ANALYTICS FOR HOSPITAL'S HEALTHCARE DATA

A PROJECT BASED LEARNING REPORT

SUBMITTED BY

R. GOKUL
K. ARUN KUMAR
V. DHAKSHINAMOORTHI
S. NAVEENPRABAHARAN

TEAM ID: PNT2022TMID07021

INTRODUCTION

1.1 Project Overview

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.

1.2 Purpose

The purpose of the project 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 by creating the meaningful visualization by exploring the available data.

LITERATURE SURVEY

TITLE	AUTHOR	ALGORITHM	ADVANTAGE	DISADVANTAGE
Big data analytics in hospital health care	Ashwin Belle Raghuram Thiagarajan S. M. Reza Soroushmehr	Data analytics	Leverage legions of disparate ,structured and unstructured data sources is going to play a vital role in health care	Have patents to some of the methodologies surveyed in this paper
The role of big data analysis in hospital management system	Dhivyalakshmi.S	Data analytics	Helpful in tracing and handling the population health more competently and successfully It improves the ability to deliver preventive care Four main security models approach was introduced	Prevent the credential users from misusing the system Prevent credential users from observing and altering the information stored in clusters
Big data analytics solution to healthcare	Manpreet Singh	Data analytics	It discusses the usefulness of application of big data analytics using patient care dataset for better insight in care coordination ,health management and patient engagement .	There is a lot of big data flowing which includes genomics, remote sensing , social media, mobile app and many other data types. Issues such as data integrity ,privacy lead to poor data management privacy violation and discrimination

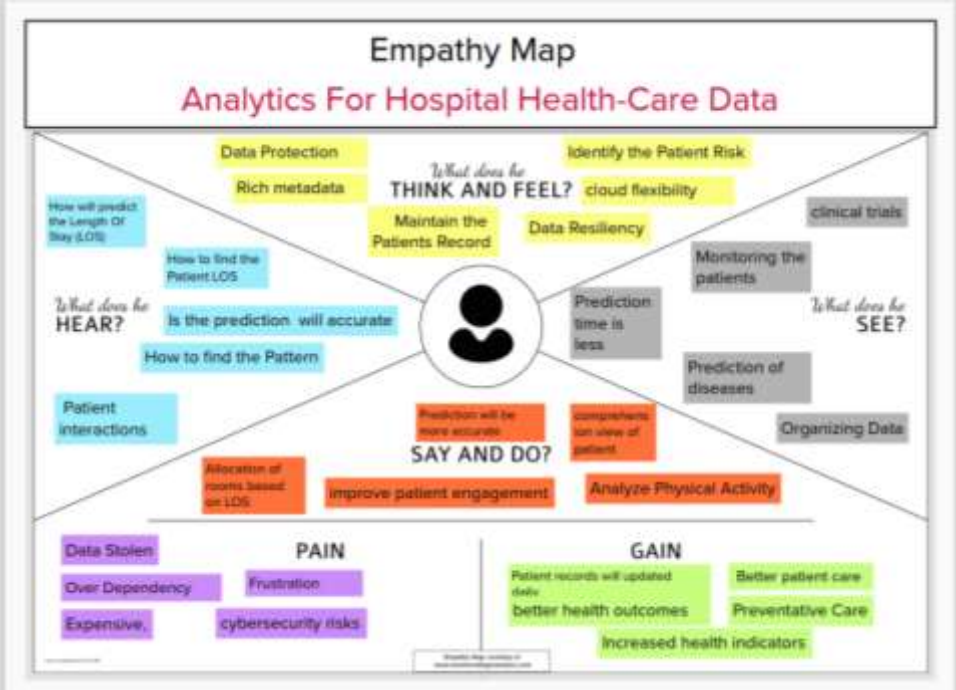
Big data analytics in medical engineering and healthcare	Lidong Wang Cherly Ann Alexander	Health care Analysis	Big data analytics used in large scale genetics studies, public health, personalised and precision medicine and also for new drug development	All data in database doesn't come from somewhere with data governance habits
The Use of Big data analytics in Health care	Kornelia Batko and Andrzej Slezak	Data Analytics	Big Data Analytics in healthcare will allow to use new technologies both in treatment of patients and health management. Medical Centers will have a complete picture of their Activities, taking into account the clinical, management, financial and quality perspectives.	Medical enterprises still cannot keep up with the information needs of patients, clinicians, administrators and the creator's policy. The main challenge with Big Data is how to handle such a large amount of information and use it to make datadriven decisions in plenty of areas.
Big data analytics in health care: Promise and Potential	Viju Raghupathi and Wullianallur Raghupathi	Cluster analysis and Regression	The healthcare industry historically has generated large amounts of data, driven by record keeping, compliance & regulatory requirements, and patient care.While most data is stored in hard copy form, the current trend is toward rapid digitization of these large amounts of data.	As big data analytics becomes more mainstream, issues such as guaranteeing privacy, safeguarding security, establishing standards and governance, and continually improving the tools and technologies will garner attention.
Health care data analysis using evolutionary algorithm	A.suresh, R.Kumar, Varatharajan	k-Means Clustering,SVM, Naive bayes	Data mining is used and an assessment model for the health care analysis is developed with the preprocessing steps of performing data.	The analysis demonstrates that the planned perfect has accomplished a regular correctness of 98.79% of health care dataset.

Data Visualisation in Health care	Ivan Dunskiy	Data analytics	Modern data visualization tools in healthcare convert complex data into userfriendly visuals that are easy to understand for its stakeholders, be they doctors, patients, or government officers.By visualizing realtime data on patient health status, doctors can define and group patients according to the treatment and attention they need.Also prevents practitioners from missing important information.	Visuals tend to increase our confidence, so it's possible for us to draw inaccurate conclusions from them. Much of the success with data visualization depends on how implement is done, and how it is used on a regular basis. If it's designed in an unsophisticated way, or if there's a flaw in how it operates, it might lead to inaccurate presentations.

IDEATION AND PROPOSED SOLUTION

3.1 Empathy Map

Empathy map helps is simple and easy to digest visually that captures knowledge about a user's behaviour and attitudes.



3.2 Ideation and Brainstorming

Brainstorming provides a free and open environment that encourages everyone within a team to participate in creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich number of creative solutions

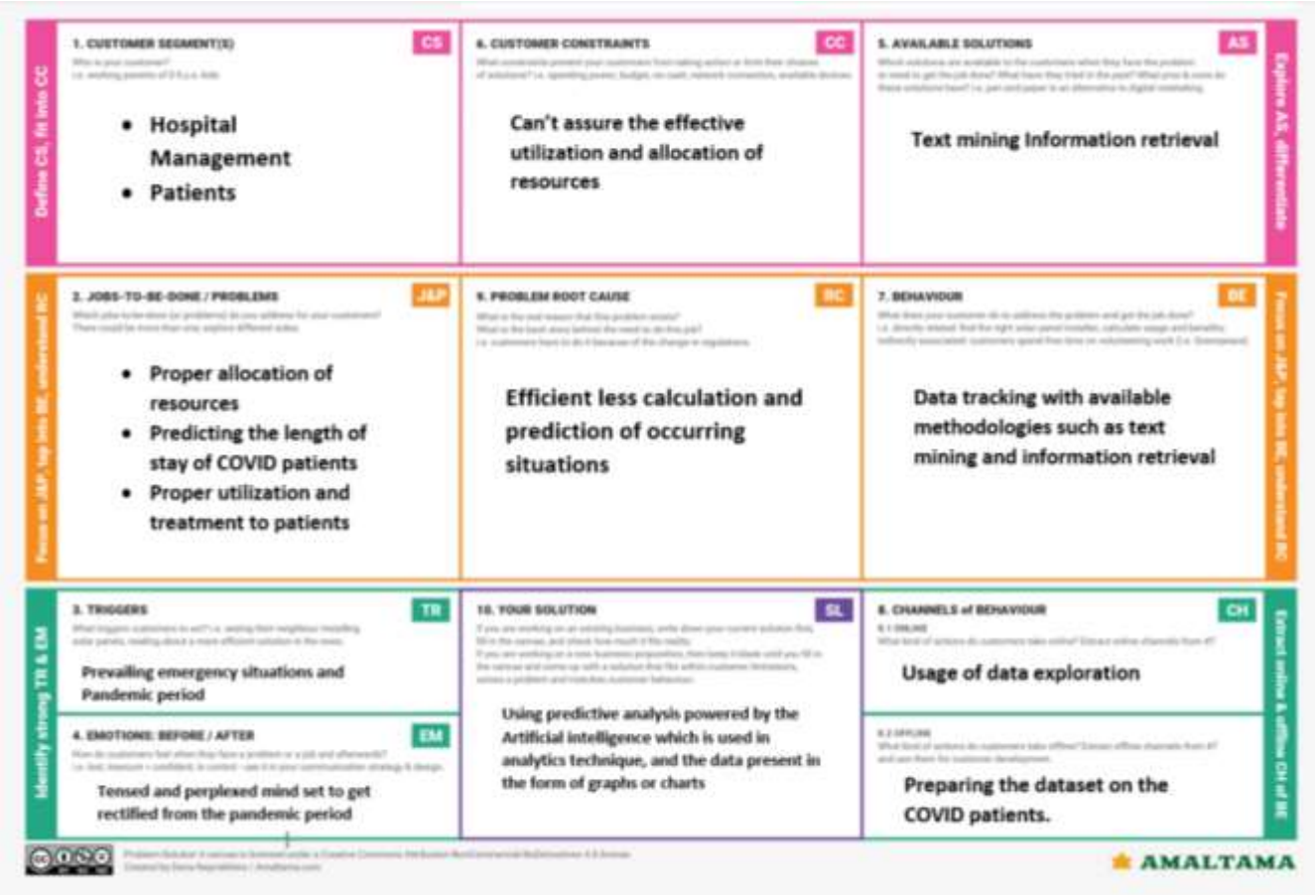
Problem Statement :

Create a problem statement to understand your patient's point of view. The Patient Problem Statement template helps you focus on what matters to create experiences people will love. A well-articulated Patient problem statement allows you and your team to find the ideal solution for the challenges your Patients face. Throughout the process, you'll also be able to empathize with your Patients, which helps you better understand how they perceive your product or service. Health Care Industry desires to classify the Patients using their pathology data for their CARE (Self-management, Doctor-Advise, Further Diagnostic and Chronic Medication, predicting length of stay) management improvement that facilitates to build a multi-classification model to build CARE Management Model (CMM) with right classification of patient.

