':'Username Already Exists'})
        else:
            return render(request, 'auth_app/registration.html', {'form':form})
    else:
        form = PatientRegistrationForm()
    return render(request, 'auth_app/registration.html', {'form':form})
  def login_view(request):
    if request.method == 'POST':
        form = LoginForm(request.POST)
        if form.is_valid():
```

```
            user = authenticate(**form.cleaned_data)
            if user is not None:
                login(request, user)
                return redirect(reverse('patient_app:data_entry'))
            else:
                error = "Invalid credentials"
                return render(request, 'auth_app/login.html', {'form':form,'error':error})
        else:
            return render(request, 'auth_app/login.html', {'form':form})
    form = LoginForm()
    return render(request, 'auth_app/login.html', {'form':form})
def logout_view(request):
    logout(request)
    return redirect(reverse('auth_app:login'))
```

Dashboard.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Health Care</title>
    <!-- Latest compiled and minified CSS -->
    <link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/css/bootstrap.min.css"
rel="stylesheet" integrity="sha384-
QWTKZyjpPEjISv5WaRU9OFeRpok6YctnYmDr5pNlyT2bRjXh0JMhjY6hW+AL
EwIH" crossorigin="anonymous">
    <link rel="stylesheet" href="styles.css">
    <style>
        .h-20{
            height: 20rem;
```

```
}
.h-30{
    height:30rem;
}

body{
    background-
image:url(https://png.pngtree.com/background/20210711/original/pngtree-summer-forest-minimalist-poster-background-picture-image_1099798.jpg);
    background-size: cover;
    background-repeat: repeat;
    background-position: center;
}
.rating {
    unicode-bidi: bidi-override;
    direction: rtl;
    font-size: 25px;
}
.rating > span {
    display: inline-block;
    position: relative;
    width: 1.1em;
}
.custom-toggler .navbar-toggler-icon {
    color: red; /* Change color here */
}
.text-gold{
    color: gold;
}
.navbar-nav .nav-link {
transition: padding 0.3s ease;
}
.navbar-nav .nav-link:hover {
    padding: 8px 20px; /* Change the padding values to whatever you prefer */
```

```
        background-color: rgba(32, 36, 43, 0.2); /* Change the background color to
whatever you prefer */
    }
    .health-facts {
        font-size: 18px;
        margin-top: 50px;
        text-align: center;
        color: #333; /* Darker text color */
    }
    .user-request {
        font-size: 20px;
        text-align: center;
        color: #333; /* Darker text color */
        margin-top: 50px;
    }
    .rating-explanation {
        font-size: 16px;
        text-align: center;
        color: #333; /* Darker text color */
        margin-top: 50px;
    }
    .animate-on-scroll {
        opacity: 0;
        transition: opacity 0.5s ease;
        visibility: hidden;
    }
    /* CSS for visible effect */
    .visible {
        opacity: 1;
        visibility: visible;
    }
    #animated-element {
  animation: slideDown 0.5s ease-in-out;
}
```

```
 @keyframes slideDown {
   0% {
      transform: translateY(-100%);
      opacity: 0;
   }
   100% {
      transform: translateY(0);
      opacity: 1;
   }
}
   </style>
   <script src="https://cdn.jsdelivr.net/npm/chart.js"></script>
 </head>
<body>
   <nav class="navbar navbar-expand-lg" style="background: linear-gradient(to
bottom, rgba(0,0,0,0.9) 0%,rgba(0, 0, 0, 0.2) 100%); padding: 5px 10px;">
      <div class="container-fluid">
         <a href="#" class="navbar-brand h1 text-white" style="font-size:
18px;">Health Care</a>

         <button class="navbar-toggler bg-white" type="button" data-bs-
toggle="collapse" data-bs-target="#navbarNav">
            <span class="navbar-toggler-icon" style="color: white;"></span>
         </button>
         <div class="collapse navbar-collapse justify-content-end" id="navbarNav">
            <ul class="navbar-nav" style="font-size: 14px;">
               <li class="nav-item">
                  <a href="/admin/login/" class="nav-link text-white">Admin
Panel</a>
               </li>
               {% if user.is_authenticated %}
               <li class="nav-item">
                  <a href="{% url 'patient_app:dashboard' %}" class="nav-link text-
white">Dashboard</a>
```

```
                </li>
                <li class="nav-item">
                    <a href="{% url 'patient_app:data_entry' %}" class="nav-link text-
white">Health Data</a>
                </li>
                <li class="nav-item">
                    <a href="{% url 'auth_app:logout' %}" class="nav-link text-
white">Logout</a>
                </li>
                {% else %}
                <li class="nav-item">
                    <a href="{% url 'auth_app:registration' %}" class="nav-link text-
white">Register</a>
                </li>
                <li class="nav-item">
                    <a href="{% url 'auth_app:login' %}" class="nav-link text-
white">Login</a>
                </li>
                {% endif %}
            </ul>
        </div>
    </div>
</nav>
{% if user.is_authenticated %}
<div class="container text-white" id="animated-element">
    <div class="row justify-content-center align-items-center mt-5">
        <div class="col">
            <h1 class="text-center" style="font-size: 50px; font-style: oblique; border-
radius: 50px; background-position: bottom; background-image:
url(https://thumbs.dreamstime.com/b/faded-landscape-wild-bear-landscape-
illustration-faded-landscape-tall-trees-wild-bear-passing-ai-297495204.jpg); color:
#000;"><br><br><br>Hi,<br><b>{{ user.name }}</b><br><p style="font-size:
20px;">Scroll down&#8681; for insights<br><br></p></h1>
        </div>
```

```
      </div>
   </div>
   {% endif %}
   <div class="container mt-3">
      {% if data %}
         <div class="row justify-content-center">
            <div class="col-md-6 text-white align-items-center">
               <div class="content-container animate-on-scroll">
                  <span class="mr-2">
                     <h5 style="text-align: center;color: #000 ;font-size: 40px; font-
family:Georgia, 'Times New Roman', Times, serif;"><br><br>Your health Rating
:</h5>
                  </span>
                  <div class="rating text-gold" style="text-align: center;padding-left:
380px;">
                     {% if 0.5 == rating  %}
                     <span style="font-size: 100px;">&#11243;</span>  <!--0.5--><!--
half_star =  &#11242;   full_star = &#9733-->
                     {% elif  1 ==  rating %}
                     <span style="font-size: 100px;">&#9733;</span>   <!--1-->
                     {% elif  1.5 ==  rating %}
                     <span style="font-size: 100px;">&#11242;&#9733;</span>   <!--
1.5-->
                     {% elif  2 ==  rating %}
                     <span style="font-size: 100px;">&#9733;&#9733;</span>   <!--2-
->
                     {% elif  2.5 ==  rating %}
                     <span style="font-size:
100px;">&#11242;&#9733;&#9733;</span>   <!--2.5-->
                     {% elif  3 ==  rating %}
                     <span style="font-size:
100px;">&#9733;&#9733;&#9733;</span>   <!--3-->
                     {% elif  3.5 ==  rating %}
```

```
                    <span style="font-size:
100px;">&#11242;&#9733;&#9733;&#9733;</span>  <!--3.5-->
                    {% elif  4 ==  rating %}
                    <span style="font-size:
100px;">&#9733;&#9733;&#9733;&#9733;</span>  <!--4-->
                    {% elif  4.5 ==  rating %}
                    <span style="font-size:
100px;">&#11242;&#9733;&#9733;&#9733;&#9733;</span>  <!--4.5-->
                    {% elif  5 ==  rating %}
                    <span style="font-size:
100px;">&#9733;&#9733;&#9733;&#9733;&#9733;</span>  <!--5-->
                    {% endif %}
                </div>
            </div>
        </div>
    </div>
    <div style="margin-top: 20px;">
    <div class="row justify-content-center align-items-center h-20">
        <p style="font-size: 25px; text-align: center; margin-top:
10px;"><b>Based on your heartbeat data, our analysis shows:</b></p>
        <div class="col-md-6 col-sm-12"><canvas id="hbChart" class="h-100
w-100" ></canvas></div>
        <p style="font-size: 20px; text-align: center;"><b>To improve your
heart health:</b></p>
        <ul style="font-size: 17px;text-align: center;">
            <li>Engage in regular aerobic exercise such as brisk walking,
running, or cycling.</li>
            <li>Follow a heart-healthy diet rich in fruits, vegetables, whole
grains, and lean proteins.</li>
            <li>Manage stress through relaxation techniques like meditation or
yoga.<br><br></li>
        </ul>
        <p style="color: #336699; font-size: 18px; font-family: 'Arial', sans-
serif; text-align: justify;padding-left: 200px; padding-right: 200px;">
```

