Low Level Design (LLD)

Heart Disease Diagnostic Analysis

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14/10/2024	1.0	First version of Complete LLD	Mainak Mukherjee

Contents

1. Introduction:

1.1 What is Low-Level Design Document?

Objective of this Low-level design document (LLDD) is to provide the internal logic or representation of the structured flow in actual program code for Heart Disease Diagnostic Analysis dashboard. LLDD: These contain the class diagrams with methods and how classes are connected to each other, along with programs specs. It shows the modules, so that the programmer can code directly from these document.

1.2 Scope:

Low-level design (LLD) is a component-level design process that follows a step-by-step refinement process. It is the process that can be used for designing data structures, required software architecture, source code & finally performance algorithm. In general, the organization of data may be established at requirement analysis level and then refined as part of structure design work.

1.3 Project Introduction:

Heart disease is a term covering any disorder of the heart. Heart diseases have become a major concern to deal with as studies show that the number of deaths due to heart diseases have increased significantly over the past few decades in India it has become the leading cause of death in India. A study shows that from 1990 to 2016 the death rate due to heart diseases have increased around 34% from 155.7 to 209.1 deaths per 1 lakh population in India.

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:

Health is real wealth in the pandemic time we all realized the brute effects of covid-19 on all irrespective of any status. You are required to analyse this health and medical data for better future preparation. A dataset is formed by taking into consideration some of the information of 303 individuals.

Dataset : https://drive.google.com/file/d/1-LggZ4JQSSAUi65m1eag3NW1hZg2MisQ/view?usp=sharing

3. Dataset Information:

1. **age**: Age of the patient

2. **sex**: Sex of the patient (1 = male, 0 = female)

3. **cp**: Chest pain type (1: typical angina, 2: atypical angina, 3: non-anginal pain, 4: asymptomatic)

4. **trestbps**: Resting blood pressure (in mm Hg)

5. **chol**: Serum cholesterol (in mg/dl)

6. **fbs**: Fasting blood sugar (> 120 mg/dl, 1 = true, 0 = false)

7. **restecg**: Resting electrocardiographic results (0: normal, 1: ST-T wave abnormality, 2: left ventricular hypertrophy)

8. **thalach**: Maximum heart rate achieved

9. **exang**: Exercise-induced angina (1 = yes, 0 = no)

10. **oldpeak**: ST depression induced by exercise relative to rest

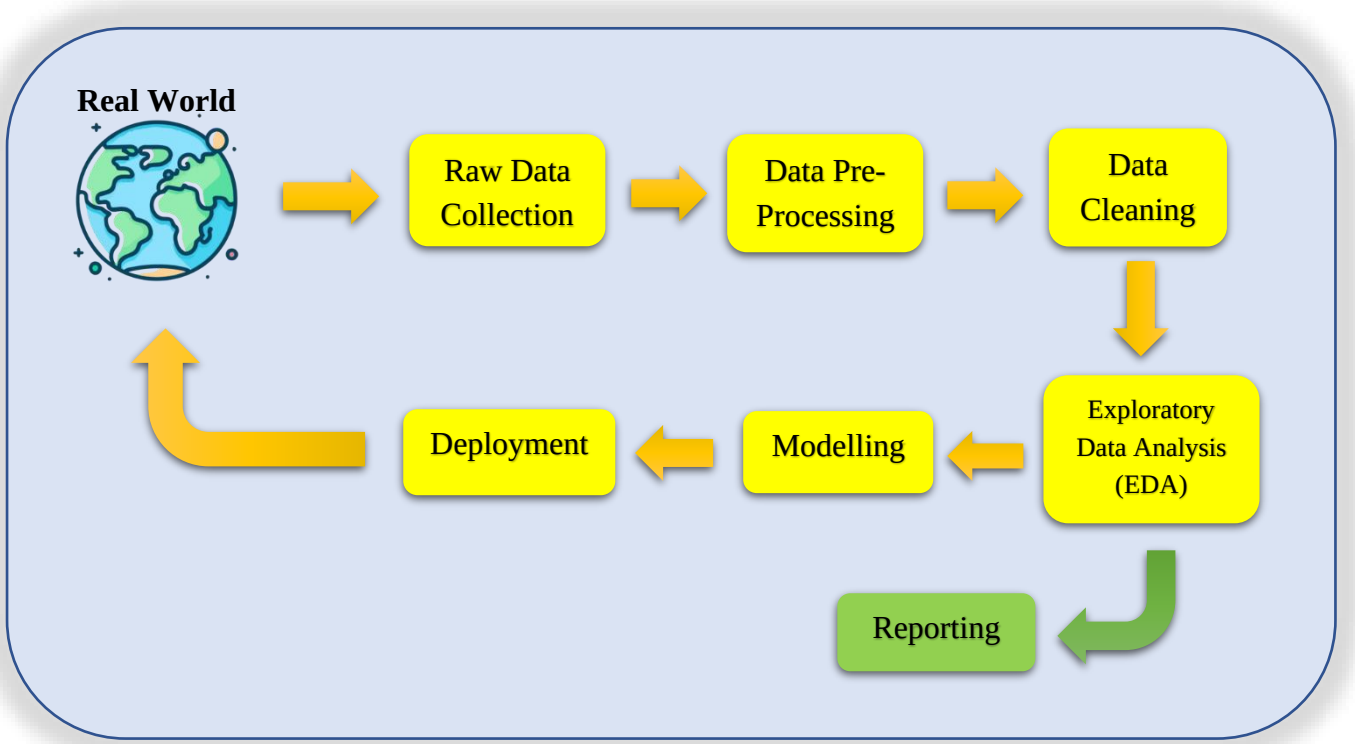
11. **slope**: Slope of the peak exercise ST segment (1: upsloping, 2: flat, 3: downsloping)

12. **ca**: Number of major vessels (0–3) colored by fluoroscopy

13. **thal**: Thalassemia (3 = normal, 6 = fixed defect, 7 = reversible defect)

14. **num**: Diagnosis of heart disease (0 for no disease, 1 for yes)

4. Architecture:



4.1 Architectural Description:

- **Raw Data Collection:**

  The dataset was sourced from the project description document provided by iNeuron.

- **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:
  - Handling Null/Missing Values
  - Handling Skewed Data
  - Outliers Detection and Removal

- **Data Cleaning:**

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

- **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.

- **Reporting:**

Reporting is one of the most important and underrated skill in the data analytics field. Because being a Data Analyst one should be good in easy and self-explanatory report because the model that is build by the Data Analyst will be used by many stakeholders who are not from technical background.
- High Level Design Document (HLD)
- Low Level Design Document (LLD)
- Architecture
- Wireframe
- Detailed Project Report
- Power Point Presentation

- **Modelling:**

Data Modelling is the process of analysing the data objects and their relationship to the other objects. It is used to analyse 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.

- **Deployment:**

A Power BI dashboard was created.

Power BI Dashboard