**Project Title**

**An Application Development for Symptom-Based Heart Disease Detection using Machine Learning**

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# Aim of the Project

The project aims to design an application through which heart disease can be detected based on the symptoms of the patients. Heart Disease can be seen for different symptoms and health conditions and it varies by the person (Atallah & Al-Mousa, 2021). In this project, the application interface will be designed by taking machine learning in the backend to detect the heart disease of the patients based on their symptoms. When a patient will input their symptoms, the application will detect the symptoms and predict whether the patient has heart disease or not and the outcome will be shown as a detailed report (Abdulhadi & Al-Mousa, 2021).

# Research Questions

The research questions have been prepared to satisfy the aim of the project and to conduct the project successfully. The research questions are as follows:

1. Which symptoms are highly effective to detect the disease?
2. How the users o the application will be facilitated by getting the result of disease testing?
3. Which algorithm will be the best to detect disease?

# Objectives of the Project

The objectives have been prepared in the view of fulfilling the aim and answering the research questions successfully. The objectives of the project are discussed below in steps:

1. To study and obtain the idea about disease prediction approaches ad methodologies from the existing research models.
2. To determine the algorithm and the methods that the researchers have applied in their experiments.
3. To select the heart disease data and study the features and understand the symptoms and the effect on disease.
4. To select and apply the algorithms of machine learning and determine the best model to detect disease by comparing the classification metrices such as accuracy, precision etc. along with signifying the improvement of the research by comparing the performances of the best model with the existing models.
5. To design the Graphivcal User Interface to detect disease by applying the best model in the backend.
6. To Visualize the outcome of the disease prediction in the form of a detailed evaluation report.

# Brief Idea

Heart Disease is one of the most seen diseases in humans that can happen for various health conditions (Biswas, et al., 2020). There are no particular symptoms by checking which it can be said that the patient is affected with heart disease, Rather, the heart disease can be detected with the combination of symptoms like the number of cholesterols in blood, amount of sugar in blood etc. So, the determination should be done to check which symptom is most influential to detect heart disease and whether there will be any relatioinahip with the age or not (Keya, et al., 2021). This kind of determibation will be done in this project by applying statistical methods such as correlation and feature selection. Using the feature selection method, the highly influential symptoms will be considered for the detection of heart disease (Schulte, et al., 2018).

In this project, heart disease will be detected using data analysis and the application of machine learning algorithms. In this context, the data will be collected and the analytics will be applied there. The choice of the features that are the symptoms will be detected using correlation. Those symptoms will be selected as most important features where the correlation value is higher (Katarya & Srinivas, 2020). Then by applying machine learning classifiers, the heart attack will be predicted. As there will be multiple algorithms selected, all those will be applied to detect heart disease and the performces will be recorded in terms of the matrices such as accuracy, precision, recall, f1-scores etc (Biswas, et al., 2020). By comparing the performances, the best model will be detected. Finally, with the application of the best model the detection of heart disease will be done using the Graphical User Interface where the patient will input the values of the symptoms. The backend model will take those symptoms and detect whether the patient has a heart attack or there will be a possibility of a heart attack in future. The detailed report will be presented when the patient will check the result.

# Project Planning

The research has been planned to satisfy the aim and to address the research questions through executing the objective sequentially. In this context, to execute the research, the tool and technologies have been selected so that the aim can be achieved.

## Selection of Tool

Python 3 has been chosen as the programming tool to conduct the research. As mentioned and discussed earlier, machine learning should be applied to detect the disease in the liver, Python 3 will be used to commence this. The reason behind the choice of Python 3 are as follows:

1. Python is the platform-independent programming language
2. Python has a large number of library support for machine learning and data analytics
3. Python is the open-source programming language

## Selection of Technologies

The following technologies have been selected which will be executed using Python 3:

1. Data analysis and Visualization
2. Statistical analysis
3. Data Analytics
4. Machine Learning and Classification
5. Graphical User Interface

## Project Planning

The Gantt Chart for the project commencement has been shown below by following which the research will be conducted to fulfil the aims and the research questions will be addressed:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Day 1-10** | **Day 11-20** | **Day**  **21-35** | **Day**  **36-40** | **Day**  **41-45** | **Day**  **45-65** | **Day**  **66-80** | **Day 81-84** |
| **Introduction** |  |  |  |  |  |  |  |  |
| **Select algorithms and data ideas from previous researches** |  |  |  |  |  |  |  |  |
| **Collect the heart disease data and analyse** |  |  |  |  |  |  |  |  |
| **Select machine learning classifiers (algorithms)** |  |  |  |  |  |  |  |  |
| **Train and test the algorithms and predict disease in the heart and compared the performances of all classifiers to find the best model** |  |  |  |  |  |  |  |  |
| **Design the GUI and apply the best model to predict heart disease by symptom input** |  |  |  |  |  |  |  |  |
| **Present the detailed result of heart disease detection** |  |  |  |  |  |  |  |  |
| **Concluding the research** |  |  |  |  |  |  |  |  |

# References

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