🌟 Heartbeat Harmony: Your heart is at the core of your vitality, beating the rhythm of life with every pulse! Celebrate the strength and steadiness of your heart. Keep this rhythm vibrant with activities that spark joy and health. We're here to cheer you on every step of the way. Let's keep the beat going together!

Based on your sleep time data, our analysis shows:

<canvas id="sleepChart" class="h-100 w-100"></canvas>

To improve your sleep quality:

<ul style="font-size: 17px;text-align: center; ">

Establish a consistent sleep schedule by going to bed and waking up at the same time every day, even on weekends.

Create a relaxing bedtime routine to signal your body that it's time to sleep, such as reading a book or taking a warm bath.

Avoid electronic devices and bright lights before bedtime as they can disrupt your sleep cycle.

🌙 Sleep Serenity: Dive into a sea of tranquility with each night's rest. Your dedication to nurturing your sleep pattern shines brightly, illuminating the path to well-being. Continue to embrace the night's embrace, and let's explore new heights of health and vitality. Your journey to serene nights and energized days is just beginning!

Based on your weight data, our analysis shows:

<canvas id="weightChart" class="h-100 w-100"></canvas>

```
            <p style="font-size: 20px; text-align: center;"><b>To maintain a healthy weight:</b></p>
<ul style="font-size: 17px;text-align: center;">
                <li>Eat a balanced diet that includes a variety of nutrient-rich foods and limits processed foods high in added sugars, fats, and sodium.</li>
                <li>Engage in regular physical activity such as walking, jogging, or strength training to burn calories and build muscle mass.</li>
                <li>Monitor portion sizes and practice mindful eating to prevent overeating and promote weight loss or maintenance.<br><br></li>
            </ul>
            <p style="color: #336699; font-size: 18px; font-family: 'Arial', sans-serif; text-align: justify;padding-left: 200px; padding-right: 200px;">
                🏆 <strong>Weight Wisdom:</strong> Watching your weight journey unfold is like witnessing a masterpiece in progress. Every little change is a step towards your masterpiece of health. Remember, you're not walking this path alone; we're here to support and celebrate each milestone with you. Here's to many more successes and insights together!<br><br><br><br><br><br><br><br>
            </p>
<p style="color: #ff9900; font-size: 20px; font-family: 'Arial', sans-serif; text-align: center; margin-top: 30px;">
                🌈 <strong>Ready for more vibrant health insights?</strong> Keep tracking, keep thriving, and let's make each day healthier than the last. Your health journey is our journey, and we can't wait to see where it takes you next. <strong>See you soon!</strong>
            </p>
        </div>
        </div>
    {% else %}
        <div class="row h-30 justify-content-center align-items-center">
            <div class="col-md-6 h3">
                Patient health data not available.
            </div>
        </div>
```

```
{% endif %}
<script>
    // get data drom th django template
    var healthReports = JSON.parse('{{data|escapejs}}');
    if (!Array.isArray(healthReports)) {
        // Handle error gracefully
        console.error("Invalid health report data");
    }
    // extract necessary data for the charts
    const labels = healthReports.map(report => new
Date(report.date).toLocaleDateString());
    const hbData = healthReports.map(report => report.hb);
    const sleepTimeData = healthReports.map(report=>report.sleep_time);
    const weightData = healthReports.map(report=>report.weight);
    // construct the data object for chart.js
    function createBarChart(canvasId, label, data) {
    var ctx = document.getElementById(canvasId).getContext('2d');
    var chart = new Chart(ctx, {
        type: 'bar',
        data: {
            labels: labels,
            datasets: [{
                label: label,
                data: data,
                backgroundColor: 'rgba(54, 162, 235, 0.6)',
                borderColor: 'rgba(54, 162, 235, 1)',
                borderWidth: 1
            }]
        },
        options: {
            scales: {
                y:{
                    beginAtZero: true
                }
```

```
                }
            }
        });
    }
        // create bar charts
        createBarChart('hbChart', 'Heart Beat', hbData);
        createBarChart('weightChart', 'Weight', weightData);
        createBarChart('sleepChart', 'Sleep Time', sleepTimeData);
    </script>
</div>
<script src="https://cdn.jsdelivr.net/npm/jquery"></script>
<script>
    function isInViewport(element) {
        const rect = element.getBoundingClientRect();
        return (
            rect.top >= 0 &&
            rect.left >= 0 &&
            rect.bottom <= (window.innerHeight ||
document.documentElement.clientHeight) &&
            rect.right <= (window.innerWidth ||
document.documentElement.clientWidth)
        );
    }
    // Function to handle scroll event
    function handleScroll() {
        const content = document.querySelector('.content-container');
        if (isInViewport(content)) {
            content.classList.add('visible');
            // Remove the event listener once the content is visible
            window.removeEventListener('scroll', handleScroll);
        }
    }
    // Add scroll event listener
    window.addEventListener('scroll', handleScroll);
```

```
</script>
   <!-- Latest compiled and minified JavaScript -->
   <script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/js/bootstrap.bundle.min.js"><
/script>
</body>
</html>
```