3.3 Proposed solution

S. No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	The covid-19 pandemic has resulted in uncontrollable, may local hospital where not prepared to handle this crisis. These challenges may include visualization and wide array of data integrity concerns.
2.	Idea / Solution description	Data visualization acquires the main in the health industry into focus help to identify patterns as well as correlation and makes data analysis more relevant. Example data visualization include interactive dashboard, bar charts, pie charts, heat maps, all of which have their particular uses to represent idea and data.
3.	Novelty / Uniqueness	These days data often need to be visually presented in the form of interactive graphs or charts to be impactful and understand.
4.	Social Impact / Customer Satisfaction	Reducing patient waiting times Allocating and scheduling adequate staffing levels Reducing readmission rates Monitoring clinical trial data and patient outcomes Less casualty
5.	Business Model (Revenue Model)	Analytics is playing a huge role in helping companies taking informed decision therapeutical areas, markets and regions reach up to decision within the stipulated timeframe and get exposed to real world insight from competitors, payers, regulators, patient, etc.
6.	Scalability of the Solution	This advanced prediction method instead of the traditional methods makes the Hospital function better by more accurate allocation of beds and resources because it uses the historical data to analyse using visualization tools.

3.4 Problem Solution Fit



.

4.1 Functional Requirements

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form
FR-2	User Confirmation	Confirmation via OTP
FR-3	Database	Every patient has some necessary data like phone number, their first and last name, personal health number, postal code, country, address, city, 'patient's ID number, etc
FR-4	Report Generation	The Hospital Management System generates a report on every patient regarding various information like patients name, Phone number, bed number, the doctor's name whom its assigns, ward name, and more. The Hospital Management system also helps in generating reports on the availability of the bed regarding information like bed numbers unoccupied or occupied, ward name, and more.
	Check Out	The staff in the administration section of the ward can delete the patient ID from the system when the patient checkout from the hospital. The Staff in the administration section of the ward can put the bed empty in the list of beds available.
	Adding Patients	The Hospital Management enables the staff at the front desk to include new patients in the system.

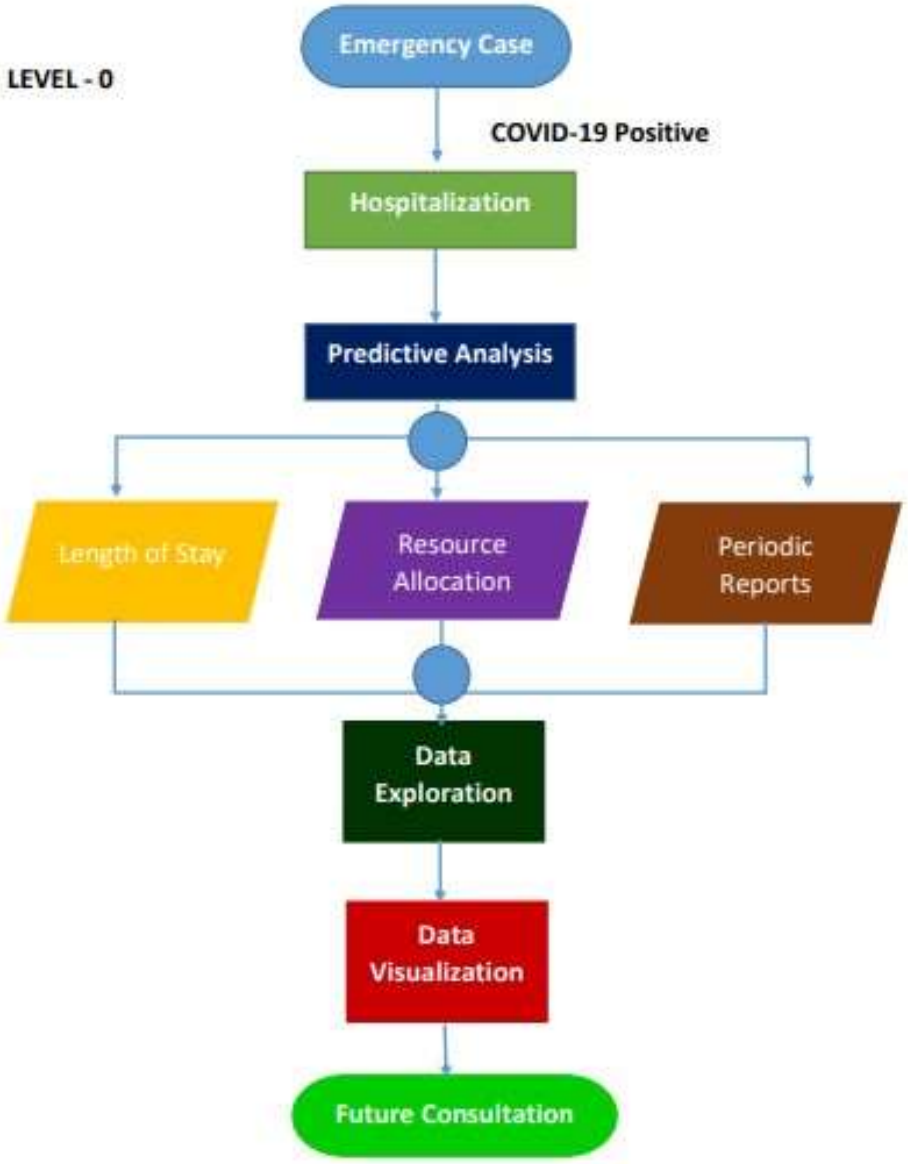
4.2 Non-Functional Requirements

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The effectiveness, efficiency and satisfaction with which specific users can achieve a specific set of tasks in a particular environment.
NFR-2	**Security**	This process of protecting data from unauthorized access and data corruption throughout its lifecycle
NFR-3	**Reliability**	A highly reliable system has a lower risk of errors and process failures that can cause patients harm
NFR-4	**Performance**	performance measurements include: ● Quality and efficiency of patient care ● Cost of healthcare services ● Disparities in performance Care outcomes
NFR-5	**Availability**	inpatient, outpatient, pharmacy, and enrollment
NFR-6	**Scalability**	The ability of a health intervention shown to be efficacious on a small scale and/or under controlled conditions to be expanded under real world conditions to reach a greater proportion of the eligible population, while retaining effectiveness

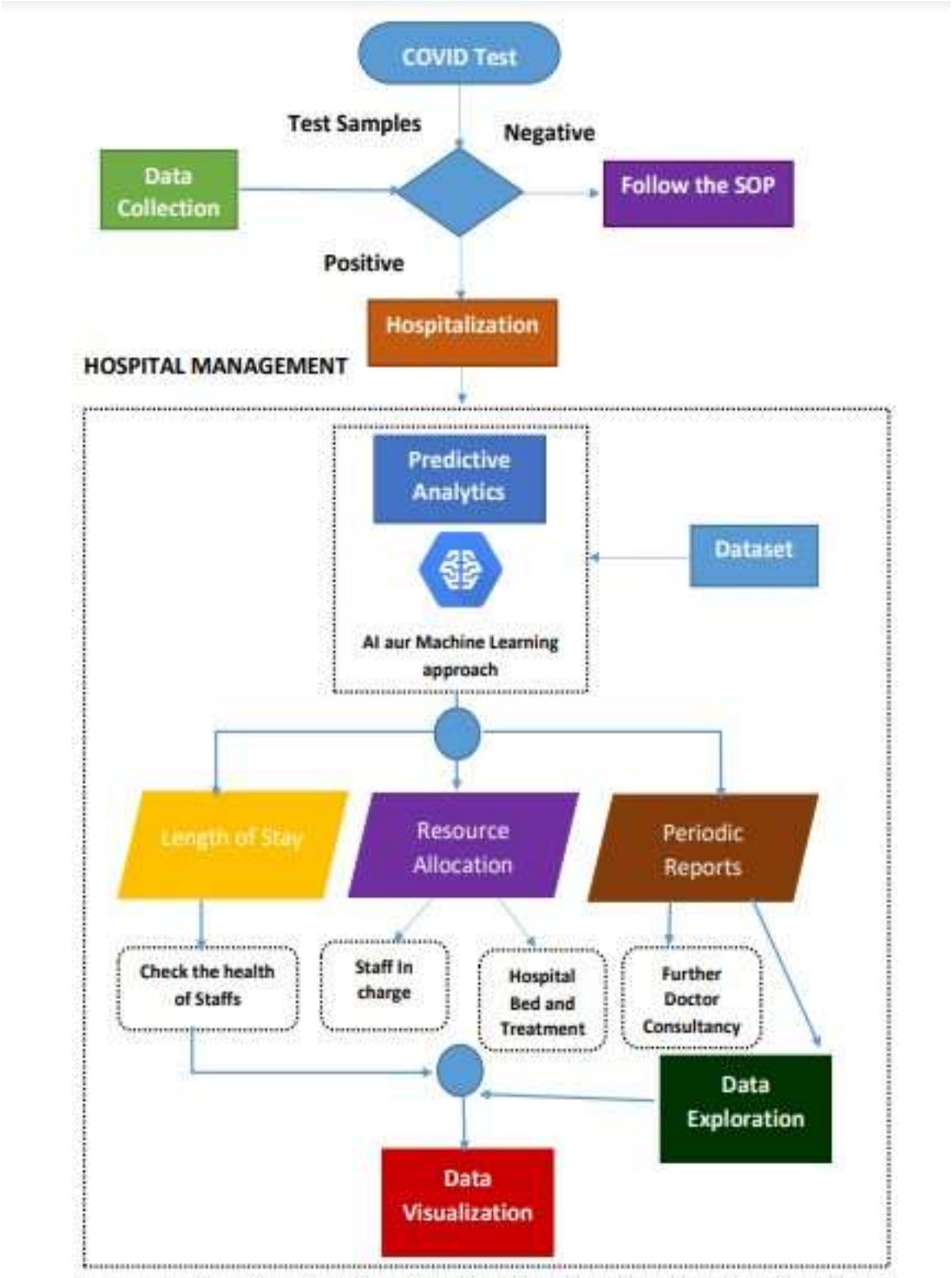
PROJECT DESIGN

5.1 Data Flow Diagram

Data Flow Diagram is the traditional visual representation of the information flow within the system. A neat and clear DFD can depict the right amount of the system requirements graphically.



