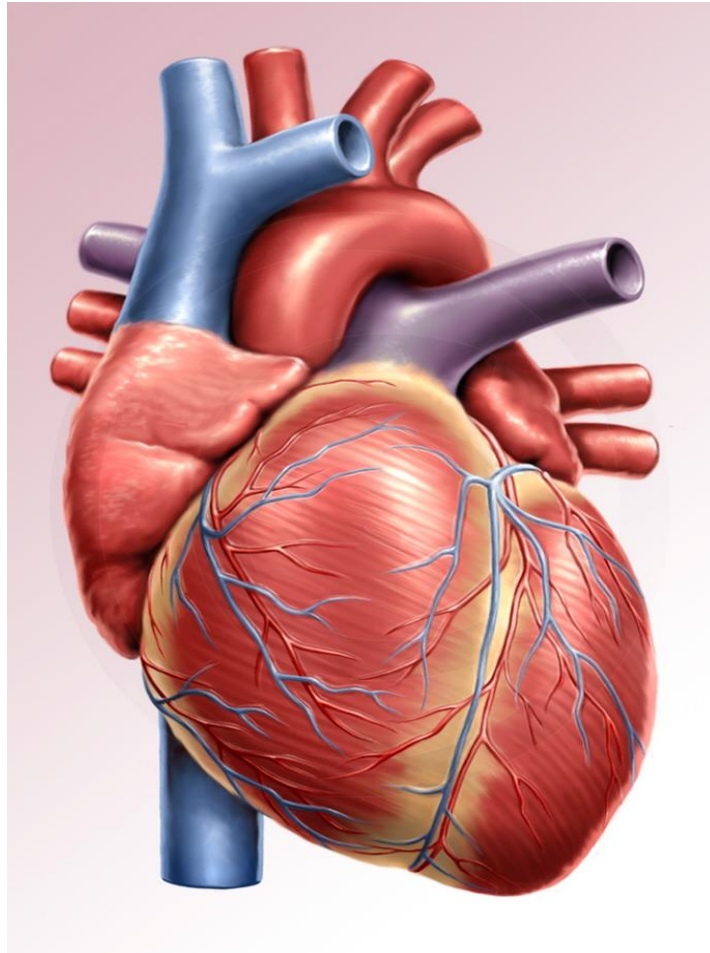


HEART DISEASE ANALYSIS



VERSION: 1.0
DATE 13-12-2022

RAVIKUMAR SURAM

DOCUMENT VERSION CONTROL

HEART DISEASE ANALYSIS BUSINESS INTELLIGENCE PROJECT

DATE	VERSION	AUTHOR	CHANGE
13-12-2022	1.0	RAVIKUMAR SURAM	FIRST VERSION OF HLD

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Document Version Control

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Abstract:

Heart disease is the leading cause of death. The term “heart disease” refers to several types of heart conditions. The most common type of heart disease is coronary artery disease (CAD), which can lead to heart attack.

Sometimes heart disease may be “silent” and not diagnosed until a person experiences signs or symptoms of a heart attack, heart failure, or an arrhythmia. When these events happen, symptoms may include

- Heart Attack: Chest pain or discomfort, upper back or neck pain, indigestion, heartburn, nausea or vomiting, extreme fatigue, upper body discomfort, dizziness, and shortness of breath.
- Arrhythmia: Fluttering feelings in the chest (palpitations).
- Heart Failure: Shortness of breath, fatigue, or swelling of the feet, ankles, legs, abdomen, or neck veins.

Thus, Preventing Heart Disease is necessary and analysing the risk factors to predict the heart disease is need of an hour.

You can greatly reduce your risk for heart disease through lifestyle changes and, in some cases medicine.

1 Introduction

1.1 Why this High-Level Design Document?

The purpose of this High-Level Design (HLD) Document is to add the necessary detail to the current project description to represent a suitable model for coding. This document is also intended to help detect contradictions prior to coding, and can be used as a reference manual for how the modules interact at a high level.

The HLD will:

- Present all of the design aspects and define them in detail
- Describe the user interface being implemented
- Describe the hardware and software interfaces
- Describe the performance requirements
- Include design features and the architecture of the project
- List and describe the non-functional attributes like:
 - o Security
 - o Reliability
 - o Maintainability
 - o Portability
 - o Reusability
 - o Application compatibility
 - o Resource utilization
 - o Serviceability

1.2 Scope

The HLD documentation presents the structure of the system, such as the database architecture, application architecture (layers), application flow (Navigation), and technology architecture. The HLD uses non-technical to mildly-technical terms which should be understandable to the administrators of the system.