Index.html

```
{% extends 'base.html' %}
  {% block body %}
   <div class="container">
      {% if user.is_authenticated %}
         <div class="row justify-content-evenly">
            <div class="col-md-3">
               <a href="{% url 'patient_app:data_entry' %}" class="btn btn-
primary">Click here to enter the health data</a>
            </div>
            <div class="col-md-3 align-self-end">
               <a href="{% url 'patient_app:dashboard' %}" class="btn btn-
success">Dashboard</a>
            </div>
         </div>
      {% else %}
         <div class="row justify-content-center align-items-center h-20">
            <div class="col-md-6 h2">
               Please log in to view the Health Reports.
            </div>
         </div>
      {% endif %}
   </div>
{% endblock %}
```

Patient_data_form.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Health Care</title>
    <!-- Latest compiled and minified CSS -->
    <link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/css/bootstrap.min.css"
rel="stylesheet" integrity="sha384-
QWTKZyjpPEjISv5WaRU9OFeRpok6YctnYmDr5pNlyT2bRjXh0JMhjY6hW+AL
EwIH" crossorigin="anonymous">
    <link rel="stylesheet" href="styles.css">
    <style>
        .h-20{
            height: 20rem;
        }
        .h-30{
            height:30rem;
        }
        body{
            background-image:url(https://wallpapers-clan.com/wp-
content/uploads/2023/09/walk-in-the-fall-forest-minimalist-background.jpg);
            background-size: cover;
            background-repeat: repeat;
            background-position: center;
        }
        .rating {
            unicode-bidi: bidi-override;
            direction: rtl;
            font-size: 25px;
```

```
}
.rating > span {
    display: inline-block;
    position: relative;
    width: 1.1em;
}
.rating > span:hover:before,
.rating > span:hover ~ span:before {
    content: "\2605";
    position: absolute;
}
.custom-toggler .navbar-toggler-icon {
    color: red; /* Change color here */
}
.text-gold{
    color: gold;
}
.navbar-nav .nav-link {
transition: padding 0.3s ease;
}
.navbar-nav .nav-link:hover {
    padding: 8px 20px; /* Change the padding values to whatever you prefer */
    background-color: rgba(32, 36, 43, 0.2); /* Change the background color to whatever you prefer */
}
.health-facts {
    font-size: 18px;
    margin-top: 50px;
    text-align: center;
    color: #333; /* Darker text color */
}
.user-request {
    font-size: 20px;
    text-align: center;
```

```
            color: #333; /* Darker text color */
            margin-top: 50px;
        }
        .rating-explanation {
            font-size: 16px;
            text-align: center;
            color: #333; /* Darker text color */
            margin-top: 50px;
        }
        #animated-element {
    animation: slideDown 0.5s ease-in-out;
}
@keyframes slideDown {
    0% {
        transform: translateY(-100%);
        opacity: 0;
    }
    100% {
        transform: translateY(0);
        opacity: 1;
    }
}
#animated-element_ {
    animation: slideDown_ 0.5s ease-in-out;
}
@keyframes slideDown_ {
    0% {
        transform: translateX(-100%);
        opacity: 0;
    }
    100% {
        transform: translateY(0);
        opacity: 1;
    }
```

```
}
  </style>
  <script src="https://cdn.jsdelivr.net/npm/chart.js"></script>
</head>
<body>
  <nav class="navbar navbar-expand-lg" style="background: linear-gradient(to bottom, rgba(0,0,0,0.9) 0%,rgba(0, 0, 0, 0.2) 100%); padding: 5px 10px;">
    <div class="container-fluid">
      <a href="#" class="navbar-brand h1 text-white" style="font-size: 18px;">Health Care</a>
      <button class="navbar-toggler bg-white" type="button" data-bs-toggle="collapse" data-bs-target="#navbarNav">
        <span class="navbar-toggler-icon" style="color: white;"></span>
      </button>
      <div class="collapse navbar-collapse justify-content-end" id="navbarNav">
        <ul class="navbar-nav" style="font-size: 14px;">
          <li class="nav-item">
            <a href="/admin/login/" class="nav-link text-white">Admin Panel</a>
          </li>
          {% if user.is_authenticated %}
          <li class="nav-item">
            <a href="{% url 'patient_app:dashboard' %}" class="nav-link text-white">Dashboard</a>
          </li>
          <li class="nav-item">
            <a href="{% url 'patient_app:data_entry' %}" class="nav-link text-white">Health Data</a>
          </li>
          <li class="nav-item">
            <a href="{% url 'auth_app:logout' %}" class="nav-link text-white">Logout</a>
          </li>
          {% else %}
```