Level - 1

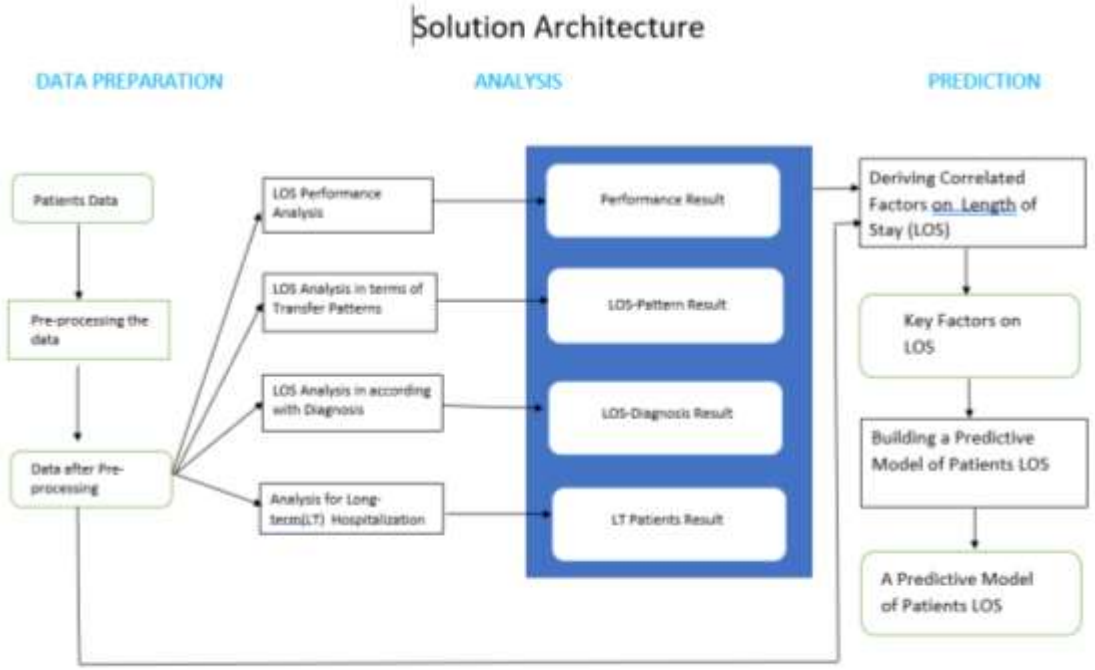

COVID Test
Test Samples
Negative
Data Collection
Follow the SOP
Positive
Hospitalization
HOSPITAL MANAGEMENT
Predictive Analytics
Dataset
AI aur Machine Learning approach
Length of Stay
Resource Allocation
Periodic Reports
Check the health of Staffs
Staff In charge
Hospital Bed and Treatment
Further Doctor Consultancy
Data Exploration
Data Visualization

5.2.1 Solution Architecture

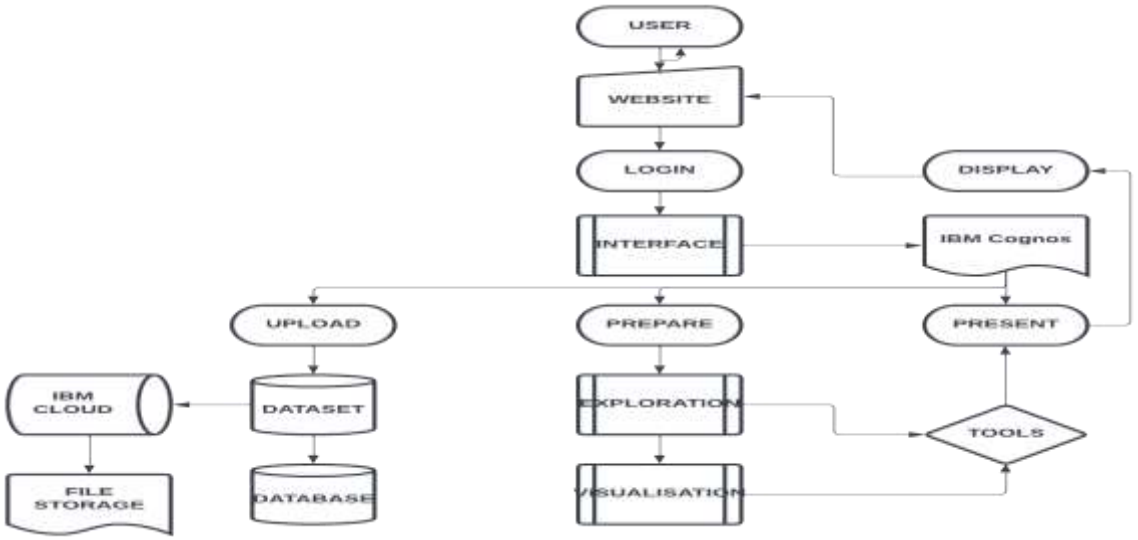
Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions.

Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behaviour, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.



5.2.2 Technical Architecture



COMPONENTS AND TECHNOLOGIES

S.No	Component	Description	Technology
1.	User Interface	The Users will be interacting with the site through their convenient devices	IBM cognos or IBM cloud
2.	Application Logic-1	The Collecting the data	CSV File
3.	Application Logic-2	Exploring and visualizing the data	IBM Cognos analytics
4.	Application Logig-3	Data model on the available data	AI or ML
5.	Cloud Database	Storing the patients data in cloud environment	IBM cloud
6.	Machine Learning Model	Predictive Analysis on the data model	Python, IBM Cognos
7.	Infrastructure Service	Cloud environment for analytics	IBM Cloud and Cognos Analytics

Application Characteristics

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Pandas and Numpy	Python
2.	Security Implementations	Admin and User Authorization	SHA

3.	Availability	The data exploration and visualization is a timely work hence the system should be more available	Cognos analytics
4.	Performance	The accurate calculation of data	Predictive Analytics using AI or ML Model,Confusion matrix

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-I	Dataset	USN-I	The user needs a complete data about the patients admitted in the hospital and a dataset should be prepared.	2	High	Gokul R Arun Kumar K Dhakshinamoorthi V Naveenprabaharan S
Sprint-I	Data Exploration	USN-2	Data exploration is the first step of data analysis used to explore and visualize data to uncover insights from the start.	2	High	Gokul R Arun Kumar K Dhakshinamoorthi V Naveenprabaharan S
Sprint-I	Secondary Exploration	USN-3	The secondary relationship of data is identified here	1	Low	Gokul R Arun Kumar K Dhakshinamoorthi V Naveenprabaharan S
Sprint-2	Data Vizualization	USN-4	The patients data are graphically visualized for data verification and to know available resources	2	High	Gokul R Arun Kumar K Dhakshinamoorthi V Naveenprabaharan S
Sprint-3	Dashboard	USN-5	The explored and visualized data are displayed in dashboard	2	High	Gokul R Arun Kumar K Dhakshinamoorthi V Naveenprabaharan S
Sprint-4	Predictive Model	USN-6	The Predictive analysis on the data is performed by modelling the predictive model.	2	High	Gokul R Arun Kumar K Dhakshinamoorthi V Naveenprabaharan S

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-I	20	4 Days	24 Oct 2022	27 Oct 2022	20	27 Oct 2022
Sprint-2	20	6 Days	29 Oct 2022	03 Nov 2022	20	03 Nov 2022
Sprint-3	20	6 Days	04 Nov 2022	9 Nov 2022	20	9 Nov 2022
Sprint-4	20	8 Days	10 Nov 2022	18 Nov 2022	20	19 Nov 2022

\

CODING AND SOLUTIONING

7.1 Feature 1

7.1.1 Data Exploration and Visualization:

Data exploration is the first step of data analysis used to explore and visualize data to uncover insights from the start or identify areas or patterns to dig into more. Using interactive dashboards and point-and-click data exploration, users can better understand the bigger picture and get to insights faster.

Steps:

1. Variable Identification
2. Univariate Analysis
3. Bi-Variable Analysis
4. Detecting / Treating missing values
5. Detecting / Treating outliers
6. Feature Engineering

Data visualization is the graphical representation of information and data. By using visual elements like charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data. Additionally, it provides an excellent way for employees or business owners to present data to non-technical audiences without confusion.

It can be employed as;

- Dashboards
- Story
- Reports

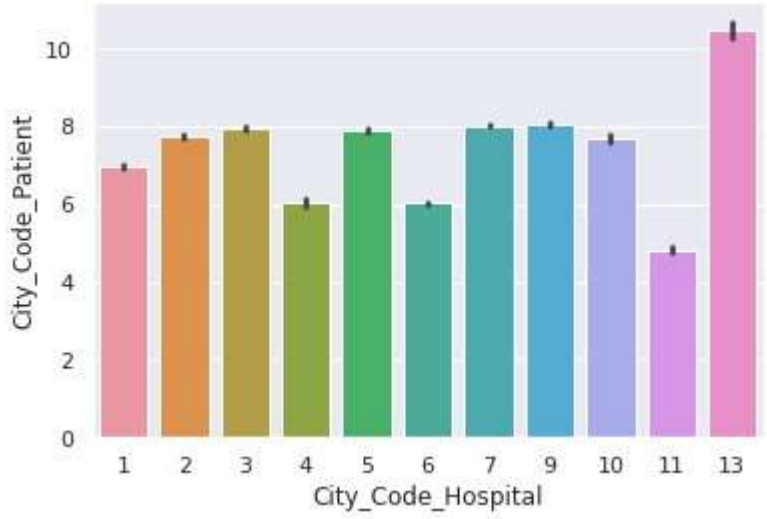
Code:

Data Exploration on Healthcare dataset

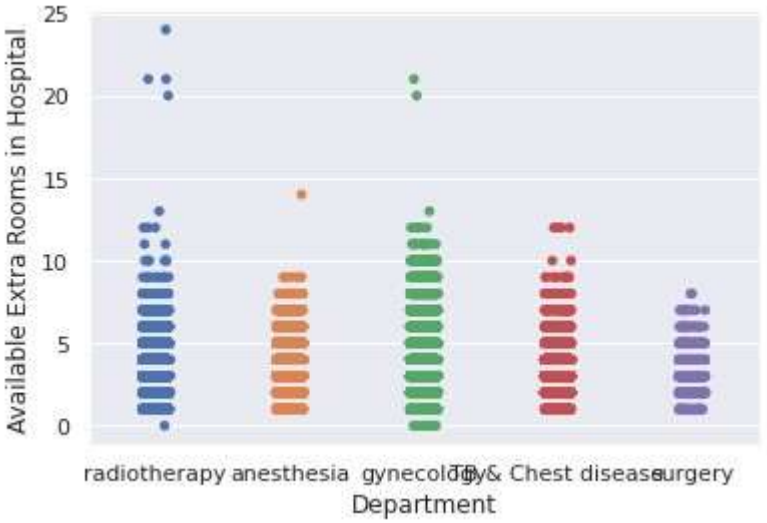
```
# Import packages import
pandas as pd import
NumPy as np import
matplotlib. pyplot as plot

# Reading the Dataset data =
pd.read_csv("/content/drive/My Drive/Machine
Learning/train_data.csv") data.head() data.tail()
data.info()
data.nunique() // finding unique and null value
data.isnull().sum()
(data.isnull()).sum()/(len(data))* 100

# Data Reduction
data.drop(columns=['City_Code_Patient'], inplace = True)
data.describe() // finding the mean value
```

Data Visualization on Healthcare Data:

