Low Level Design (LLD)

Heart Disease Diagnostic Analysis

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Document Control

Date	Version	Description	Author
09/08/2024	1.0	Introduction, Problem Statement, Dataset Information, Architecture Description	Akhil Tarisha

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1. Introduction

1.1 What is Low Level Design Document?

The goal of the Low-level design document (LLDD) is to give the internal logic design of the actual program code for the Heart Disease Diagnostic Analysis dashboard. LLDD describes the class diagrams with the methods and relations between classes and programs specs. It describes the modules so that the programmer can directly code the program from the document.

1.2 What is Scope?

Low-level design (LLD) is a component-level design process that follows a step-by-step refinement process. The process can be used for designing data structures, required software architecture, source code and ultimately, performance algorithms. Overall, the data organization may be defined during requirement analysis and then refined during data design work.

1.3 Project Introduction

Heart disease is a leading cause of mortality in India, contributing significantly to the country's health burden. The prevalence of cardiovascular diseases (CVDs) has risen sharply due to lifestyle changes, urbanization, and aging populations. Key risk factors include hypertension, diabetes, high cholesterol, smoking, obesity, and physical inactivity. Rapid economic growth and associated lifestyle shifts have exacerbated these issues. Access to healthcare varies widely across urban and rural areas, often limiting timely diagnosis and treatment.

Public health initiatives aim to address these challenges through awareness campaigns, improved healthcare infrastructure, and preventive measures. Despite these efforts, the burden of heart disease remains high, requiring continued focus on both prevention and treatment strategies.

Thus, preventing heart diseases has become more than necessary. Good data-driven systems for predicting heart diseases can improve the entire research and prevention process, making sure that more people can live healthy lives.

2. Problem Statement

The objective of this project is to predict the likelihood of heart disease occurrence by analyzing a set of features related to the condition. To accomplish this, we utilized a dataset comprising information from 303 individuals. The task is to determine, based on the provided details about each person, whether they are at risk of developing heart disease. Additionally, we aim to identify other factors that may influence the individual's overall health.

3. Dataset Information

age: The person's age in years

sex: The person's sex (1 = male, 0 = female)

cp: The chest pain experienced (Value 1: typical angina, Value 2: atypical angina, Value 3: non-anginal pain, Value 4: asymptomatic)

trestbps: The person's resting blood pressure (mm Hg on admission to the hospital)

chol: The person's cholesterol measurement in mg/dl

fbs: The person's fasting blood sugar (> 120 mg/dl, 1 = true; 0 = false)

restecg: Resting electrocardiographic measurement (0 = normal, 1 = having ST-T wave abnormality, 2 = showing probable or definite left ventricular hypertrophy by Estes' criteria)

thalach: The person's maximum heart rate achieved

exang: Exercise induced angina (1 = yes; 0 = no)

oldpeak: ST depression induced by exercise relative to rest

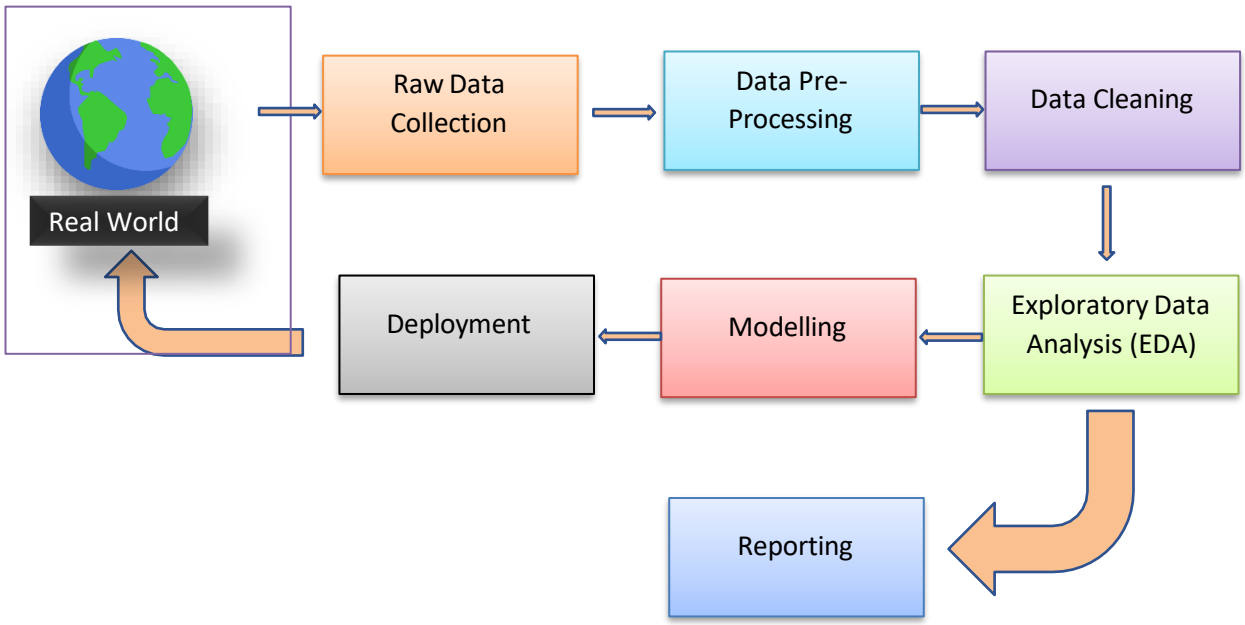
slope: the slope of the peak exercise ST segment (Value 1: upsloping, Value 2: flat, Value 3: downsloping)