```
                <li class="nav-item">
                    <a href="{% url 'auth_app:registration' %}" class="nav-link text-
white">Register</a>
                </li>
                <li class="nav-item">
                    <a href="{% url 'auth_app:login' %}" class="nav-link text-
white">Login</a>
                </li>
                {% endif %}
            </ul>
        </div>
    </div>
</nav>
{% if user.is_authenticated %}
<div class="container text-white"id="animated-element">
    <div class="row justify-content-center align-items-center mt-5">
        <div class="col">
            <h1 class="text-center" style="font-size: 50px;font-style: oblique; border-
radius: 50px;background-position: bottom; background-image:
url(https://thumbs.dreamstime.com/b/faded-landscape-wild-bear-landscape-
illustration-faded-landscape-tall-trees-wild-bear-passing-ai-297495204.jpg); color:
#000;  ;"><br><br><br>Welcome,<br><b>{{ user.name }}</b></h1>
</div>
        </div>
    </div>
{% endif %}
<div class="container text-white">
    <div class="row justify-content-center align-items-center" id="animated-
element_">
        <div class="col-md-8">
            <div class="health-facts">
                <h2><br><br><br>&#10147;       Why Health Care and Health
Monitoring are Important?</h2>
```

```
            <p>Healthcare is crucial for maintaining overall well-being and preventing diseases. Regular health monitoring helps in early detection of health issues and allows for timely intervention.</p>
            <p><b>Here are some facts:</b></p>
            <ul>
                <li>Regular exercise and a balanced diet can reduce the risk of chronic diseases like heart disease, diabetes, and obesity.</li>
                <li>Monitoring vital signs such as blood pressure, heart rate, and cholesterol levels can help in the prevention and management of cardiovascular diseases.</li>
                <li>Sleep is essential for cognitive function, mood regulation, and overall health. Poor sleep quality can increase the risk of various health problems.</li>
            </ul>
        </div>
        <div class="user-request">
            <h2>Your Health Data is Important!</h2>
            <p>We encourage you to enter your health data regularly. This information helps us track your health status and provide personalized insights and recommendations.</p>
            <p>Please enter data for the following metrics:</p>
        </div>
    <div class="container mt-3">
        <div class="row justify-content-center align-items-center h-30">
            <div class="col-md-5">
                <form method="post">
                    {% csrf_token %}
                    <fieldset>
                        <legend>Enter health data</legend>
                        {% if form.hb.errors %}
                            {{form.hb.errors}}
                        {% endif %}
                        <div class="mb-3">
                            <label for="id_hb" class="form-label">Heart Beat</label>
```

```
                    <input type="number" name="hb" placeholder="heart beat count
for 1 minute" id="id_hb" class="form-control mb-2">
                </div>
                {% if form.weight.errors %}
                    {{form.weight.errors}}
                {% endif %}
                <div class="mb-3">
                    <label for="id_weight" class="form-label">Weight</label>
                    <input type="number" name="weight" placeholder="Enter your
weight" id="id_weight" class="form-control mb-2">
                </div>
                {% if form.sleep_time.errors %}
                    {{form.sleep_time.errors}}
                {% endif %}
                <div class="mb-3">
                    <label for="id_sleep_time" class="form-label">Sleep
Time</label>
                    <input type="time" name="sleep_time"  id="id_sleep_time"
class="form-control mb-2">
                </div>
            </fieldset>
            <button class="btn btn-primary" type="submit">Save</button>
        </form>
    </div>
  </div>
</div>
<div class="rating-explanation">
    <h2>How Our Website Helps You</h2>
    <p>Our website utilizes a 5-star rating system to provide you with insights into
your health data. Each metric is assigned a rating based on predefined ranges,
allowing you to easily track your progress over time.</p>
    <p>By regularly updating your health data and monitoring your ratings, you
can gain valuable insights into your health and make informed decisions to improve
your well-being.</p>
```

```
    </div>
            </div>
          </div>
        </div>
    </div>
    <script src="https://cdn.jsdelivr.net/npm/jquery"></script>
    <!-- Latest compiled and minified JavaScript -->
    <script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/js/bootstrap.bundle.min.js"><
/script>
</body>
</html>
```

Views.py

```
from django.shortcuts import render
import pickle
import pandas as pd
from .models import PatientHealthModel
from .forms import PatientDataForm
from django.contrib.auth.decorators import login_required
from django.urls import reverse_lazy, reverse
from django.shortcuts import redirect
from datetime import datetime
from .ml_model import MLModel
from MedicalProject.settings import BASE_DIR
from .utils import cleaning_latest_record
import numpy as np
from sklearn.preprocessing import StandardScaler
def index(request):
    return render(request, 'patient_app/index.html')
@login_required(login_url=reverse_lazy('auth_app:login'))
def patient_data_enter_view(request):
```

```
    if request.method == "POST":
        form = PatientDataForm(request.POST)
        if form.is_valid():
            user = request.user
            PatientHealthModel.objects.create(**{'user':user, **form.cleaned_data})
            return redirect(reverse('patient_app:dashboard'))
        else:
            return render(request, 'patient_app/patient_data_form.html', {'form':form})
    form = PatientDataForm()
    return render(request, 'patient_app/patient_data_form.html', {'form':form})
  @login_required(login_url=reverse_lazy('auth_app:login'))
def patient_dashboard(request):
    # getting the active user
    user = request.user
    # Extracting the PatientHealthModel Data of that particular user
    patient_data = PatientHealthModel.objects.filter(user=user)
  # checking whether the user has PatientHealthModel data or not if not displaying
the dashboard with out any data
    if not patient_data.exists():
        return render(request, 'patient_app/dashboard.html', {'rating':0})
    # columns for pandas data frame
    columns = ['hb', 'sleep_time', 'date', 'weight']
    df = pd.DataFrame(patient_data.values_list('hb', 'sleep_time', 'date', 'weight'),
columns=columns)
 # sorting values to remove the old records of that particular day
    df.sort_values(by='date', ascending=True)
    # after sorting changing the date as per our requirement
    df['date'] = [ x.date() for x in df['date']]
  # removing the old records of that particular day
    df = df.drop_duplicates(subset='date')
     # finding the latest record
    df_latest_record = df.tail(1)
   x = df_latest_record.to_dict()
    # converting it into dict
```