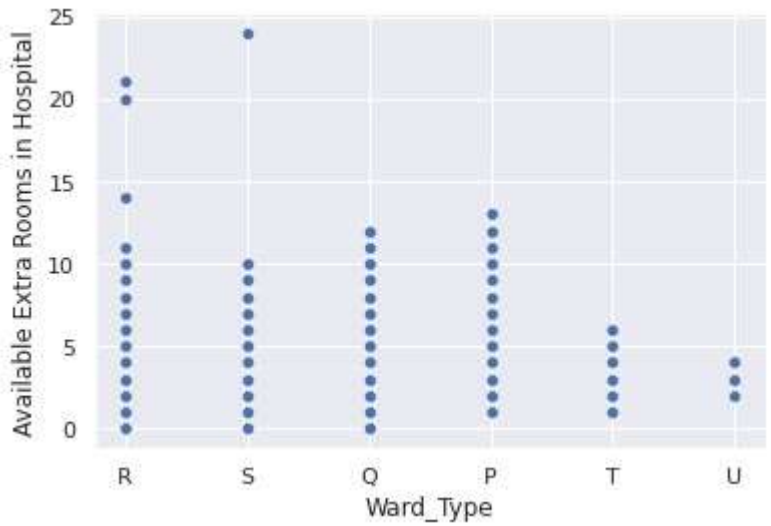
```
import numpy as np import
pandas as pd import seaborn
as sns
sns.set(color_codes=True)
from matplotlib import pyplot
as plt

data = pd.read_csv("/content/drive/My Drive/Machine Learning/train_data.csv")
 sns.barplot(data['City_Code_Hospital'],
data['City_Code_Patient'])
```



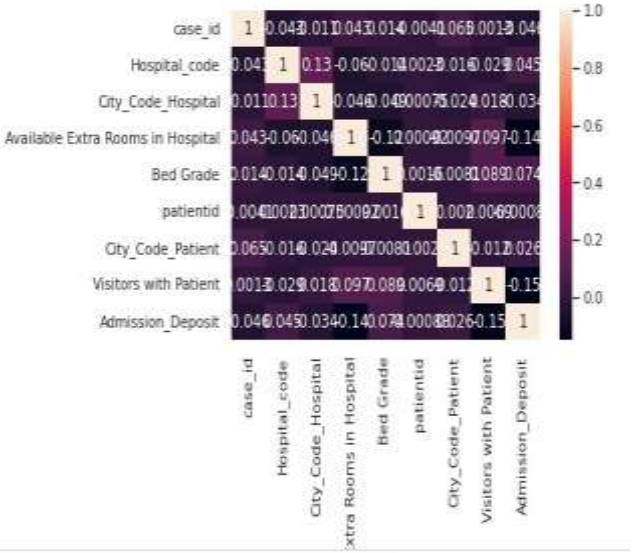

```
sns.stripplot(data['Department'], data['Available Extra Rooms in Hospital'])
```




```
sns.scatterplot(data['Ward_Type'], data['Available Extra Rooms in Hospital'])
```

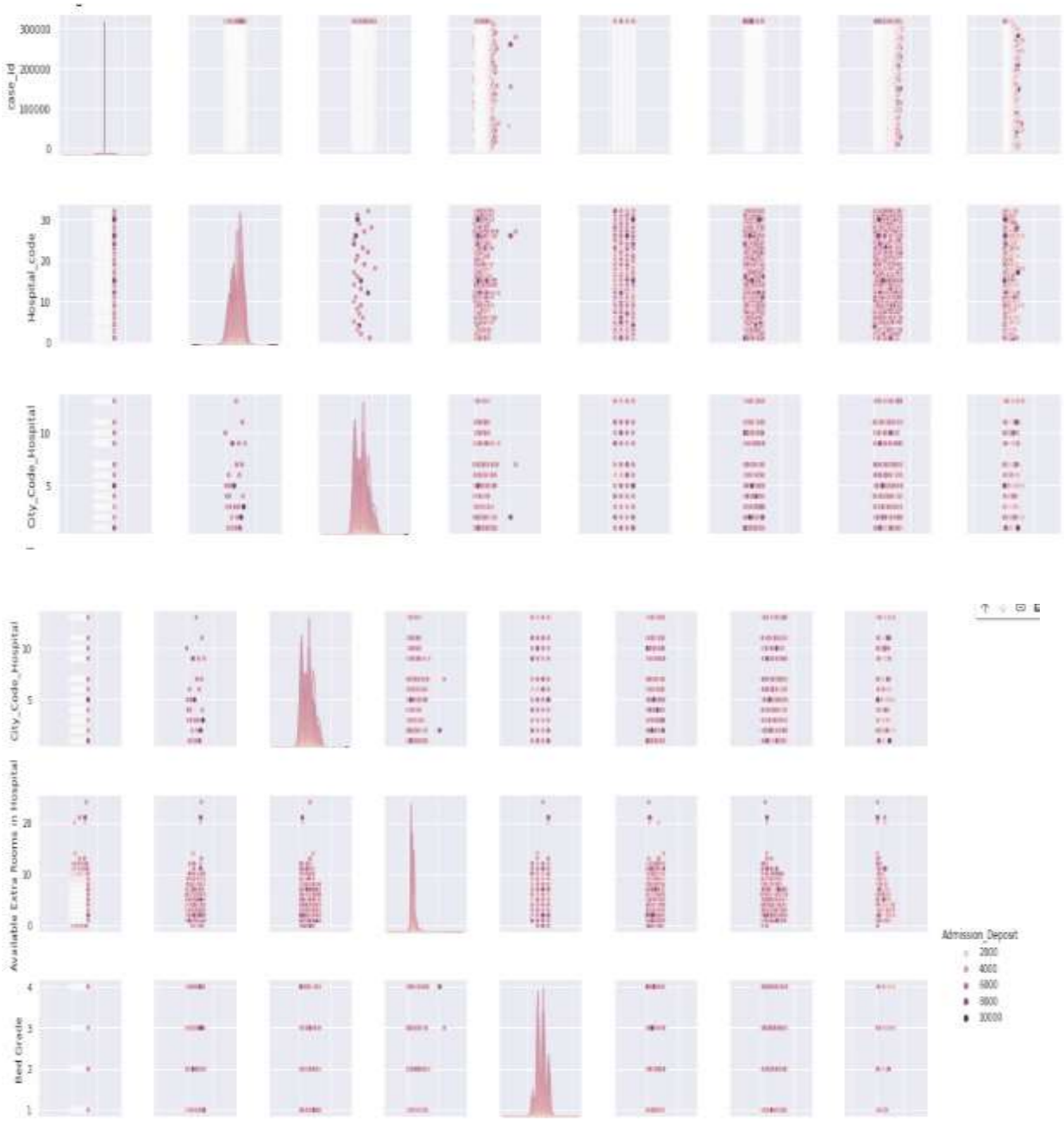


sns.heatmap(data.corr(),annot=True)



sns.jointplot(data['Severity of Illness'], data['Age'])

sns.pairplot(data,hue="Admission_Deposit")#multivariate


case_id
Hospital_code
City_Code_Hospital
City_Code_Hospital
Available Extra Rooms in Hospital
Bed Grade
Admission_Deposit
2000
4000
6000
8000
10000

TESTING

8.1 Testcases

Components	Test Scenario	Steps to Execute	Test data	Actual Vorkin g	Status
Home Page	Verify user is able to navigate to the homepage	Navigate to Hospital Healthcare analytics page and view the Homepage	https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2FAnalytics&action=view&mode=dashboard	Working as expected	Pass
Analytics Dashboard	Verify that users are able to view the responsive dashboard and view the data about the current scenario	1.Enter the Analytics Home page 2.Choose the dashboard option 3. View the data	https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2FAnalytics&action=view&mode=dashboard	Working as expected	Pass
Story	Verify whether the story is functioned on the analytics dashboard	1.Enter the Analytics Home page 2.Choose the story option 3. View the story about the Hospital data	https://us1.ca.analytics.ibm.com/bi/?perspective=story&pathRef=.my_folders%2FANALYTICS%2BSTORY&action=view&mode=dashboard	Working as expected	Pass
Report	Verify user is able to view and run the reports	1. Enter the Analytics Home page 2. Choose the report option 3. View the story	https://us1.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2FAnalytics%2Breport	Working as expected	Pass

8.1 User Acceptance Testing

1. Purpose of the Document:

The purpose of this document is to briefly explain the test coverage and open issuesof the Analytics for Hospital's Healthcare Data project at the time of the release to User Acceptance Testing (UAT).

2. Defect Analysis:

This report showsthe number of resolved or closed bugs at each severity level, and how they were resolved.

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	8	4	0	2	14
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	13	4	3	16	36
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	1	4	2	1	8
Totals	23	18	12	22	76

3. Test Case Analysis:

This report shows the number of test cases that have passed, failed, and untested.

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	9	0	0	9
Client Application	43	0	0	43
Security	1	0	0	1
Outsource Shipping	1	0	0	1
Except on Reporting	9	0	0	9
Final Report Output	10	0	0	10
Version Control	1	0	0	1

CODE AND IMPLEMENTATION :

1.HOME.html

```
<!DOCTYPE html>
<html lang="en">
<head>
  <title>Data Analytics</title>
  <meta charset="utf-8">
  <meta name="viewport" content="width=device-width, initial-scale=1">
  <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">
  <script
src="https://ajax.googleapis.com/ajax/libs/jquery/3.6.0/jquery.min.js"></scrip
t>
  <script
src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></sc
ript>
</head>
<body>

<nav class="navbar navbar-inverse">
  <div class="container-fluid">
    <div class="navbar-header">
      <a class="navbar-brand" href="about.html">Analytics for Hospitals'
Health-Care Data</a>
    </div>
    <ul class="nav navbar-nav">
      <li class="active"><a href="Home.html">Home</a></li>

      <li><a  href="about.html">About</a></li>
      <li><a href="exploration.html">Exploration</a></li>
      <li><a href="dashboard.html">Dashboard</a></li>
      <li><a href="report.html">Report</a></li>
      <li><a href="story.html">Story</a></li>
    </ul>
  </div>
</nav>

<div class="jumbotron">
 <center> <h4><b>Team ID : PNT2022TMID07021  </b></h4></center>

</div>
<table class="table table-bordered">

    <tbody>
      <tr>
        <td>Team Leader</td>
        <td>DHAKSHINAMOORTHI V</td>
```

```
      </tr>
      <tr>
        <td>Team member</td>
        <td>GOKUL R</td>

      </tr>
      <tr>
        <td>Team member</td>
        <td>NAVEENPRABAHARAN S</td>

      </tr>
    <tr>
        <td>Team member</td>
        <td>ARUN KUMAR K</td>

    </tr>

    </tbody>
  </table>
</body>
</html>
```

