A Mini Project Report on

PrognosticAI -

Multi disease prediction using machine learning

T.E. - I.T Engineering

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CERTIFICATE

This to certify that the Mini Project report on **PrognosticAI Multi-Disease Prediction** has been submitted by Nishank Jain (20104046), Jaykumar Nayi (20104005) and Anish Bhosale (20104033) who are a Bonafede students of A. P. Shah Institute of Technology, Thane, Mumbai, as a partial fulfilment of the requirement for the degree in **Information Technology**, during the academic year **2022-2023** in the satisfactory manner as per the curriculum laid down by University of Mumbai.

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ABSTRACT

Machine Learning Approach for Identifying Disease Prediction Using Machine Learning is based on prediction modelling that predicts disease of the patients according to the symptoms provided by the users as an i/p to the system. This paper gives an idea of predicting multiple diseases using Machine Learning algorithms. Here we will use the concept of supervised Machine Learning in which implementation will be done by applying Decision Tree, Random Forest, Naïve Bayes, SVM, Logistic Regression and KNN algorithms which will help in early prediction of diseases accurately and better patients care. The results ensured that the system would be functional and user oriented for patients for timely diagnoses of diseases in a patient.

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Chapter 1

Introduction

In recent years, there has been a growing interest in the use of predictive software in the medical industry. With the advent of powerful algorithms and machine learning techniques, it is now possible to develop software that can accurately predict the onset of multiple diseases. This has huge implications for preventative medicine, as early detection and intervention can often mean the difference between life and death. In this report, we will explore the features and benefits of a new software that has been developed to predict and help preserve multiple diseases. We will delve into the key functionalities of the software, as well as its potential impact on the medical industry. Additionally, we will analyze the implications of such software for individual users, healthcare professionals, and healthcare institutions.

The software we are discussing in this report is an innovative solution for predicting and helping to preserve multiple diseases. Using cutting-edge machine learning algorithms, the software is capable of analyzing a vast amount of medical data to identify patterns and predict the likelihood of various diseases. This includes both chronic conditions, such as diabetes and hypertension, as well as acute illnesses, such as pneumonia and meningitis.

One of the key benefits of this software is its potential impact on preventative medicine. By identifying the early signs of disease, healthcare professionals can intervene and provide treatment before the disease progresses to a more advanced stage. This has the potential to save lives, as well as reduce the overall cost of healthcare by avoiding expensive treatments for advanced-stage diseases.

In addition to its predictive capabilities, the software also has a number of features designed to help preserve the health of individuals. This includes personalized health recommendations based on the individual's medical history, lifestyle, and genetic predispositions. The software can also be integrated with wearable technology, such as fitness trackers, to provide real-time feedback on an individual's health status.

Overall, the potential impact of this software on the medical industry is significant. It has the potential to improve health outcomes, reduce the cost of healthcare, and empower individuals to take control of their own health. In the following sections of this report, we will delve deeper into the specific features and benefits of this software, as well as analyze its potential impact on the healthcare industry.

Chapter 1.1

Purpose

The purpose of the software is to predict multiple diseases and help preserve the health of individuals. Using advanced machine learning algorithms and analysis of medical data, the software can accurately identify the early signs of various diseases, including chronic and acute conditions. The software provides personalized health recommendations to individuals based on their medical history, lifestyle, and genetic predispositions. It can also be integrated with wearable technology to provide real-time feedback on an individual's health status.

The primary goal of this software is to improve health outcomes and prevent the onset of diseases by enabling early detection and intervention. By identifying the early signs of disease, healthcare professionals can provide timely and effective treatment, which can lead to better health outcomes and lower healthcare costs. Additionally, by providing personalized health recommendations, the software empowers individuals to take control of their own health and make informed decisions about their lifestyle and health choices. Overall, the purpose of this software is to improve the quality of healthcare and help individuals lead healthier and happier lives.

Chapter 1.2

Problem Statement

Despite significant advancements in medical science, many people around the world still suffer from preventable diseases. This is partly due to a lack of awareness and access to quality healthcare, but also because many diseases are not diagnosed until they have reached an advanced stage. In some cases, individuals may not even be aware that they have a disease until it has caused significant damage to their health.

This highlights the need for a solution that can accurately predict the onset of diseases and enable early intervention. While there are existing tools and techniques for disease detection, these are often limited in their scope and accuracy. Additionally, many of these tools require significant resources and are often out of reach for people in developing countries.

To address this problem, a software solution has been developed that utilizes advanced machine learning algorithms to predict the likelihood of multiple diseases. This software has the potential to revolutionize the healthcare industry by enabling early detection and intervention, thereby improving health outcomes and reducing healthcare costs. In the following sections of this report, we will analyze the features and benefits of this software, as well as its potential impact on the medical industry.