```
    latest_record = cleaning_latest_record(x)
    # age of the person
    age = datetime.today().year - request.user.dob.year
    # Define the the path to your model file
    #model_path = BASE_DIR/'ml_models'/'project_model.pkl'
    '''
    # age of the person
    age = datetime.today().year - request.user.dob.year
    # Define the the path to your model file
    model_path = BASE_DIR/'ml_models'/'project_model.h5'
    # creating the MLModel object
    ml_model_prediction = MLModel(model_path=model_path)
    # input data to the MLModel
    # inputs are => heart_beat, BMI, gender, sleep time, age
    input_data = np.array([[
        latest_record['hb'],
        int(latest_record['weight']/((user.height/100)**2)),
        1 if user.gender == 'M' else 0,
        latest_record['sleep_time'].hour,
        age
    ]])
    # prediction determined by the Machine Learning Model
    rating_prediction = ml_model_prediction.predict(input_data)
    rating = np.argmax(rating_prediction) + 1
'''
    # Define the the path to your model file
    model_path = BASE_DIR/'ml_models'/'project_model.h5'
    # creating the MLModel object
    ml_model_prediction = MLModel(model_path=model_path)
    # input data to the MLModel
    # inputs are => heart_beat, BMI, gender, sleep time, age
    input_data = np.array([[
        latest_record['hb'],
        int(latest_record['weight']/((user.height/100)**2)),
```

