**Analytics For Hospitals' Health-Care Data**

Recent Covid-19 Pandemic has raised alarms over one of the most overlooked areas to focus: Healthcare

Management. While healthcare management has various use cases for using data science, patient length of stay is one critical parameter to observe and predict if one wants to improve the efficiency of the healthcare management in a hospital.

This parameter helps hospitals to identify patients of high LOS-risk (patients who will stay longer) at the time of admission. Once identified, patients with high LOS risk can have their treatment plan optimized to minimize LOS and lower the chance of staff/visitor infection. Also, prior knowledge of LOS can aid in logistics such as room and bed allocation planning.

Suppose you have been hired as Data Scientist of Health Man – a not for profit organization dedicated to manage the functioning of Hospitals in a professional and optimal manner.

**Goal:**

The goal is to accurately predict the Length of Stay for each patient on case by case basis so that the Hospitals can use this information for optimal resource allocation and better functioning. The length of stay is divided into 11 different classes ranging from 0-10 days to more than 100 days.

**Technical Architecture:**



### Solution Requiremets

Services Used: IBM Cognos Analytics.



**Project Objectives**

By the end of this Project, you will:

* Know fundamental concepts and can work on IBM Cognos Analytics
* Gain a broad understanding of plotting different visualizations to provide the suitable solution.
* Able to create meaningful Visualizations and the Dashboard(s).

**Project Flow**

* Users create multiple analytical graphs/charts/Visualizations.
* Using the Analytical Visualizations, build the required Dashboard(s).
* Saving and visualizing the final dashboard in the IBM Cognos Analytics.

To accomplish this, we have to complete all the activities and tasks listed below:

* IBM Cloud Account
* Login to Cognos Analytics
* Working with the Dataset
  + Understanding the Dataset
  + Loading the Dataset

* Build the following visualizations
  + Length of Stay for each case of patients.
  + Stay by Patient ID using Column Chart
  + Severity of illness by Patient-Id using Tree Map
  + Age, Department Wise Patient using Table
  + Room Availability by Pie Chart
  + Dashboard Creation
  + Department wise no. of admissions by Waterfall Chart

* **IBM Account**
* Create and [login to IBM Account.](https://cloud.ibm.com/registration), Click on login to IBM Account to access the link.
* **We give you 2GB of runtime and container memory free for 30 days, plus..**
* We give you 2GB of runtime and container memory free for 30 days, plus access to provision up to 10 services...
* <https://cloud.ibm.com/registration>
* **IBM Cognos Analytics**
* Create an IBM Cognos Analytics account with the following link.
* **IBM Cognos Analytics**
* Create the [Cognos Analytics Account](https://www.ibm.com/account/reg/in-en/signup?formid=urx-34710), Click on the Cognos Analytics Account for accessing the link

**Working With The Dataset**

Working with the Dataset.

* Understand Dataset
* Load the Dataset
* Explore the Data
* Visualize the Data.

**Understanding The Dataset**

This project is based on understanding the Health Analytics dataset can be downloaded from Health Analytics Dataset.

[**Download the Dataset**](https://drive.google.com/file/d/1slC0MhsJHeuODVkhIXrdNOX_aBDySSBh/view?usp=sharing)

The data is spread across 3 data files (csv) and one data dictionary enclosed. The primary data file we use is test\_data.csv consist of 17 Columns with 137057 Rows. The data dictionary is as follows:

|  |  |
| --- | --- |
| Column | Description |
| case\_id | Case\_ID registered in Hospital |
| Hospital\_code | Unique code for the Hospital |
| Hospital\_type\_code | Unique code for the type of Hospital |
| City\_Code\_Hospital | City Code of the Hospital |
| Hospital\_region\_code | Region Code of the Hospital |
| Available Extra Rooms in Hospital | Number of Extra rooms available in the Hospital |
| Department | Department overlooking the case |
| Ward\_Type | Code for the Ward type |
| Ward\_Facility\_Code | Code for the Ward Facility |
| Bed Grade | Condition of Bed in the Ward |
| patientid | Unique Patient Id |
| City\_Code\_Patient | City Code for the patient |
| Type of Admission | Admission Type registered by the Hospital |
| Severity of Illness | Severity of the illness recorded at the time of admission |
| Visitors with Patient | Number of Visitors with the patient |
| Age | Age of the patient |
| Admission\_Deposit | Deposit at the Admission Time |
| Stay | Stay Days by the patient |

**Loading The Dataset**

Before you can build a view and analyze your data, you must first connect the data to IBM Cognos. Cognos supports connecting to a wide variety of data, stored in a variety of places.