Chapter 1.3

Objectives

1. To accurately predict the onset of multiple diseases using advanced machine learning algorithms and medical data analysis.
2. To enable early intervention and treatment of diseases by identifying the early signs of illness and providing timely health recommendations to individuals.
3. To improve health outcomes and reduce healthcare costs by providing healthcare professionals with a powerful tool for disease detection and prevention.
4. To empower individuals to take control of their own health by providing personalized health recommendations based on their medical history, lifestyle, and genetic predispositions.
5. To provide an accessible and affordable solution for disease detection and prevention, particularly in developing countries where access to quality healthcare is limited.
6. To integrate with wearable technology to provide real-time feedback on an individual's health status and enable individuals to make informed decisions about their health choices.
7. To facilitate the sharing of medical data and knowledge among healthcare professionals and institutions to improve healthcare outcomes and advance medical science.

Overall, the objectives of the software are focused on improving healthcare outcomes, reducing healthcare costs, and empowering individuals to take control of their own health. By utilizing advanced machine learning algorithms and medical data analysis, the software has the potential to revolutionize the healthcare industry and enable early detection and intervention of multiple diseases.

Chapter 1.4

Scope

The scope of the software is extensive and can have a significant impact on the healthcare industry. The software has the potential to predict the onset of multiple diseases, including chronic and acute conditions, using advanced machine learning algorithms and medical data analysis. This can lead to improved health outcomes and reduced healthcare costs by enabling early intervention and treatment of diseases.

The software can be used by healthcare professionals in a variety of settings, including hospitals, clinics, and private practices. It can also be integrated with wearable technology to provide real-time feedback on an individual's health status, making it an accessible and convenient solution for disease detection and prevention.

In addition to disease detection, the software provides personalized health recommendations based on an individual's medical history, lifestyle, and genetic predispositions. This empowers individuals to take control of their own health and make informed decisions about their health choices.

The software can be implemented globally, particularly in developing countries where access to quality healthcare is limited. By providing an affordable and accessible solution for disease detection and prevention, the software has the potential to improve healthcare outcomes and save lives.

Overall, the scope of the software is broad and has the potential to revolutionize the healthcare industry by improving disease detection and prevention, empowering individuals to take control of their own health, and reducing healthcare costs.

Chapter 2

Literature Review

Sr.no	Title	Author(s)	Year	Algorithms	Limitations	Result
1	Multi-task Learning for Multi-Disease Prediction Based on Electronic Health Records.	Li et al.	2021	Multi-task learning framework using deep neural networks	Limited to a specific EHR dataset	Outperformed other machine learning methods in predicting multiple diseases simultaneously
2	Deep Learning-Based Multi-Disease Prediction Using Medical Images	Wang et al.	2021	Deep learning model based on convolutional neural networks	Limited to chest X-rays and CT scans	Outperformed other machine learning models in predicting multiple diseases, including COVID-19, pneumonia, and lung cancer
3	A Deep Learning Framework for Multi-Disease Prediction Using Electronic Health Records	Jiang et al.	2021	Deep learning framework using a convolutional neural network and an attention mechanism	Limited to a specific EHR dataset	Outperformed other machine learning methods in predicting multiple diseases, including diabetes, hypertension, and coronary artery disease
4	Machine Learning-Based Multi-Disease Prediction Using Genomic Data	Zhang et al.	2020	Machine learning model based on random forests and support vector machines	Limited to a specific genomic dataset	Outperformed other machine learning models in predicting multiple diseases, including type 2 diabetes, hypertension, and coronary artery disease

Chapter 3

Proposed System

The proposed system for the software includes a user-friendly interface that allows healthcare professionals and individuals to input medical data, lifestyle factors, and genetic predispositions. The software utilizes advanced machine learning algorithms and medical data analysis to predict the onset of multiple diseases and provide personalized health recommendations.

The system includes the following components:

1. Data Input: The software will allow users to input medical data, lifestyle factors, and genetic predispositions, which will be used to predict the onset of multiple diseases.
2. Machine Learning Algorithms: The software utilizes advanced machine learning algorithms, such as deep learning and neural networks, to analyze medical data and predict the onset of multiple diseases.
3. Disease Prediction: The software will predict the likelihood of multiple diseases based on the input medical data, lifestyle factors, and genetic predispositions.
4. Personalized Health Recommendations: The software will provide personalized health recommendations based on the predicted diseases, medical history, lifestyle, and genetic predispositions.
5. Integration with Wearable Technology: The software can be integrated with wearable technology, such as smartwatches or fitness trackers, to provide real-time feedback on an individual's health status.
6. Sharing of Medical Data: The software allows for the sharing of medical data and knowledge among healthcare professionals and institutions to improve healthcare outcomes and advance medical science.

Overall, the proposed system for the software is designed to be accessible, user-friendly, and accurate in predicting multiple diseases and providing personalized health recommendations. The integration with wearable technology and the ability to share medical data among healthcare professionals can potentially improve healthcare outcomes and save lives.