2 General Descriptions

2.1 Product Perspective & Problem Statement

The goal of this project is to analyse what are the factors that are responsible for heart disease and probability of occurrence of the heart disease based on a combination of features that describes the condition of the patients. To achieve the goal, an open-source data set is used from the UCI machine learning repository. The data is collected for 303 individuals by professionals considering some factors to evaluate the heart disease occurrence. The problem statement is to do EDA and to extract the meaningful insights from the data based on the given information for each individual.

2.2 Tools used

To bring meaningful insights from the data we are going to use Python and its libraries such as NumPy, Pandas, Seaborn, Matplotlib to do EDA (exploratory data analysis). Jupyter Notebook and Python Programming Language is used to build the whole framework. Business Intelligence tool like MS-Power BI is used to present the data in self-exploratory and interactive visuals.



NumPy



3 Design Details

3.1 Functional Architecture

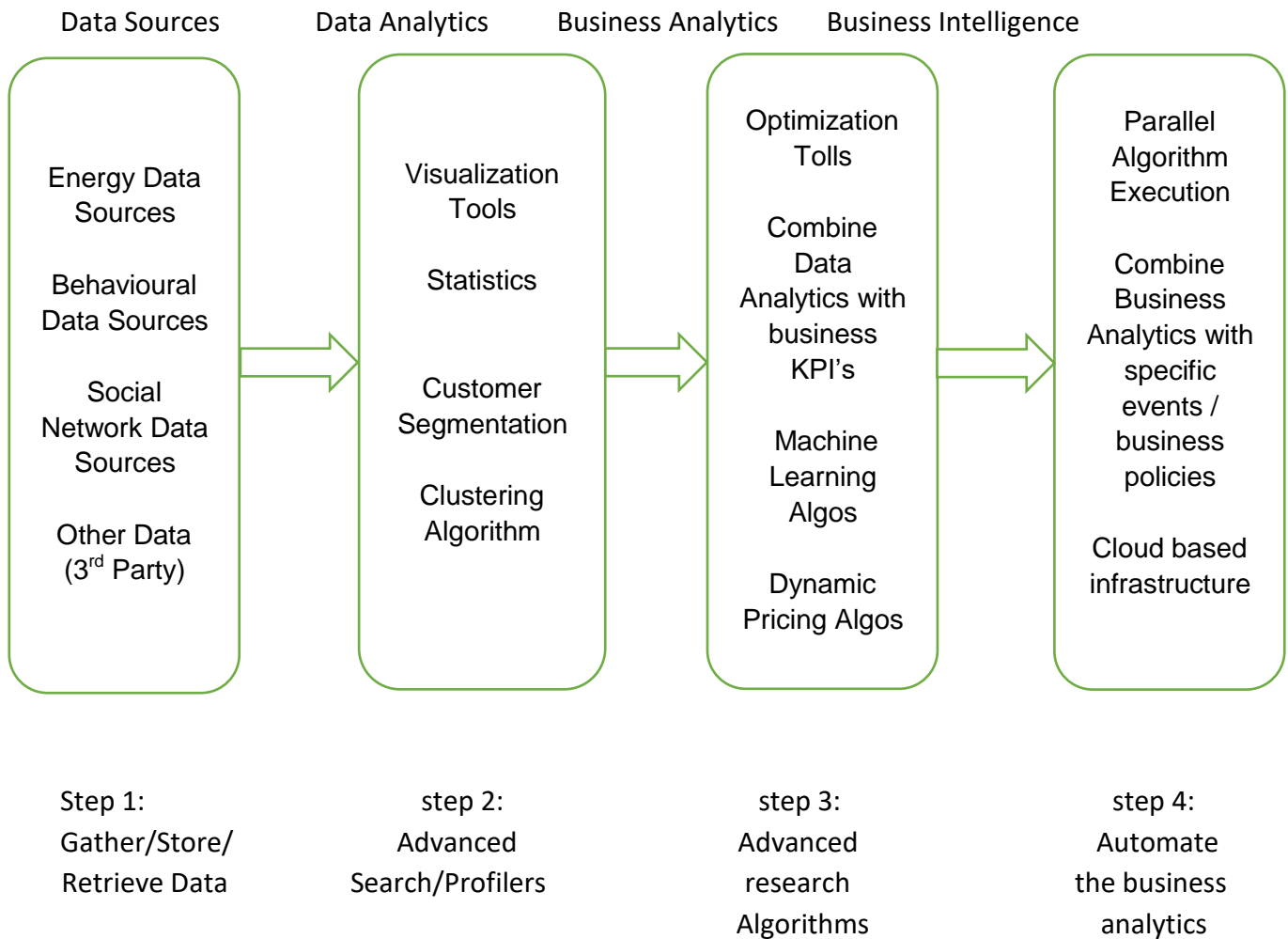
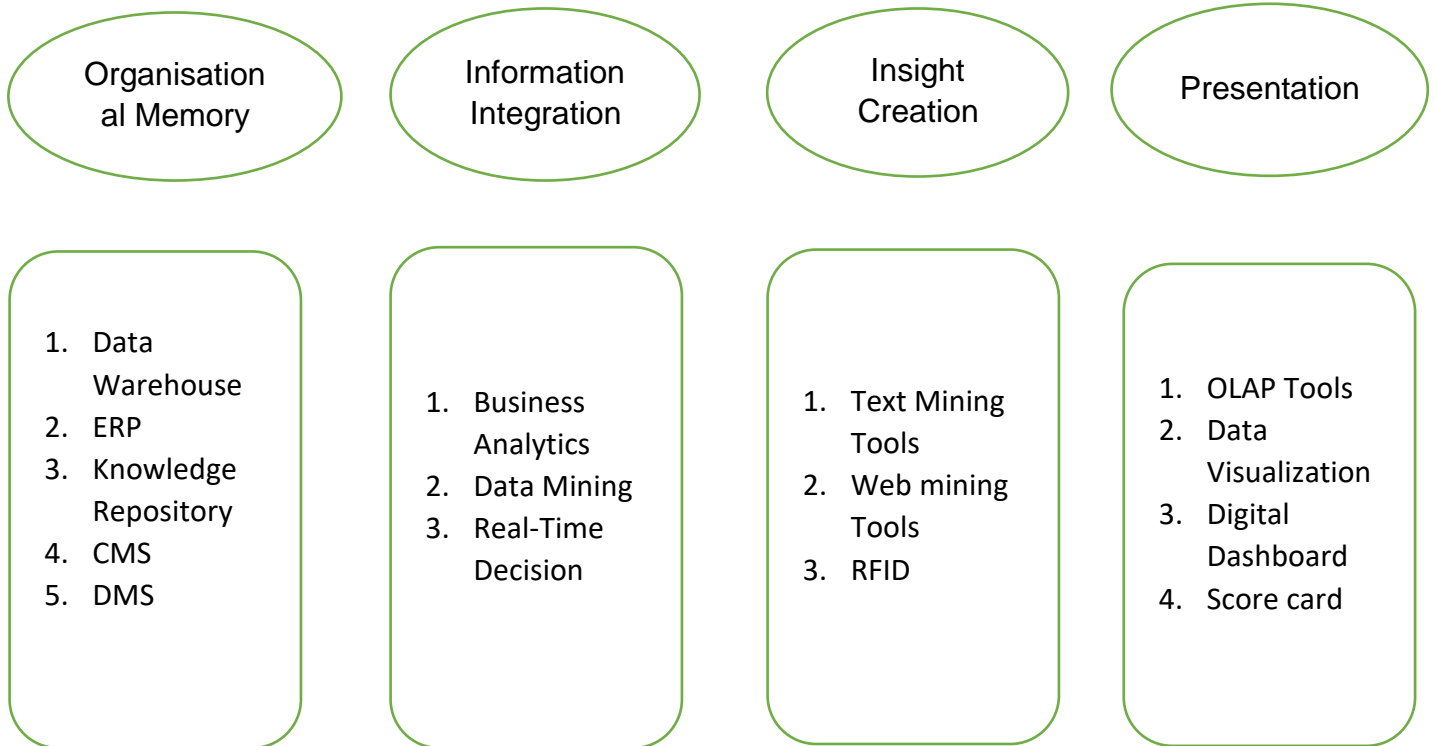