ca: The number of major vessels (0-3)

thal: A blood disorder called thalassemia (3 = normal; 6 = fixed defect; 7 = reversable defect)

num: Heart disease (0 = no, 1 = yes)

4. Architecture



4.1 Architecture Description

1. **Raw Data Collection**
   The Dataset was taken from iNeuron's Provided Project Description Document.
   https://docs.google.com/spreadsheets/d/14YPvi12tshRYfzLSmdw8J63v1zjSjG2c/edit?usp=sharing&ouid=105973225632152334213&rtpof=true&sd=true

2. **Data Pre-Processing**
   Before building any model, it is crucial to perform data pre-processing to feed the correct data to the model to learn and predict. Model performance depends on the quality of data feeded to the model to train.
   This Process includes-
   a) Handling Null/Missing Values
   b) Handling Skewed Data

3. **Data Cleaning**
   Data cleaning is the process of fixing or removing incorrect, corrupted, incorrectly formatted, duplicate, or incomplete data within a dataset.
   a) Remove duplicate or irrelevant observations
   b) Filter unwanted outliers
   c) Renaming required attributes

4. Exploratory Data Analysis (EDA)

Exploratory Data Analysis refers to the critical process of performing initial investigations on data to discover patterns, spot anomalies, test hypothesis and to check assumptions with the help of summary statistics and graphical representations.

5. Reporting

Reporting is a most important and underrated skill of a data analytics field. Because being a Data Analyst you should be good in easy and self- explanatory report because your model will be used by many stakeholders who are not from technical background.

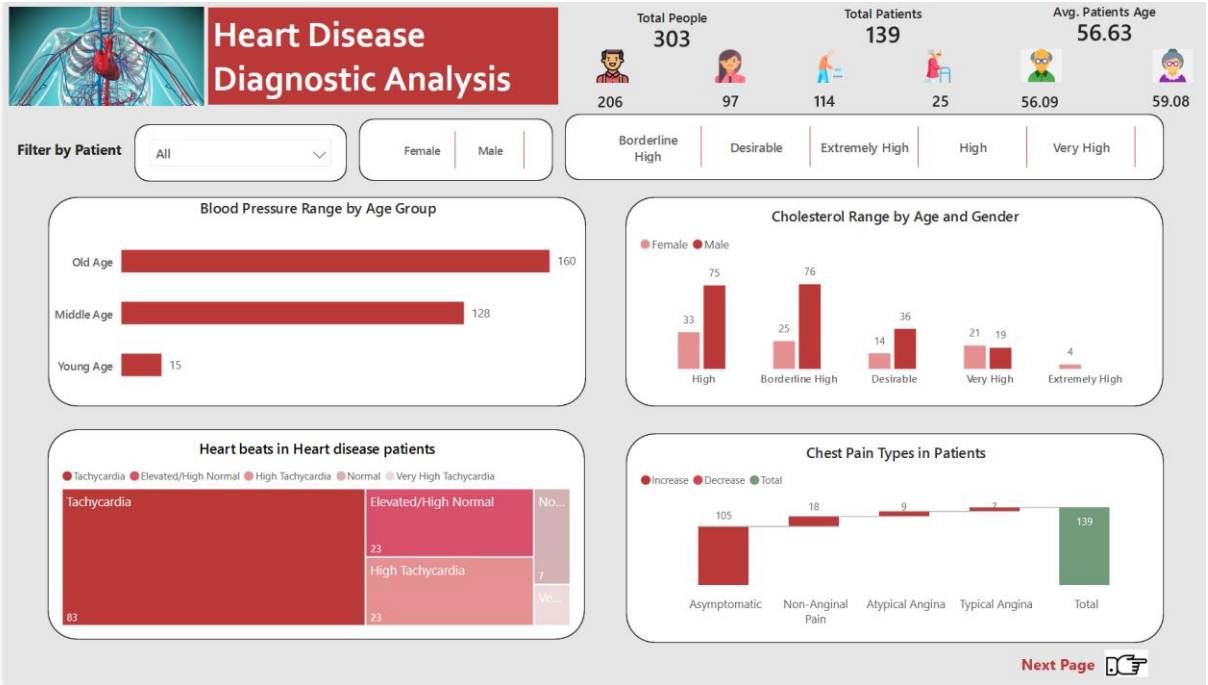
a) High Level Design Document (HLD)
b) Low Level Design Document (LLD)
c) Architecture
d) Wireframe
e) Detailed Project Report
f) Power Point Presentation