```
        1 if user.gender == 'M' else 0,
        latest_record['sleep_time'].hour,
        age
    ]])
    input_data = input_data.reshape(1, -1)
    # prediction determined by the Machine Learning Model
    rating_prediction = ml_model_prediction.predict(input_data)
    rating = np.argmax(rating_prediction) + 1
    # converting sleep time into hours for displaying in charts
    df['sleep_time'] = [x.hour for x in df['sleep_time'] ]
    return render(request, 'patient_app/dashboard.html', {'data':
df.to_json(orient='records', date_format='iso'), 'rating':rating})
```

CHAPTER 11

SCREEN LAYOUTS

User Login: User can Login required details.

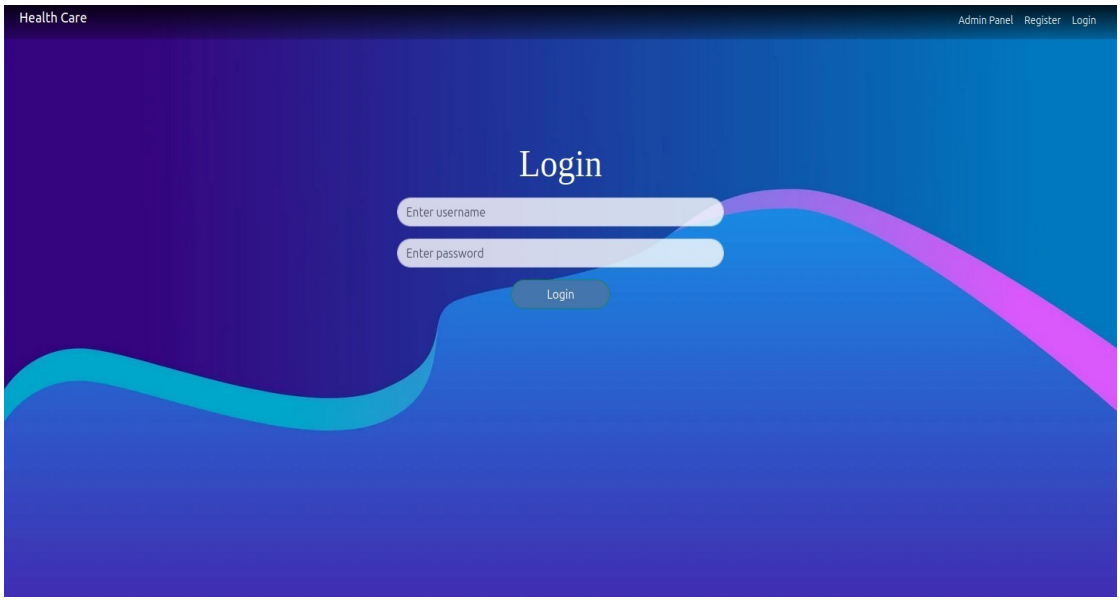


FIG 11.1 LOGIN PAGE

User Registration page: User can register with required details.

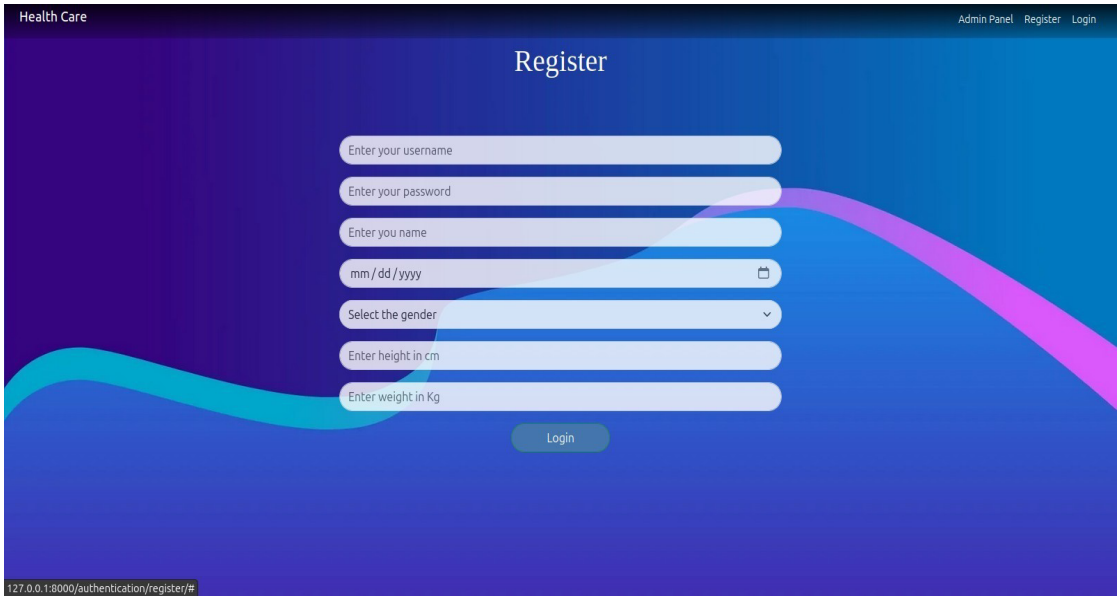


FIG 11.2 REGISTER PAG

User Home page: User can view the home page after successful login.

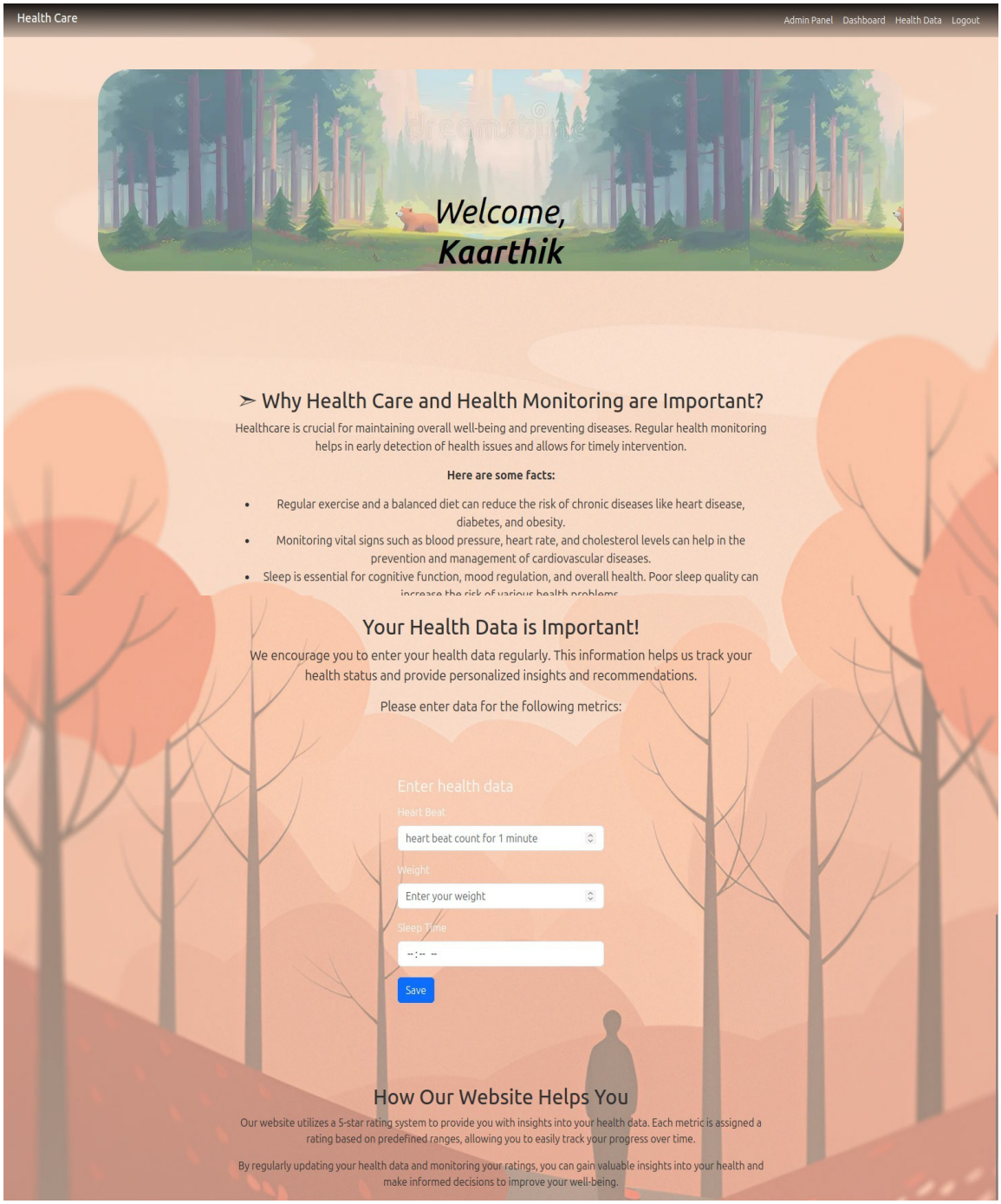


FIG 11.3 HOMEPAGE

DASHBOARD:


Health Care
Admin Panel
Dashboard
Health Data
Logout
Hi,
Kaarthik
Scroll down ⇩ for insights
Your health Rating :
Based on your heartbeat data, our analysis shows:
Heart Beat
100
90
80
70
60
50
40
30
20
10
0
3/20/2024
3/21/2024
3/22/2024
3/23/2024
3/25/2024
4/8/2024
To improve your heart health:
Engage in regular aerobic exercise such as brisk walking, running, or cycling.
Follow a heart-healthy diet rich in fruits, vegetables, whole grains, and lean proteins.
Manage stress through relaxation techniques like meditation or yoga.
Heartbeat Harmony: Your heart is at the core of your vitality, beating the rhythm of life with every pulse! Celebrate the strength and steadiness of your heart. Keep this rhythm vibrant with activities that spark joy and health. We're here to cheer you on every step of the way. Let's keep the beat going together!
Based on your sleep time data, our analysis shows:
Sleep Time

FIG 11.4 DASHBOARD

CHAPTER 12
CONCLUSION

CONCLUSION:

Our project represents a pioneering advancement in the realm of personal health care management, harnessing the synergistic potential of machine learning methodologies within the versatile Django framework. Through meticulous design and strategic integration of decision tree algorithms, we have engineered a sophisticated system poised to revolutionize health condition predictions based on user-centric metrics. This transformative endeavor heralds a new era in proactive health management, empowering individuals with unprecedented access to personalized health insights and facilitating informed decision-making like never before.

The culmination of our efforts is not merely the development of a technical solution; rather, it signifies a profound commitment to enhancing the quality of life for users across diverse demographics. By harnessing the power of data-driven decision-making, our platform serves as a beacon of empowerment, offering users actionable insights into their health status and potential risks. In a world inundated with health information, our system stands out as a beacon of reliability and accuracy, guiding users through the labyrinth of wellness with precision and clarity.

CHAPTER 13

FUTURE ENHANCEMENT

FUTURE ENHANCEMENT:

Looking forward, our project holds immense potential for further advancement. Firstly, we can explore augmenting our system with additional health metrics and data sourcesto furnish more comprehensive insights and recommendations. This entails integrating data from wearable devices for real-time health monitoring. Furthermore, extending our predictiveanalytics capabilities to encompass early disease detection and prevention strategies isparamount. Collaborating with healthcare entities for seamless data sharing and monitoring can fortify the efficacy of our system. Additionally, developing mobile applications would enhance accessibility and user engagement, enabling users to conveniently access their healthinformation on-the-go. These future endeavors aim to continually refine the functionality andefficacy of our personal health care management system, ultimately fostering better health outcomes for users.

CHAPTER 14

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Patient Health Condition Monitoring System by Using IOT

Mrs. Jasmine Punitha
Assistant professor - CSE
Nehru Institute of Engineering and Technology
Coimbatore

Mrs. Priya. S
Assistant professor – CSE
Nehru Institute of Engineering and Technology
Coimbatore.

Mrs . Mahabooba . M
Assistant professor – CSE
Nehru Institute of Engineering and Technology
Coimbatore.

M .Santhiya
Department of CSE
Nehru Institute of Engineering and Technology
Coimbatore,India

M. Monisha
Department of CSE
Nehru Institute of Engineering and Technology
Coimbatore,India

M. Athira
Department of CSE
Nehru Institute of Engineering and Technology
Coimbatore,India

Abstract

Patient Health Monitoring System (PHMS) is a new solution using IoT technology that can be used to monitor and track patients' health in real time. Thanks to advanced data analysis and machine learning algorithms, PHMS can provide real-time information and alert healthcare providers to any abnormal or potentially dangerous conditions. Integrating IoT technology into healthcare not only improves care efficiency but also facilitates early detection and health management, ultimately helping to improve patient outcomes and reduce healthcare cost.