2.Exploration.html

```
<!DOCTYPE html>
<html lang="en">
<head>
  <title>Data Analytics</title>
  <meta charset="utf-8">
  <meta name="viewport" content="width=device-width, initial-scale=1">
  <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">
  <script
src="https://ajax.googleapis.com/ajax/libs/jquery/3.6.0/jquery.min.js"></scrip
t>
  <script
src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></sc
ript>
  <style>
    iframe {
         margin: 0px;
         padding: 0px;

         border: none;
     }

     iframe {
```

```
        display: block;
        width: 100%;
        min-height: 100vh;
        border: none;
        overflow-y: auto;
        overflow-x: hidden;
    }
</style>
</head>
<body>

<nav class="navbar navbar-inverse">
  <div class="container-fluid">
    <div class="navbar-header">
      <a class="navbar-brand" href="about.html">Analytics for Hospitals'
Health-Care Data</a>
    </div>
    <ul class="nav navbar-nav">
      <li ><a href="Home.html">Home</a></li>

      <li><a  href="about.html">About</a></li>
      <li class="active"><a  href="exploration.html">Exploration</a></li>
      <li><a href="dashboard.html">Dashboard</a></li>
      <li><a href="report.html">Report</a></li>
      <li><a href="story.html">Story</a></li>
    </ul>
  </div>
</nav>
<iframe
src="https://us1.ca.analytics.ibm.com/bi/?perspective=explore&amp;pathRef=.my_
folders%2FModel%2Fexploration&amp;closeWindowOnLastView=true&amp;ui_appbar=fal
se&amp;ui_navbar=false&amp;shareMode=embedded&amp;subView=model000001849091894
6_00000004" width="320" height="200" frameborder="0" gesture="media"
allow="encrypted-media" allowfullscreen=""></iframe>
</body>
</html>
```

3. About.html

```
<!DOCTYPE html>
<html lang="en">
<head>
  <title>Data Analytics</title>
  <meta charset="utf-8">
  <meta name="viewport" content="width=device-width, initial-scale=1">
  <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">
```

```
  <script
src="https://ajax.googleapis.com/ajax/libs/jquery/3.6.0/jquery.min.js"></scrip
t>
  <script
src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></sc
ript>


</head>
<body>

<nav class="navbar navbar-inverse">
  <div class="container-fluid">
    <div class="navbar-header">
      <a class="navbar-brand" href="about.html">Analytics for Hospitals'
Health-Care Data</a>
    </div>
    <ul class="nav navbar-nav">
      <li ><a href="Home.html">Home</a></li>


      <li class="active"><a  href="about.html">About</a></li>
      <li><a href="exploration.html">Exploration</a></li>
      <li><a href="dashboard.html">Dashboard</a></li>
      <li><a href="report.html">Report</a></li>
      <li><a href="story.html">Story</a></li>
    </ul>
  </div>
</nav>

<div class="jumbotron">
 <center> <h2><i><b> Analytics For Hospitals' Health-Care
Data</b></i></h2></center>
 <p style="padding: 50px;">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.</p>

  <center> <h4><i><b> GOAL :</b></i></h4></center>
  <p  style="padding: 50px;">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.</p>

  <center> <h4><i><b> Technical Architecture:  </b></i></h4></center>

  <img style="margin-left: 500px;" src="download.png" alt="">

</div>

</body>
</html>
```

4. Dashboard.html

```
<!DOCTYPE html>
<html lang="en">
<head>
  <title>Data Analytics</title>
  <meta charset="utf-8">
  <meta name="viewport" content="width=device-width, initial-scale=1">
  <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">
  <script
src="https://ajax.googleapis.com/ajax/libs/jquery/3.6.0/jquery.min.js"></scri
pt>
  <script
src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></s
cript>
  <style>
    iframe {
        margin: 0px;
        padding: 0px;

        border: none;
     }

     iframe {
        display: block;
        width: 100%;
```

```
            min-height: 100vh;
            border: none;
            overflow-y: auto;
            overflow-x: hidden;
        }
    </style>
    </head>
    <body>

    <nav class="navbar navbar-inverse">
      <div class="container-fluid">
        <div class="navbar-header">
          <a class="navbar-brand" href="about.html">Analytics for
Hospitals' Health-Care Data</a>
        </div>
        <ul class="nav navbar-nav">
          <li ><a href="Home.html">Home</a></li>

          <li><a  href="about.html">About</a></li>
          <li><a href="exploration.html">Exploration</a></li>
          <li class="active"><a  href="dashboard.html">Dashboard</a></li>
          <li><a href="report.html">Report</a></li>
          <li><a href="story.html">Story</a></li>
        </ul>
      </div>
    </nav>

    <iframe
src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&amp;pathRef=.
my_folders%2FModel%2Fdashboard&amp;closeWindowOnLastView=true&amp;ui_appbar=f
alse&amp;ui_navbar=false&amp;shareMode=embedded&amp;action=view&amp;mode=dash
board&amp;subView=model00000184909955ee_00000003" width="320" height="200"
frameborder="0" gesture="media" allow="encrypted-media"
allowfullscreen=""></iframe>

    </body>
    </html>

```

5.Report.html

```
<!DOCTYPE html>
<html lang="en">
<head>
  <title>Data Analytics</title>
  <meta charset="utf-8">
  <meta name="viewport" content="width=device-width, initial-scale=1">
```

```
  <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">
  <script
src="https://ajax.googleapis.com/ajax/libs/jquery/3.6.0/jquery.min.js"></scrip
t>
  <script
src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></sc
ript>
  <style>
    iframe {
        margin: 0px;
        padding: 0px;

        border: none;
     }

     iframe {
        display: block;
        width: 100%;
        min-height: 100vh;
        border: none;
        overflow-y: auto;
        overflow-x: hidden;
     }
</style>
</head>
<body>

<nav class="navbar navbar-inverse">
  <div class="container-fluid">
    <div class="navbar-header">
      <a class="navbar-brand" href="about.html">Analytics for Hospitals'
Health-Care Data</a>
    </div>
    <ul class="nav navbar-nav">
      <li ><a href="Home.html">Home</a></li>

      <li><a  href="about.html">About</a></li>
      <li><a href="exploration.html">Exploration</a></li>
      <li><a href="dashboard.html">Dashboard</a></li>
      <li class="active"><a  href="report.html">Report</a></li>
      <li><a href="story.html">Story</a></li>
    </ul>
  </div>
</nav>

<iframe
src="https://us1.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2FModel%2Freport
```

```
&amp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;sh
areMode=embedded&amp;action=edit" width="320" height="200" frameborder="0"
gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

</body>
</html>
```

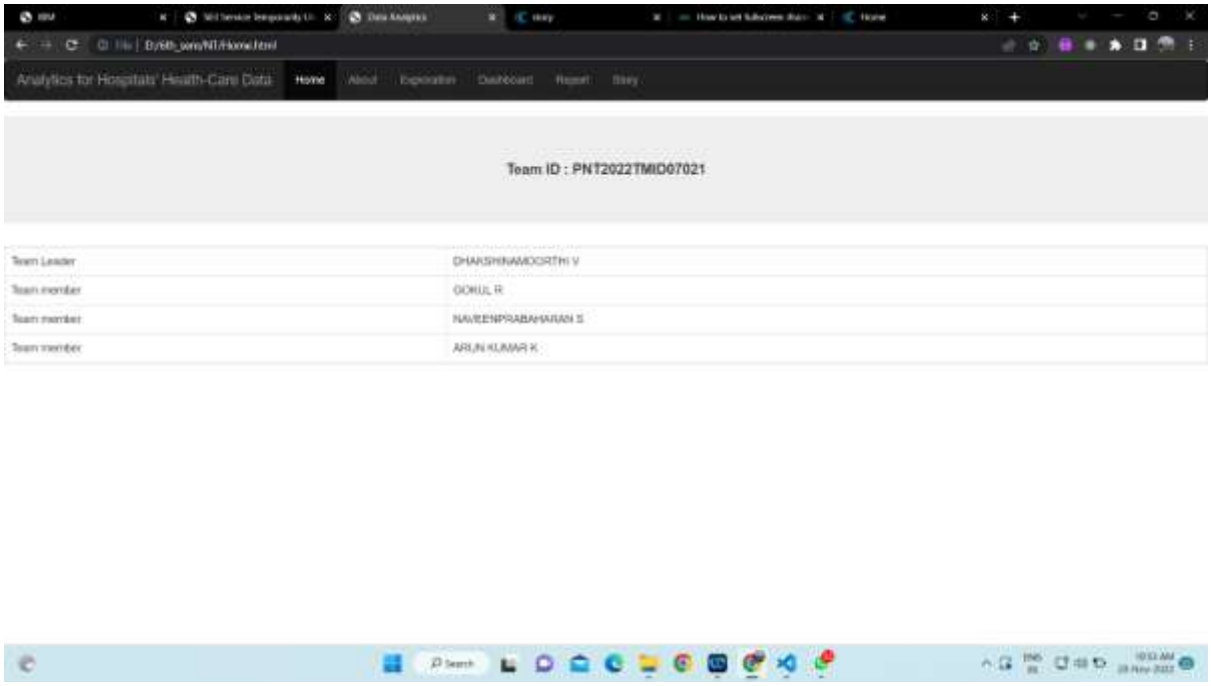
6.Story.html

```
<!DOCTYPE html>
<html lang="en">
<head>
  <title>Data Analytics</title>
  <meta charset="utf-8">
  <meta name="viewport" content="width=device-width, initial-scale=1">
  <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">
  <script
src="https://ajax.googleapis.com/ajax/libs/jquery/3.6.0/jquery.min.js"></scrip
t>
  <script
src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></sc
ript>
  <style>
       iframe {
            margin: 0px;
            padding: 0px;

            border: none;
        }

        iframe {
            display: block;
            width: 100%;
            min-height: 100vh;
            border: none;
            overflow-y: auto;
            overflow-x: hidden;
        }
  </style>
</head>
<body>

<nav class="navbar navbar-inverse">
  <div class="container-fluid">
    <div class="navbar-header">
```

```
      <a class="navbar-brand" href="about.html">Analytics for Hospitals'
Health-Care Data</a>
    </div>
    <ul class="nav navbar-nav">
      <li ><a href="Home.html">Home</a></li>

      <li><a  href="about.html">About</a></li>
      <li><a href="exploration.html">Exploration</a></li>
      <li><a href="dashboard.html">Dashboard</a></li>
      <li><a href="report.html">Report</a></li>
      <li class="active"><a  href="story.html">Story</a></li>
    </ul>
  </div>
</nav>

<iframe
src="https://us1.ca.analytics.ibm.com/bi/?perspective=story&amp;pathRef=.my_fo
lders%2FModel%2Fstory&amp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;u
i_navbar=false&amp;shareMode=embedded&amp;action=view&amp;sceneId=model0000018
490e6a52a_00000000&amp;sceneTime=0" width="100%" height="100%" frameborder="0"
gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>
</body>
</html>
```