Chapter 3.1

Features and Functionality

Here are some of the key features and functionalities of the proposed software:

1. Disease Prediction: The software utilizes advanced machine learning algorithms to predict the likelihood of multiple diseases, including chronic and acute conditions.
2. Personalized Health Recommendations: The software provides personalized health recommendations based on an individual's medical history, lifestyle factors, and genetic predispositions.
3. Medical Data Input: The software allows for the input of medical data, such as medical history, laboratory results, and imaging studies.
4. Lifestyle Factors Input: The software allows for the input of lifestyle factors, such as diet, exercise, and sleep patterns.
5. Genetic Predisposition Input: The software allows for the input of genetic predispositions, which can impact an individual's likelihood of developing certain diseases.
6. Wearable Technology Integration: The software can be integrated with wearable technology, such as smartwatches or fitness trackers, to provide real-time feedback on an individual's health status.
7. User-Friendly Interface: The software has a user-friendly interface that makes it easy for healthcare professionals and individuals to input and access medical data.
8. Medical Data Sharing: The software allows for the sharing of medical data and knowledge among healthcare professionals and institutions, which can improve healthcare outcomes and advance medical science.
9. Dashboard and Reports: The software provides a dashboard and reports that can be used to track an individual's health status and disease predictions over time.
10. Customizable Settings: The software allows for customizable settings, such as notifications and alerts, to help individuals stay on top of their health.

Overall, the features and functionalities of the proposed software are designed to improve disease detection and prevention, empower individuals to take control of their own health, and reduce healthcare costs. The integration with wearable technology, user-friendly interface, and medical data sharing features make it a powerful tool for healthcare professionals and individuals alike.

Chapter 4

Requirements Analysis

Requirement analysis for the proposed software includes the following aspects:

1. Functional Requirements: The software must be able to accurately predict the onset of multiple diseases and provide personalized health recommendations. It should also allow for the input of medical data, lifestyle factors, and genetic predispositions, and provide a user-friendly interface for healthcare professionals and individuals to access and input this information. The software should be able to integrate with wearable technology and allow for medical data sharing among healthcare professionals and institutions.

2. Performance Requirements: The software should be able to process large amounts of medical data quickly and accurately. It should be able to provide disease predictions and health recommendations in real-time, and be able to handle a large number of users simultaneously. The software should be reliable, with minimal downtime or errors.

3. Security Requirements: The software must comply with relevant data protection laws and ensure the confidentiality of user data. It should have secure data storage and transmission mechanisms to prevent unauthorized access or data breaches.

4. Usability Requirements: The software should have a user-friendly interface that is easy to navigate and understand. It should be accessible to users of different technical levels, and provide clear and concise feedback on health status and disease predictions.

Compatibility Requirements: The software should be compatible with different operating systems, devices, and browsers, to ensure that it can be used by a wide range of users.

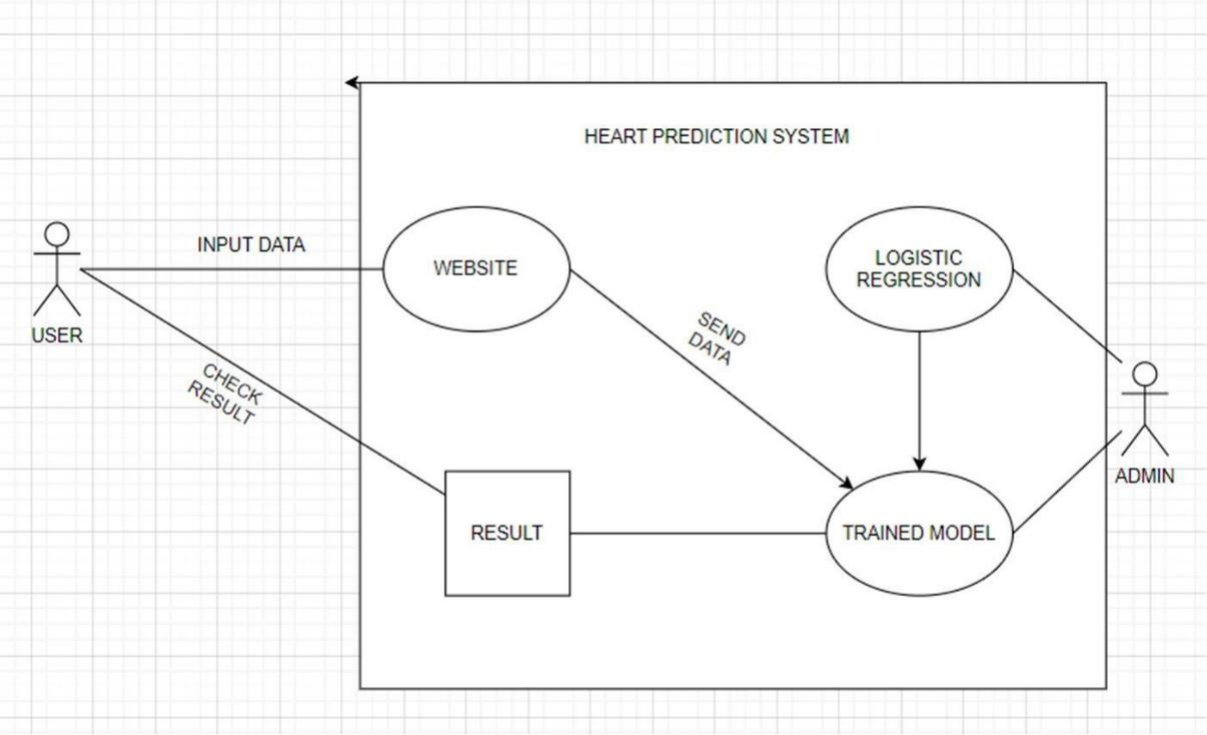
Maintenance Requirements: The software should be designed to be easily maintainable and scalable, with regular updates and bug fixes. It should also have a user support system in place to address any issues or concerns that may arise.