INTRODUCTION:

In recent years, the integration of Internet of Things (IoT) technology into healthcare has revolutionized patient care and management. The Patient Health Monitoring System (PHMS) proposed in this article uses the powerful functions of IoT devices that can be used to realize effective and continuous monitoring of the patient's healthy consumption. Routine patient care often includes routine check-ups or hospital visits, which may not reflect important health conditions or early warning signs. But patients beyond PHMS gives doctors the go-ahead for their health, leading to ongoing care hours to do. This article explores the design, implementation, and benefits of patient health monitoring using IoT wearable devices. By using IoT devices to monitor patient health, Healthcare organizations can improve patient care, reduce healthcare costs, and support health management. This article aims to provide a better understanding of the potential of IoT technology to revolutionize patient care and improve health outcomes. Abbreviations and Abbreviations: IoT: Internet of Things

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OBJECTIVES:

The main aim of the project is to develop and implement an intelligent patient health assessment. Sensors are placed on the patient's body to detect the patient's body temperature and heart rate.

Maintenance Time:
Continuous, real-time monitoring of vital signs such as heart rate, blood pressure, body temperature, and activity level using IoT wearable devices.

Preliminary Investigation:
By analysing the data collected from wearable devices, health problems or damages can be detected early and timely intervention and preventive measures can be taken.

User-Friendly Interface:
pursues the creation of an intuitive and effective system that provides easy access to medical information, alerts and recommendations for patients and doctors, encouraging patient participation.

Scalability and Flexibility:
Designing flexible and adaptable care systems to different patients, healthcare environments, technological changes in IoT and legacy urine technology one Section.

Evaluation and validation:
Has developed a care system that can be adapted and adapted to different patients, healthcare environments, and technological changes in IoT and technology.

EXISTING SYSTEM:

Systems used for healthcare are permanent care systems that can be diagnosed while the patient is in the hospital or in bed. The procedure is now common and can only be performed in intensive care units. In the current system, patients must be hospitalized for regular patient care. This is impossible when you leave the hospital. This system cannot be used at home. We want to create a system that will help protect the patient's health not only while sleeping but also when he gets out of bed. The main idea of the system is to send information from web pages and constantly monitor patients over the internet. Such a system will constantly check important physical parameters such as temperature and pulse, compare them with predetermined intervals, and instantly warn doctors and patients if these values exceed certain limits.

Drawbacks:
In the current system, patients must be hospitalized for regular patient care. This is impossible when you leave the hospital. This system cannot be used at home. Current systems measure the health status of patients and use zig bee, Bluetooth protocol, etc., which are used for short communication only to send information. It is sent via . Providers do not need to access this content.

PROPOSED TECHNIQUE:

Healthcare uses a chain of custody to monitor patients' health.

Expected Advantages:
Belt-based devices can continuously monitor vital signs and health such as heart rate, respiratory rate, activity level, and physical activity throughout the day to have a good understanding of the patient's health status. Unlike traditional medical equipment, the device is lightweight, invisible and easy to carry, allowing patients to continue their daily activities without any discomfort or discomfort. The equipment in the gloves regularly monitors vital signs and health, detecting abnormalities or deviations in the vital time, allowing timely intervention and preventive measures to reduce health risks. The system generates instant reports and alerts for adverse health metrics or critical events, allowing for timely intervention and reducing the risk of problems.

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METHODOLOGY

The IoT patient monitor has 3 sensors. These are temperature sensors, heart rate sensors and breathing sensors. This project is useful because doctors can monitor their patients' health by visiting a website or URL. Nowadays, many IoT applications are also being developed. Now doctors or family members can monitor or track patients' health through Android apps. To run an IoT-based healthcare project, you need Wi-Fi connectivity.

.