OUTPUT :

1.HOME

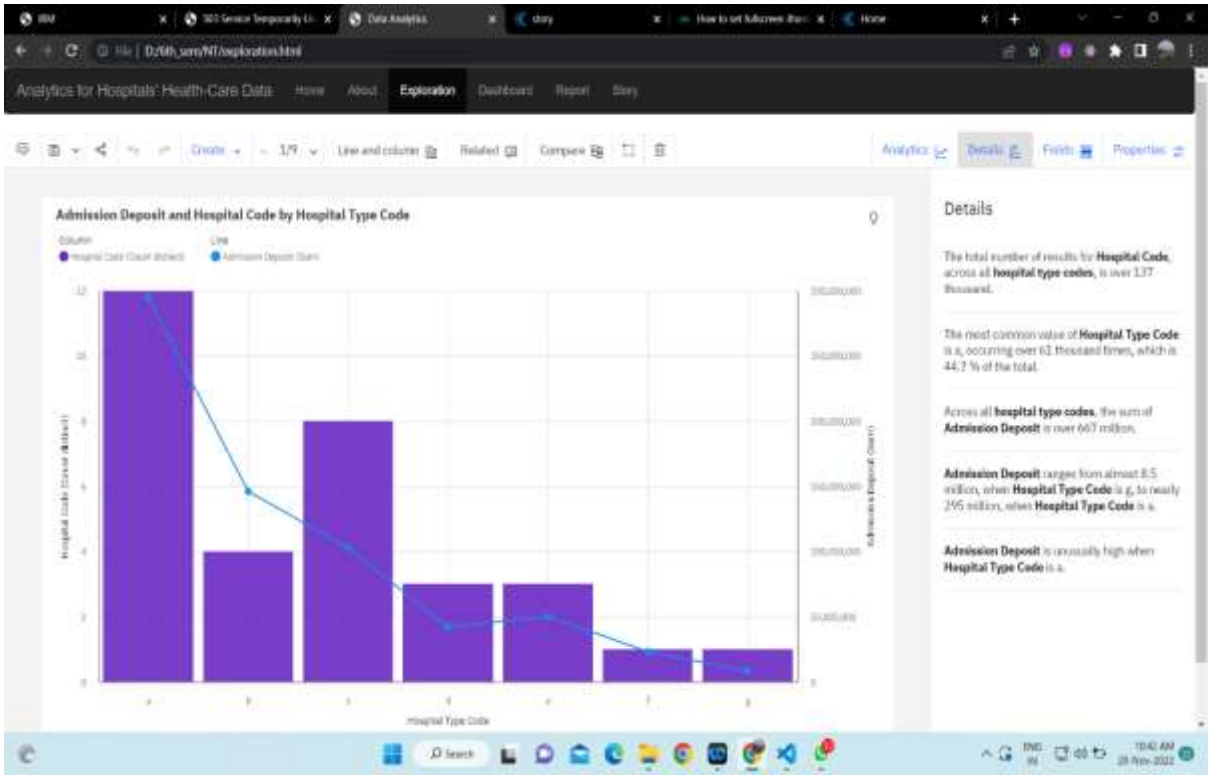


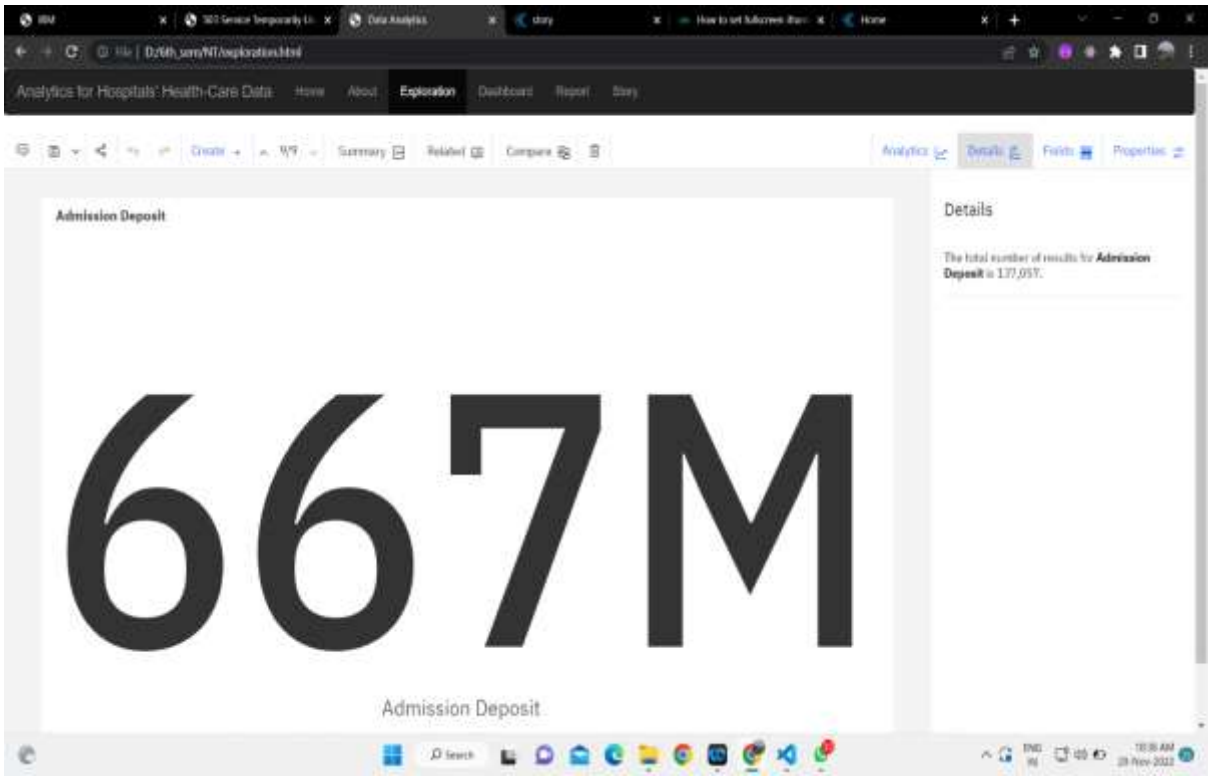
2. ABOUT

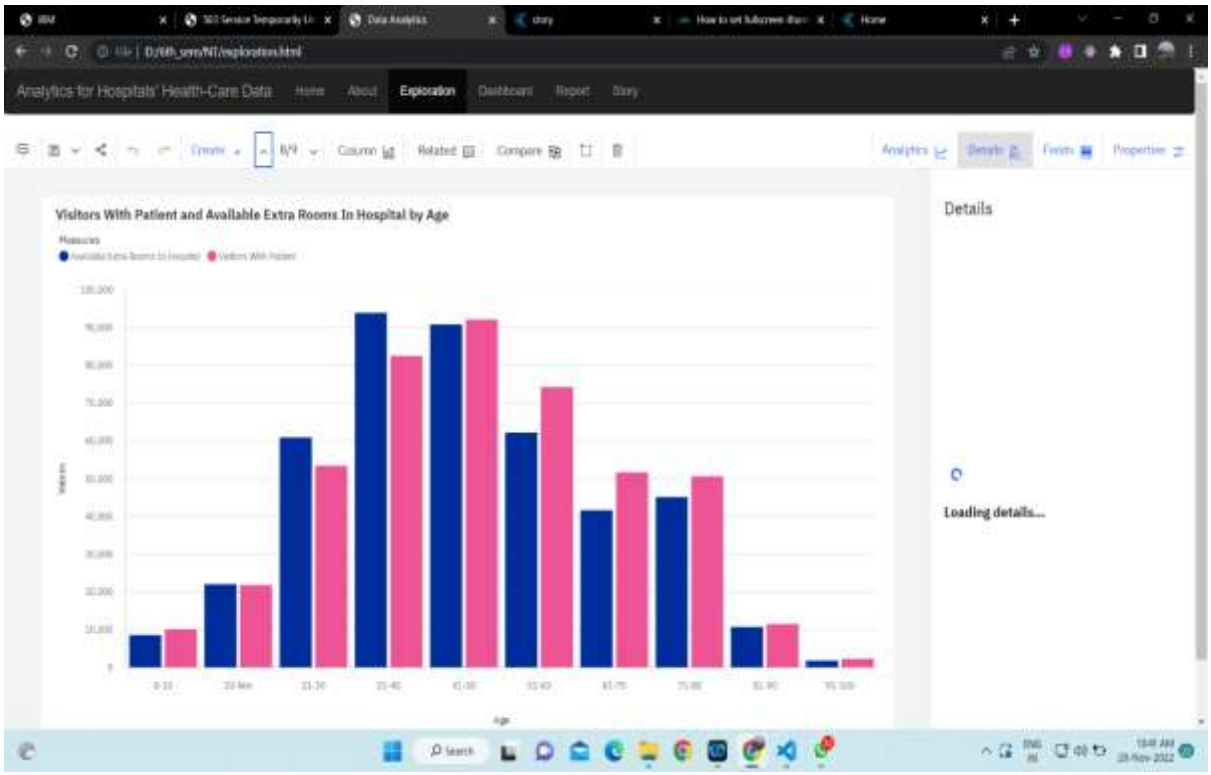

Analytics for Hospitals' Health-Care Data
Home
About
Exploration
Dashboard
Report
Story
Analytics For Hospitals' Health-Care Data
Recent Covid-19 Pandemic has raised alarms over one of the most overlooked areas to focus: Healthcare Management. While healthcare management has various use cases for using 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:

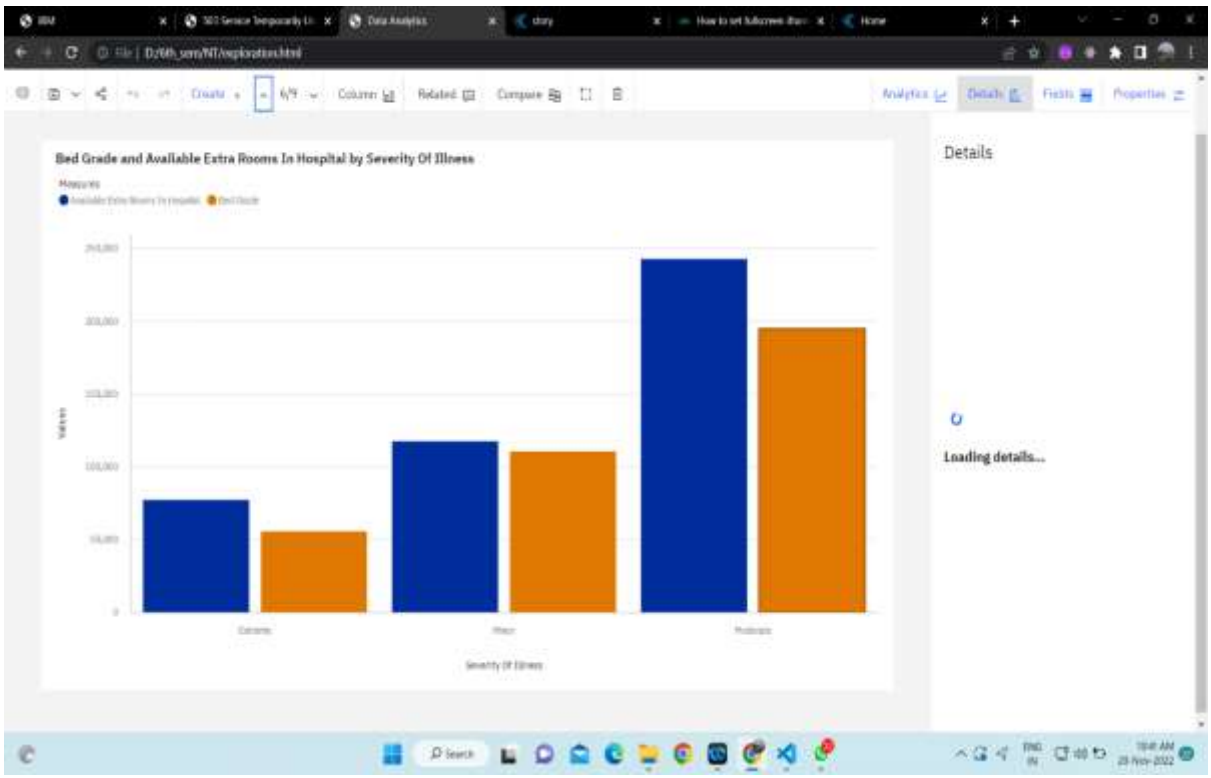

Analytics For Hospitals' Health-Care Data
Recent Covid-19 Pandemic has raised alarms over one of the most overlooked areas to focus: Healthcare Management. While healthcare management has various use cases for using data science, patient length of stay is one critical parameter to observe and predict 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:
IBM
COGNOS

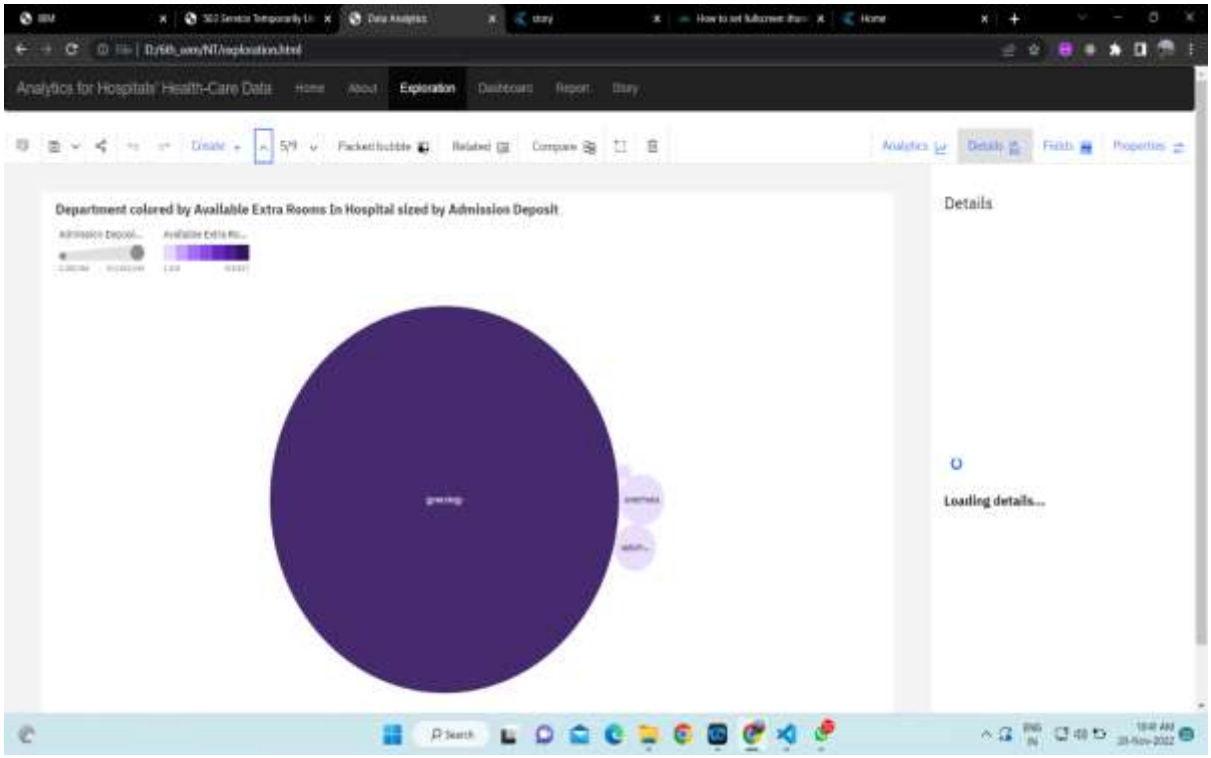
3.EXPLORATION :