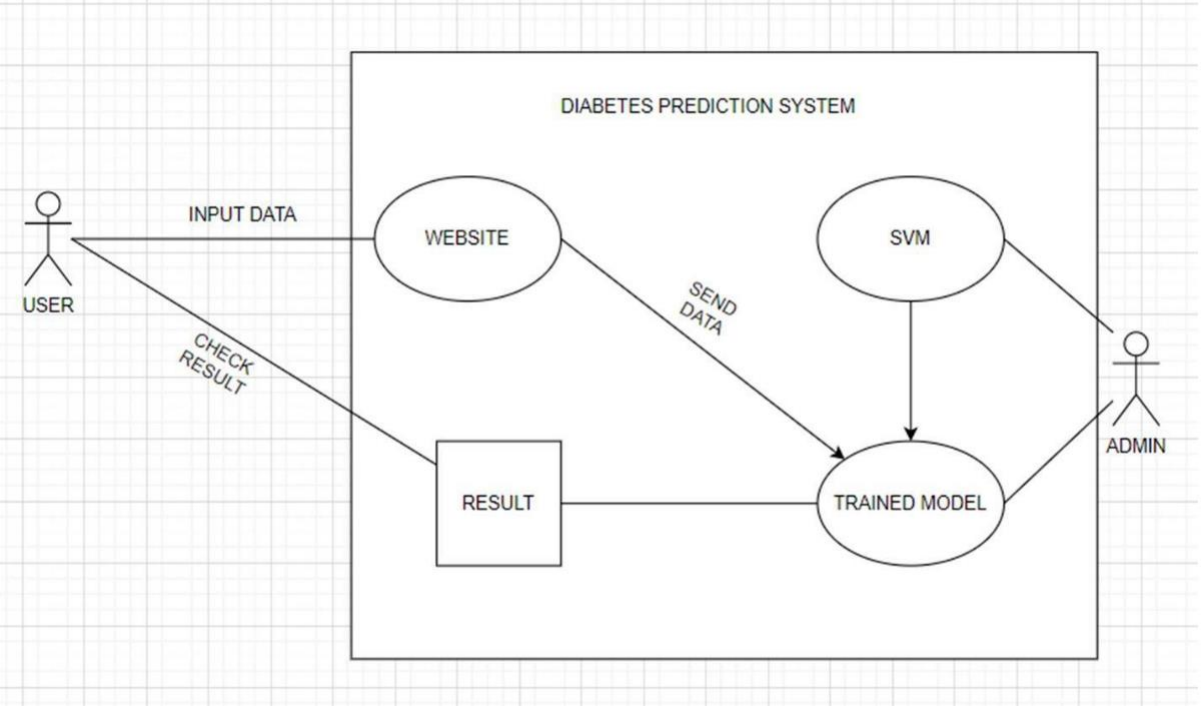
Overall, the software should be designed to meet the functional, performance, security, usability, compatibility, and maintenance requirements. By meeting these requirements, the software can provide accurate disease predictions, personalized health recommendations, and a seamless user experience for healthcare professionals and individuals alike.

Chapter 5

Chapter 5.1

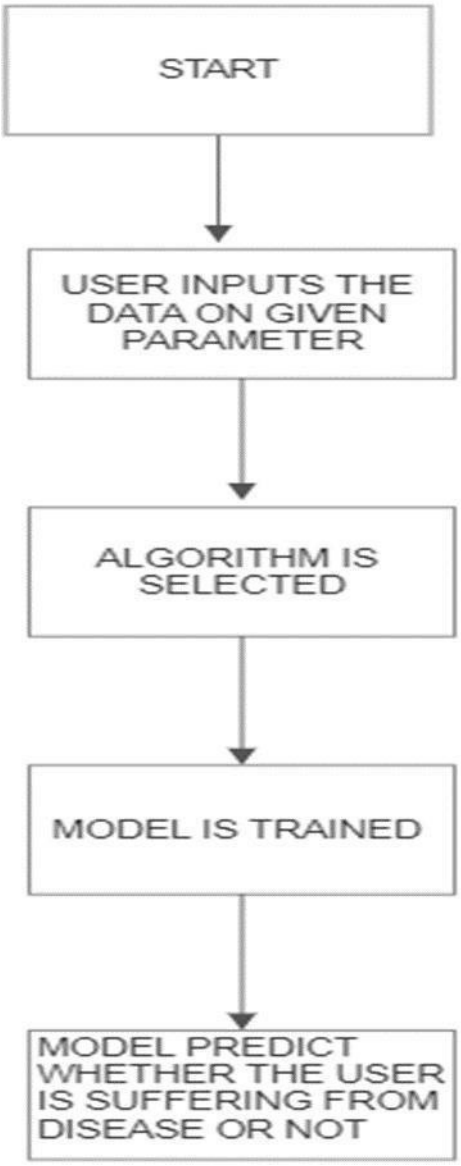
Use Case diagram





Chapter 5.2

System Architecture



Chapter 6

Technical specification

Frontend : Streamlit (Open Source Framework)