The data might be stored on your computer in a spreadsheet or a text file, or in a big data, relational, or cube (multidimensional) database on a server in your enterprise.

In our case, we will be using a spreadsheet or text file for making our analysis.

Load data from test\_data.csv file which consist of 17 Columns with 137057 Rows.

**Data Visualizations**

Using the given dataset, we plan to create various graphs and charts to highlight the insights and visualizations.

* Build the following visualizations
  + Length of Stay for each case of patients.
  + Stay by Patient ID using Column Chart
  + Severity of illness by Patient-Id using Tree Map
  + Age, Department Wise Patient using Table
  + Room Availability by Pie Chart
  + Dashboard Creation
  + Department wise no. of admissions by Waterfall Chart

**Dashboard To Show Number Of Patients**

Build a dash board with the following visuals to present various analytics of Hospitals.

- a Bar Chart to show case number of Cases based on Ward Type

- a Geo Map to show case number of cases based on City, Hospital and Region0

- a Column Chart to show case Number of Cases by each Department

**Age Wise Patients With Department And Severity Filters**

Build a column visual to show case Age wise Number of Patients with Department and Severity Filters.

- a Pie-Chart show case the Number of Cases by Ward Facility type.

**Dashboard With Hierarchy Bubble And Radial Visuals**

Create a Dashboard with Hierarchy Bubble and Radial Visuals as follows:

* Hierarchy Bubble to show case Bed Grade with Number of Cases by Department and Ward-wise.
* Radial chart to show case Department wise Admission Deposit Amount.
* **Dashboard Showing Pie, Stacked Bar, Waterfall And Pie Charts**
* Build a Dashboard to show case the following analytical visuals.
* - a Pie-Chart showing Severity of illness by number of cases.
* - a Stacked Bar Chart to visualize Department-wise, Age-wise number of cases.
* - a Waterfall chart visualizing the Department wise number of Patients.
* - a Pie-Chart showing the Availability of Extra rooms with Analytics.
* **Ideation Phase**
* In this milestone you are expected to get started with the Ideation process.
* **Literature Survey On The Selected Project & Information Gathering**
* In this activity you are expected to gather/collect the relevant information on project usecase, refer the existing solutions, technical papers, research publications etc.
* **Prepare Empathy Map**
* In this activity you are expected to prepare the empathy map canvas to capture the user Pains & Gains, Prepare list of problem statements.
* **Ideation**
* In this activity you are expected to list the ideas (at least 4 per each team member) by organizing the brainstorming session and prioritize the top 3 ideas based on the feasibility & importance.
* **Project Design Phase – I**
* From this milestone you will be starting the project design phase. You are expected to cover the activities given.
* **Proposed Solution**
* In this activity you are expected to prepare the proposed solution document, which includes the novelty, feasibility of idea, business model, social impact, scalability of solution, etc.
* **Problem Solution Fit**
* In this activity you are expected to prepare problem - solution fit document and submit for review.
* **Solution Architecture**
* In this activity you are expected to prepare solution architecture document and submit for review.
* **Project Design Phase -II**
* From this milestone you will be continue working on the project design phase. You are expected to cover the activities given.
* **Customer Journey**
* Prepare the customer journey maps to understand the user interactions & experiences with the application (entry to exit).
* **Functional Requirement**
* In this activity you are expected to prepare the functional requirement document.

* **Data Flow Diagrams**
* In this activity you are expected to prepare the data flow diagrams and submit for review.
* **Technology Architecture**
* In this activity you are expected to draw the technology architecture diagram.
* **Project Planning Phase**
* In this milestone you are expected to prepare milestones & tasks, sprint schedules.
* **Prepare Milestone & Activity List**
* In this activity you are expected to prepare the milestones & activity list of the project.
* **Sprint Delivery Plan**
* In this activity you are expected to prepare the sprint delivery plan.
* **Project Development Phase**
* In this milestone you will start the project development and expected to perform the coding & solutioning, acceptance testing, performance testing based as per the sprint and submit them.
* **Project Development - Delivery Of Sprint-1**
* In this activity you are expected to develop & submit the developed code by testing it.
* **Project Development - Delivery Of Sprint-2**
* In this activity you are expected to develop & submit the developed code by testing it.
* **Project Development - Delivery Of Sprint-3**
* In this activity you are expected to develop & submit the developed code by testing it.
* **Project Development - Delivery Of Sprint-4**
* In this activity you are expected to develop & submit the developed code by testing it.