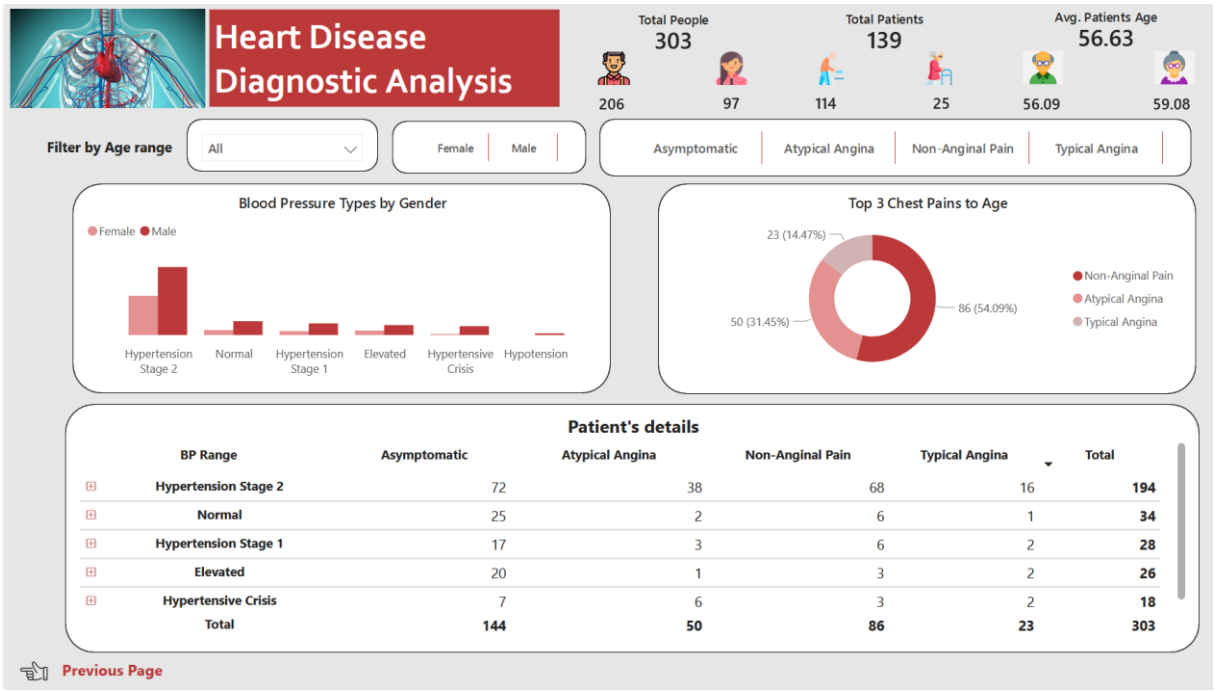
6. Modelling

Data Modelling is the process of analyzing the data objects and their relationship to the other objects. It is used to analyze the data requirements that are required for the business processes. The data models are created for the data to be stored in a database. The Data Model's main focus is on what data is needed and how we have to organize data rather than what operations we have to perform.

7. Deployment

We created a Power BI Dashboard




Heart Disease Diagnostic Analysis
Total People
303
206
97
Total Patients
139
114
25
Avg. Patients Age
56.63
56.09
59.08
Filter by Age range
All
Female
Male
Asymptomatic
Atypical Angina
Non-Anginal Pain
Typical Angina
Blood Pressure Types by Gender
Female
Male
Hypertension Stage 2
Normal
Hypertension Stage 1
Elevated
Hypertensive Crisis
Hypotension
Top 3 Chest Pains to Age
23 (14.47%)
50 (31.45%)
86 (54.09%)
Non-Anginal Pain
Atypical Angina
Typical Angina
Patient's details
BP Range
Asymptomatic
Atypical Angina
Non-Anginal Pain
Typical Angina
Total
Hypertension Stage 2 72 38 68 16 194
Normal 25 2 6 1 34
Hypertension Stage 1 17 3 6 2 28
Elevated 20 1 3 2 26
Hypertensive Crisis 7 6 3 2 18
Total 144 50 86 23 303
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