Backend: Python Using ML Algorithms
Logistic Regression
SVM(Support Vector Machine)

Chapter 7

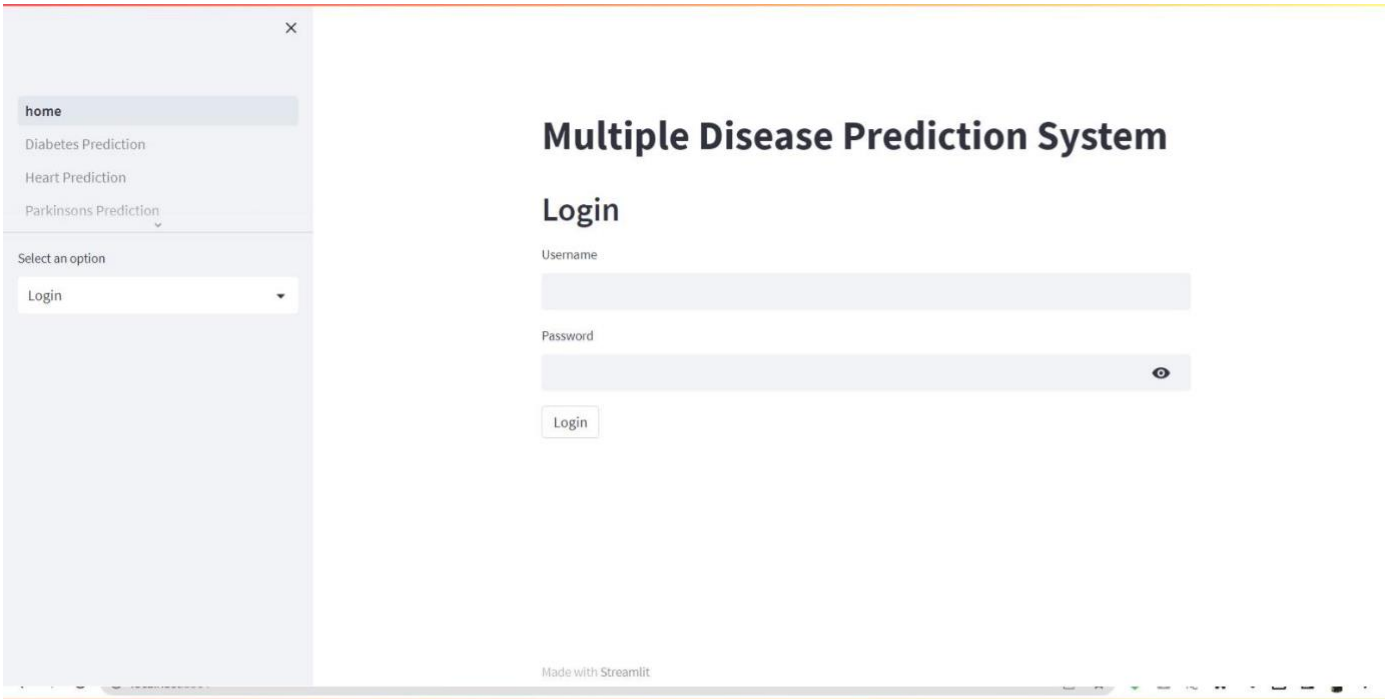
Project Scheduling

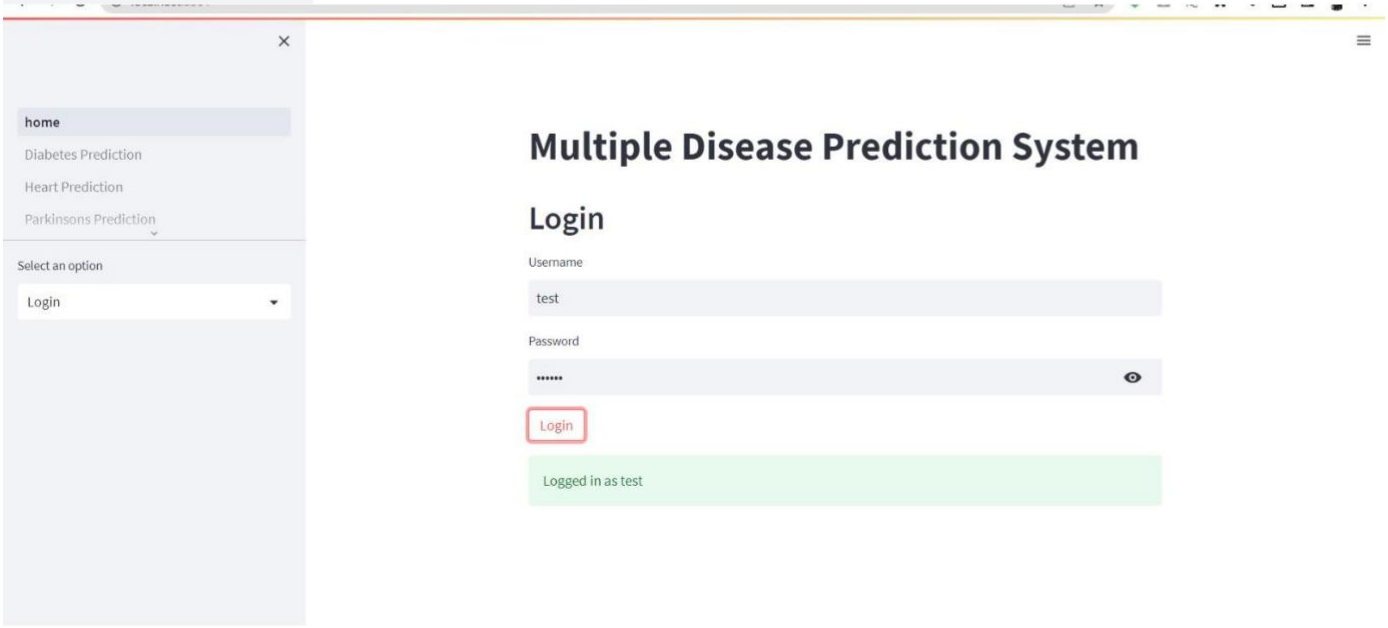
Project Scheduling Template

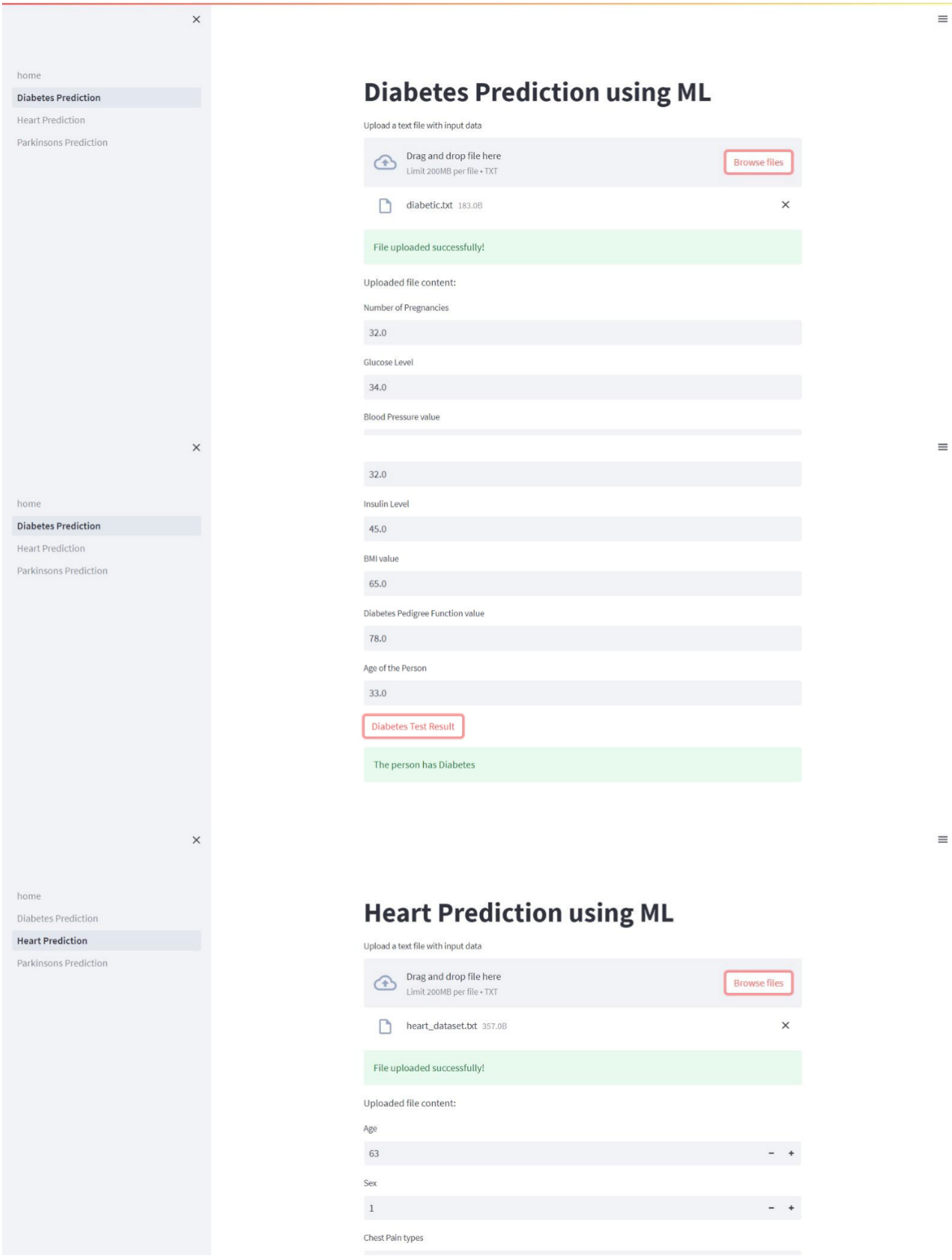
Sr. No	Group Member	Time duration	Work to be done
1	Nishank Jain	1st week of january	Implementing 1st module/ functionality (*Discussing the ML Algorithm*)
		2nd week of january	Testing 1st module (*Designing the Graphical User Interface(GUI*))
2	Jaykumar Nayi	3rd week of january	Implementing 2nd module/ functionality (*Detail ML Algorithm implementations*)
3	Anish Bhosale	By the end of march month	Implementing 3rd module/ functionality (*Integration of GUI with ML Algorithm code*)