Figure 1: Functional Architecture of Business Intelligence

HOW BI REALLY WORKS



3.2 Optimization

Your data strategy drives performance

- Minimize the number of fields
- Minimize the number of records
- Optimize extracts to speed up future queries by materializing calculations, removing columns and the use of accelerated views

Reduce the marks (data points) in your view

- Practice guided analytics. There's no need to fit everything you plan to show in a single view. Compile related views and connect them with action filters to travel from overview to highly-granular views at the speed of thought.
- Remove unneeded dimensions from the detail shelf.
- Explore trying displaying your data in different types of views.

Limit your filters by number and type

- Reduce the number of filters in use. Excessive filters on a view will create a more complex query, which takes longer to return results. Double-check your filters and remove any that aren't necessary.
- Use an include filter. Exclude filters load the entire domain of a dimension, while include filters do not. An include filter runs much faster than an exclude filter, especially for dimensions with many members.
- Use a continuous date filter. Continuous date filters (relative and range-of-date filters) can take advantage of the indexing properties in your database and are faster than discrete date filters.
- Use Boolean or numeric filters. Computers process integers and Booleans (t/f) much faster than strings.
- Use parameters and action filters. These reduce the query load (and work across data sources).

Optimize and materialize your calculations

- Perform calculations in the database
- Reduce the number of nested calculations.
- Reduce the granularity of LOD or table calculations in the view. The more granular the calculation, the longer it takes.
 - o LODs - Look at the number of unique dimension members in the calculation.
 - o Table Calculations - the more marks in the view, the longer it will take to calculate.
- Where possible, use MIN or MAX instead of AVG. AVG requires more processing than MIN or MAX. Often rows will be duplicated and display the same result with MIN, MAX, or AVG
- Make groups with calculations. Like include filters, calculated groups load only named members of the domain, whereas Tableau's group function loads the entire domain.

Use Booleans or numeric calculations instead of string calculations. Computers can process integers and Booleans (t/f) much faster than strings. Boolean>Int>Float>Date>Date Time>String.

4 KPIs



Dashboards will be implemented to display and indicate certain KPIs and relevant indicators for the disease. As and when, the system starts to capture the historical/periodic data for a user, the dashboards will be included to display charts over time with progress on various indicators or factors.

4.1 KPIs (Key Performance Indicators)

Key indicators displaying a summary of the Heart Disease and its relationship with different metrics

1. Percentage of people suffering from heart disease
2. Heart disease by gender
3. Heart disease by age-group
4. Type of chest pain experienced in patients suffering from heart disease
5. Exercised induced angina in patients
6. Cholesterol and blood pressure of the heart disease patients.

5 Deployments

Prioritizing data and analytics couldn't come at a better time. Your company, no matter what size, is already collecting data and most likely analysing just a portion of it to solve business problems, gain competitive advantages, and drive enterprise transformation. With the explosive growth of enterprise data, database technologies, and the high demand for analytical skills, today's most effective IT organizations have shifted their focus to enabling self-service by deploying and operating Power BI Visualization at scale, as well as organizing, orchestrating, and unifying disparate sources of data for business users and experts alike to author and consume content.

- **Patterns in business operations:** Data visualization techniques help us to determine the patterns of business operations. By understanding the problem statement and identifying the solutions in terms of patterning and applied to eliminate one or more of the inherent problems.
- **Identify business trends and relate to data:** These techniques help us identify market trends by collecting the data on Day-To-Day business activities and preparing trend reports, which helps track the business how influences the market. So that we could understand the competitors and customers. Certainly, this helps to long-term perspective.
- **Storytelling and Decision making:** Knowledge of storytelling from available data is one of the niche skills for business communication, specifically for the Data Science domain which is playing a vital role. Using best visualization this role can be enhanced much better way and reaching the objectives of business problems.
- **Understand the current business insights and setting the goals:** Businesses can understand the insight of the business KPIs, finding tangible goals and business strategy planning; therefore they could optimize the data for business strategy plans for on-going activities.
- **Operational and Performance analysis:** Increase the productivity with the help of visualization techniques the clarity of KPIs depicting the trends of the productivity of the manufacturing unit, and guiding were to improve the productivity of the plant.

Power BI Server - On Premises

- Full control of hardware and software
- Infrastructure and data remain behind your firewall
- Need dedicated administrators to manage hardware and software
- Additional infrastructure needed to access off-network (mobile, external)

Key components

Key components of the Power BI ecosystem comprise:

- **Power BI Desktop**
The Windows-desktop-based application for PCs and desktops, primarily for designing and publishing reports to the Service.
- **Power BI Service**
The SaaS-based (software as a service) online service. This was formerly known as Power BI for Office 365, now referred to as PowerBI.com, or simply Power BI.
- **Power BI Mobile Apps**
The Power BI Mobile apps for Android and iOS devices, as well as for Windows phones and tablets.
- **Power BI Gateway**
Gateways used to sync external data in and out of Power BI and are required for automated refreshes. In Enterprise mode, can also be used by Flows and Power Apps in Office 365.
- **Power BI Embedded**
Power BI REST API can be used to build dashboards and reports into the custom applications that serve Power BI users, as well as non-Power BI users.

- **Power BI Report Server**

An on-premises Power BI reporting solution for companies that won't or can't store data in the cloud-based Power BI Service.

- **Power BI Premium**

Capacity-based offering that includes flexibility to publish reports broadly across an enterprise, without requiring recipients to be licensed individually per user. Greater scale and performance than shared capacity in the Power BI service.

- **Power BI Visuals Marketplace**

A marketplace of custom visuals and R-powered visuals.