The microcontroller or Arduino board connects to the Wi-Fi network using the Wi-Fi module. If there is no Wi-Fi network, the project will not work. You can create a Wi-Fi zone using a Wi-Fi module or even an access point on your smartphone. The Arduino UNO board continues to read the inputs from these 3 sensors. It then sends the data to the cloud by sending it to a specific URL/IP address. Then repeat the process to send the data to the IP after a certain period of time.

COMPONENTS OF HARDWARE

1 . ESP 32 Wi-Fi Module

ESP32 series low-cost microcontrollers feature built-in Wi-Fi and dual-mode Bluetooth. The ESP32 series uses the Tensilica Xtensa LX6 dual-core or single-core, Tensilica Xtensa LX7 dual-core or discrete RISC-V CPU. in detail. and power management modules. The ESP32 was designed and manufactured by Espressif Systems, a Chinese company based in Shanghai, and manufactured by TSMC using the 40nm process. It replaces the ESP8266 microcontroller. Programming languages, frameworks, platforms and environments for ESP32 programming.

Figure: ESP 32 Wi-Fi Module

The ESP8266 started a mini revolution by packing Wi-Fi into a portable, affordable device with enough power and ports to handle simple tasks. According to Espressif, the Espressif ESP32 development board with Wi-Fi and Bluetooth has powerful capabilities and can be used in a variety of applications, from low-power devices to the most complex projects such as speech, music and MP3 decoding. Universal Wi-Fi-BT-BLE MCU module. Wi-Fi-enabled ESP32 NodeMCU Development Board The latest ESP-WROOM-32 module powers Bluetooth, a small, minimalist system development board that can be quickly dropped into a buttery loaf.

2. PLUSE SENSOR:

This is a low-power, low-cost, durable sensor that can be used in many different applications, making it popular in many different applications that require heart rate measurement.

Fig.2: Pulse sensor

When you look at the front of the sensor, you can only see the LED and photodiode. However, the actual circuit is behind the sensor. The low power bandwidth op amp in the circuit is configured to provide some gain in the circuit and we have a reverse voltage protection diode to protect the circuit from ESD and reverse voltage. Other capacitors and resistors on the PCB are used as RC filters to reduce external noise in the circuit.

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3. CABLE TEMPERATURE SENSOR:

Cable temperature sensors are used as signal sensors for electrical thermostats, regulators and thermometers. These sensors can be used almost anywhere you want to measure or measure temperature. The sensor can be mounted in the sensor housing or directly on the sensor. Digital thermometers can convert body temperature and humidity into digital measurements through a temperature sensor and connector. The Temperature System Sensor (TSYS) responds quickly to changes in process temperature in a small package designed for tight spaces. Optimized microcircuit design ensures fast switching times and low power consumption.

Fig.4: Digital Temperature Sensors

4. Respiratory sensor :

A respirator is a device used to monitor a person's breathing and patterns. These sensors can detect changes in pressure, air flow, or gas exchange to provide important information about a person's breathing. They are frequently used in medicine for patient care, sleep research, and respiratory therapy.

Fig.5: Respiratory Sensor

5. POWER SUPPLY:

The LM2596 DC-DC Buck Converter is versatile and effective for converting high voltage to lower output voltage, it can be used to power a variety of devices other than required from one location and there are now products made for added safety. . The

LM2596 is designed to step down the input voltage to a lower output voltage. It works by rapidly switching the input voltage on and off, then filtering and controlling the output to maintain a stable DC voltage.

Fig.6: Power Supply

SOFTWARE APPLICATION:

Blynk :

Blynk is a free application for smartphones and tablets that allows you to remotely control devices using the Internet of Things (IoT). With Blynk, you can easily create interfaces to control electronic devices, read sensor data, and view data streams from sensors or other devices. Blynk provides a library of predefined elements for buttons, sliders, images, and more, allowing you to create your own app interface without the need for coding.

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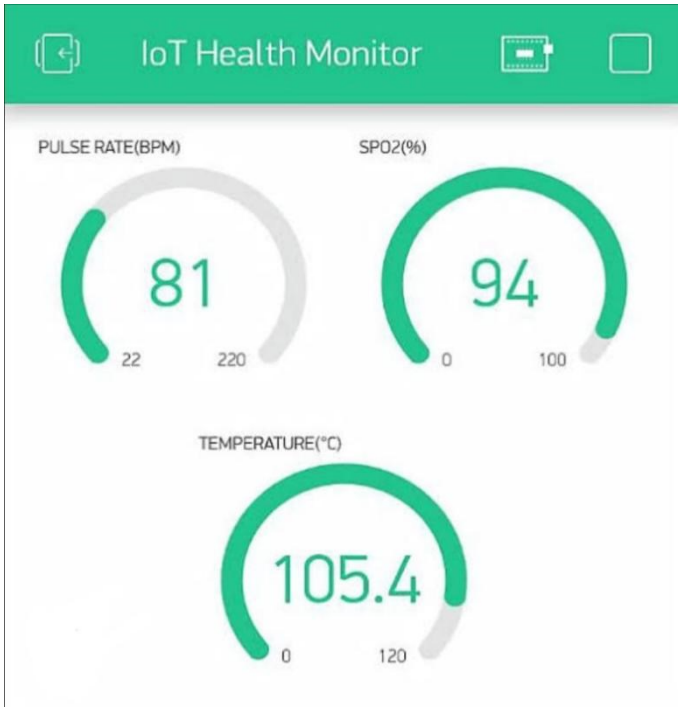

CONCLUSION:

The proposed health monitoring system can be used effectively in emergency situations because it can be monitored daily, recorded and stored in a file. Thanks to our work, doctors can also use IoT to monitor patients' health anytime and anywhere. Heart rate sensor, temperature sensor etc. All individual sensors will provide the necessary information. The
IoT belt effectively monitors patient health and provides instant information and alerts.
Accuracy of data collected by equipment compared to traditional monitoring.
Measure device user experience and comfort of use, including size, weight, and ease of use.
Benefits of using these systems, such as early detection of health problems, improved patient outcomes and reduced medical costs.

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