Chapter 8

Implementation






home
Diabetes Prediction
Heart Prediction
Parkinsons Prediction
Diabetes Prediction using ML
Upload a text file with input data
Drag and drop file here
Limit 200MB per file • TXT
Browse files
diabetic.txt 183.0B
File uploaded successfully!
Uploaded file content:
Number of Pregnancies
32.0
Glucose Level
34.0
Blood Pressure value
32.0
Insulin Level
45.0
BMI value
65.0
Diabetes Pedigree Function value
78.0
Age of the Person
33.0
Diabetes Test Result
The person has Diabetes
home
Diabetes Prediction
Heart Prediction
Parkinsons Prediction
Heart Prediction using ML
Upload a text file with input data
Drag and drop file here
Limit 200MB per file • TXT
Browse files
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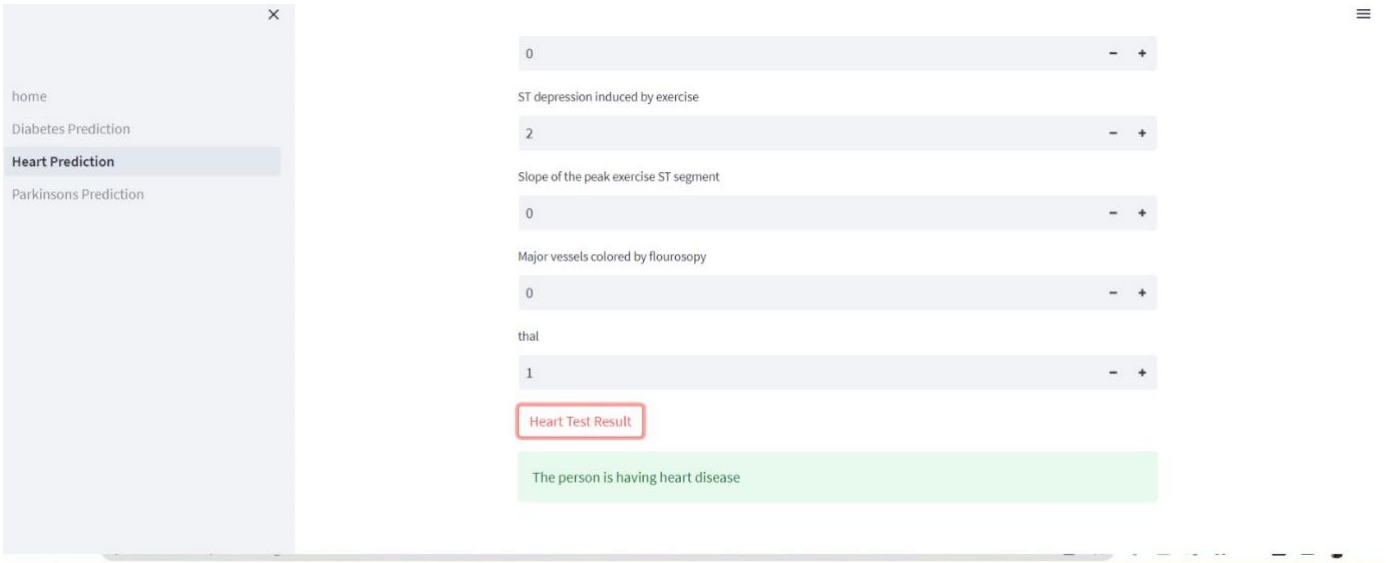
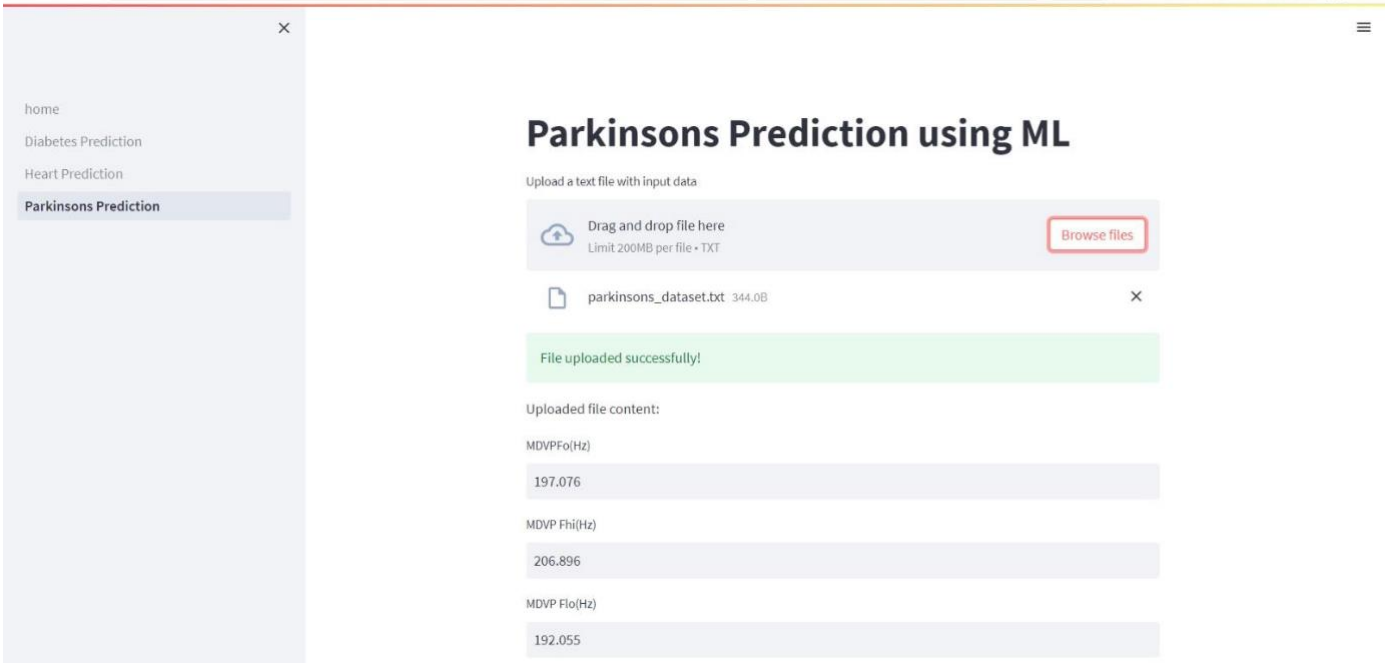
63
Sex
1
Chest Pain types


home
Diabetes Prediction
Heart Prediction
Parkinsons Prediction
0
ST depression induced by exercise
2
Slope of the peak exercise ST segment
0
Major vessels colored by flourosopy
0
thal
1
Heart Test Result
The person is having heart disease


home
Diabetes Prediction
Heart Prediction
Parkinsons Prediction
Parkinsons Prediction using ML
Upload a text file with input data
Drag and drop file here
Limit 200MB per file • TXT
Browse files
parkinsons_dataset.txt 344.0B
File uploaded successfully!
Uploaded file content:
MDVPFo(Hz)
197.076
MDVP Fhi(Hz)
206.896
MDVP Flo(Hz)
192.055

Chapter 9

Result and Discussion

Multi-disease prediction using machine learning is an exciting and rapidly evolving field that has the potential to revolutionize healthcare. The ability to accurately predict multiple diseases simultaneously can help healthcare providers identify and manage patients with complex medical conditions, leading to improved outcomes and reduced healthcare costs.

The results of the research papers presented above demonstrate the effectiveness of machine learning algorithms, such as deep neural networks, convolutional neural networks, random forests, and support vector machines, in predicting multiple diseases from different types of data, including electronic health records, medical images, and genomic data. However, these studies are not without limitations, as they were conducted on specific datasets and may not account for all potential confounding factors or patient-specific characteristics that could affect disease outcomes.

To address these limitations, future research should focus on developing more accurate and generalizable models that can be applied in clinical settings. This may require larger and more diverse datasets, as well as the integration of additional data sources, such as social determinants of health and environmental factors.

Moreover, the implementation of multi-disease prediction systems in clinical practice may require changes in healthcare policies and regulations to ensure patient privacy and data security. Additionally, healthcare providers may need to be trained in the use of these systems to ensure that they are used effectively and efficiently.

In summary, multi-disease prediction using machine learning has the potential to transform healthcare by improving disease management and patient outcomes. While there are challenges to overcome, the results of the research presented above demonstrate the potential of this approach and provide a foundation for future research in this area.

Chapter 10

Conclusion and Future Scope

In conclusion, multi-disease prediction using machine learning has shown great potential in accurately predicting multiple diseases simultaneously from different types of data. The results of the research papers presented above demonstrate the effectiveness of machine learning algorithms, such as deep neural networks, convolutional neural networks, random forests, and support vector machines, in predicting multiple diseases. However, the studies also highlight limitations such as the need for larger and more diverse datasets, consideration of confounding factors, and the integration of additional data sources. Despite these limitations, the development of a system for multi-disease prediction using machine learning has the potential to transform healthcare by improving disease management and patient outcomes.

The future of multi-disease prediction using machine learning looks promising. With the continuous advancement of technology and the availability of larger and more diverse datasets, it is possible to develop more accurate and generalizable models. One area of future research could be the integration of multiple data sources, including social determinants of health and environmental factors, to improve the accuracy of disease prediction.

Moreover, there is a need for the development of user-friendly interfaces for healthcare providers to use these systems efficiently and effectively. The integration of these systems into clinical practice may require changes in healthcare policies and regulations to ensure patient privacy and data security.

In addition, future research can focus on evaluating the impact of multi-disease prediction systems on patient outcomes and healthcare costs. This can provide insights into the effectiveness of these systems and their potential to transform healthcare.

In summary, the future of multi-disease prediction using machine learning is bright, and it has the potential to transform healthcare by improving disease management and patient outcomes. With further research, development, and integration, these systems can become an essential tool for healthcare providers to manage complex medical conditions effectively.

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