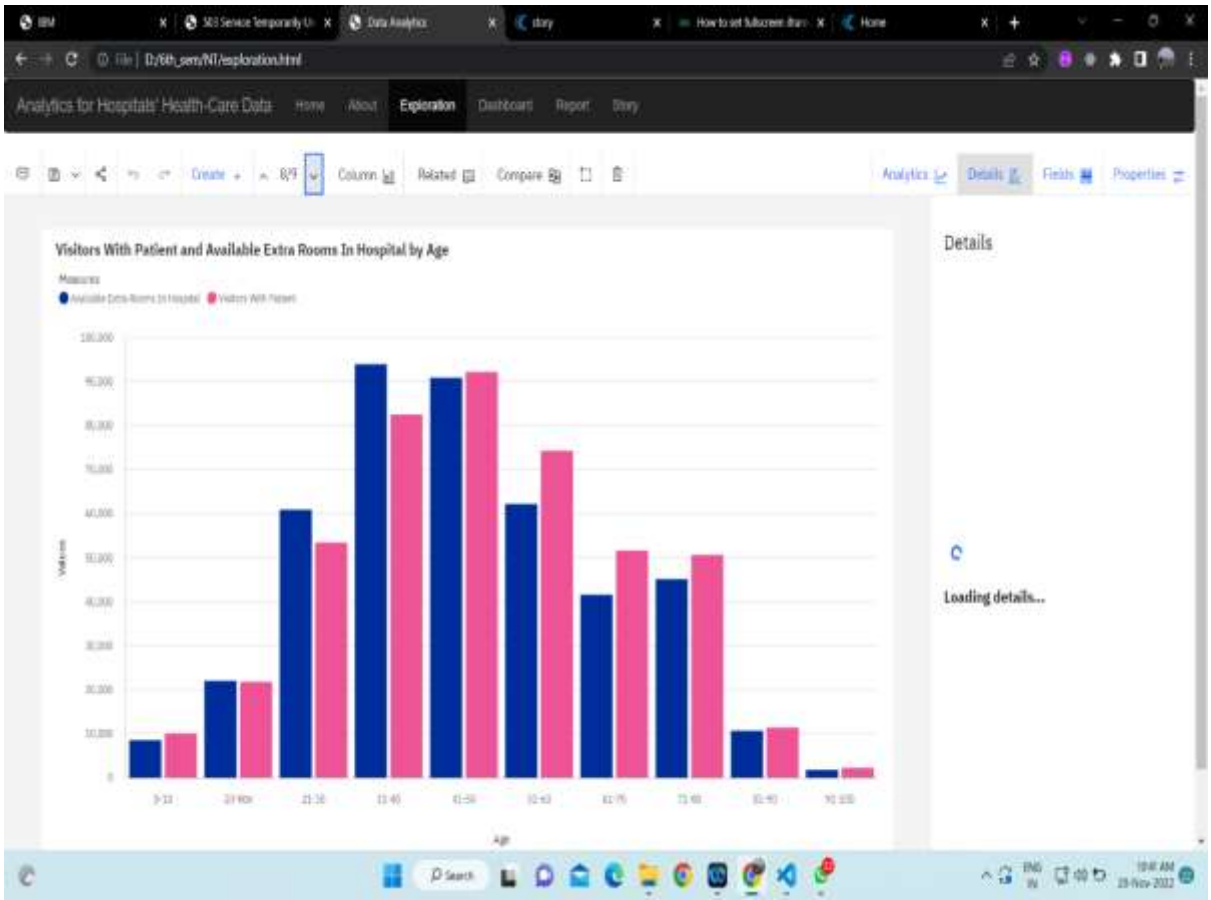


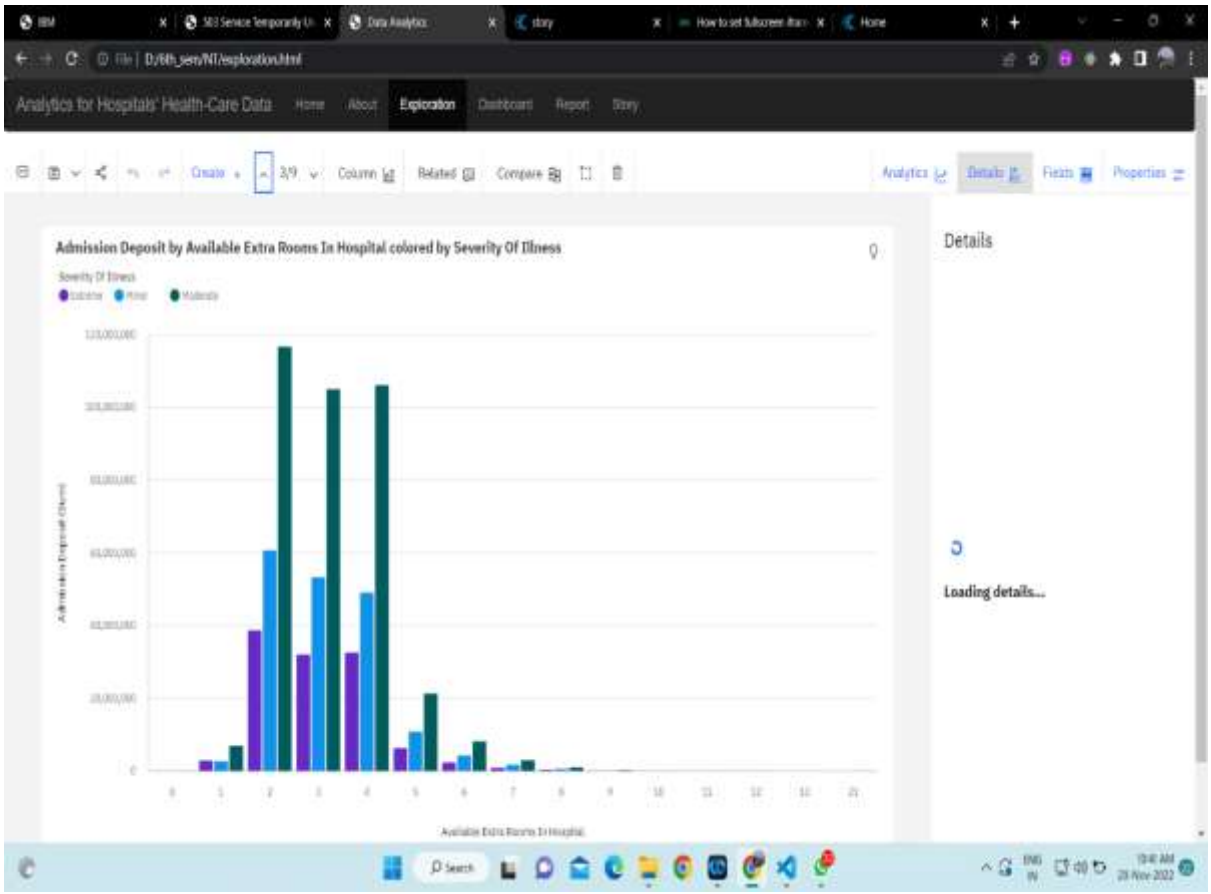



Analytics for Hospitals' Health-Care Data
Home
About
Exploration
Dashboard
Report
Story
Visitors With Patient and Available Extra Rooms In Hospital by Age
Details
Loading details...

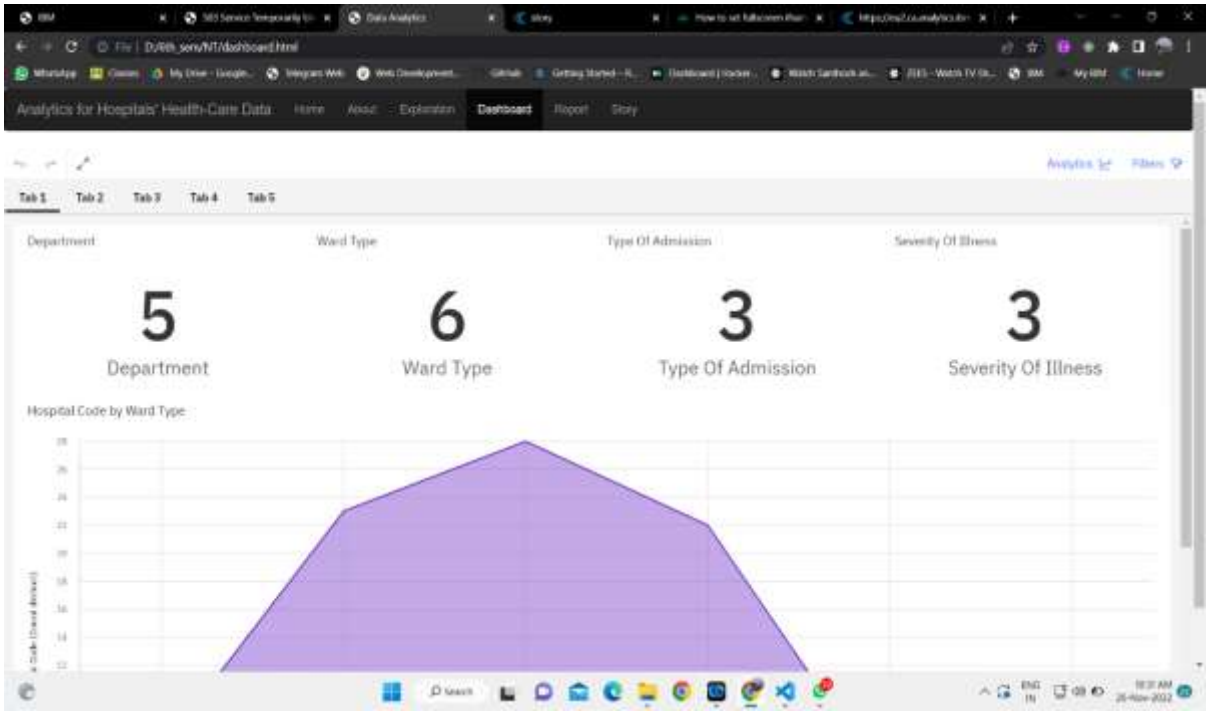

Bed Grade and Available Extra Rooms In Hospital by Severity Of Illness
Details
Loading details...

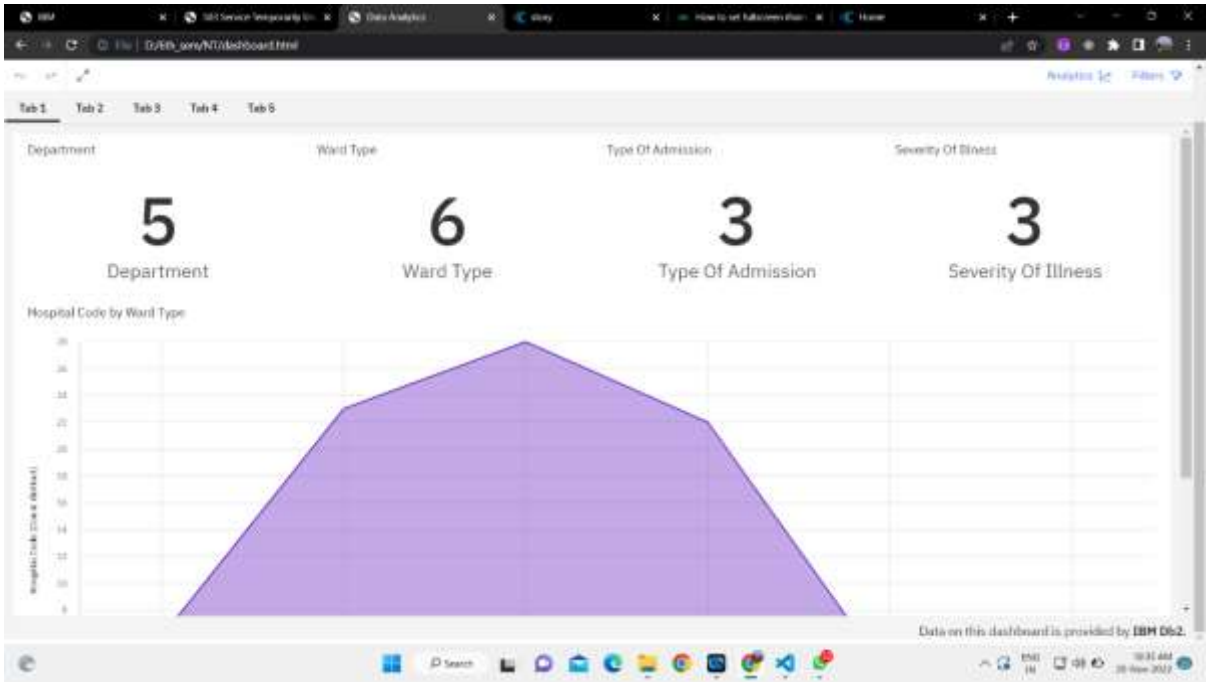

Analytics for Hospitals' Health-Care Data
Home
About
Exploration
Dashboard
Report
Story
Department colored by Available Extra Rooms In Hospital sized by Admission Deposit
Details
Loading details...

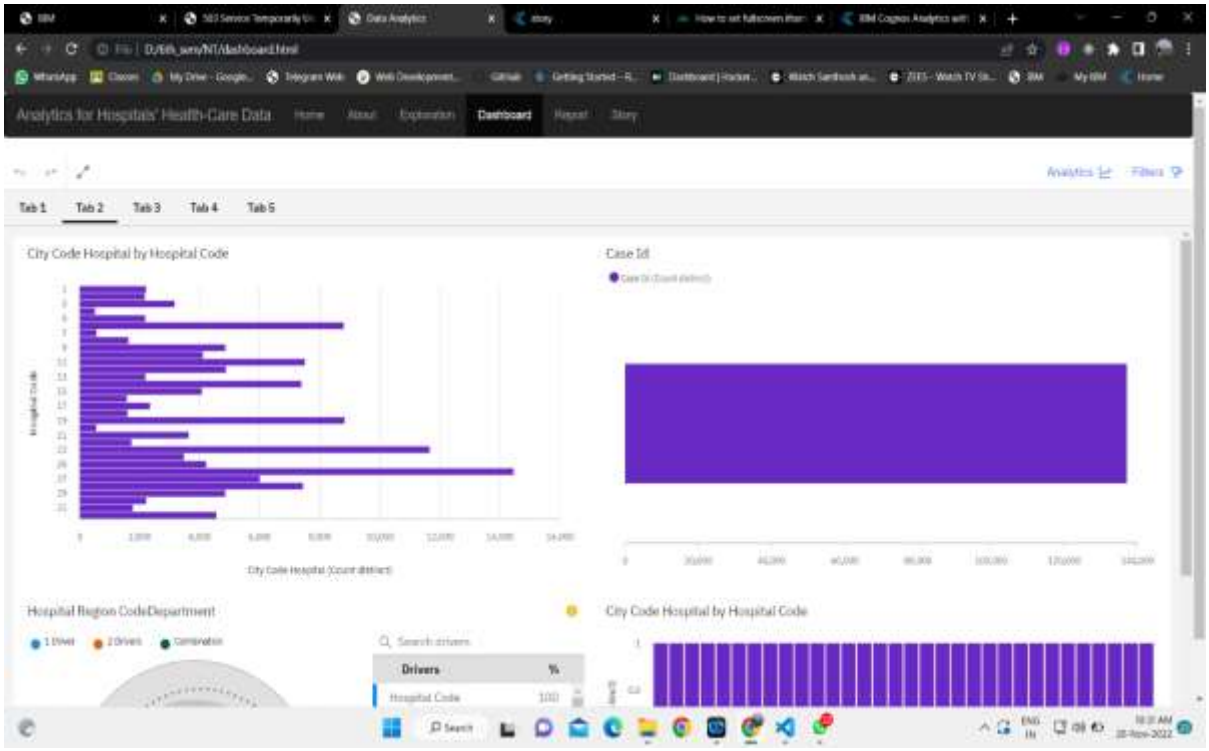

Analytics for Hospitals' Health-Care Data
Home
About
Exploration
Dashboard
Report
Story
Visitors With Patient and Available Extra Rooms In Hospital by Age
Details
Loading details...

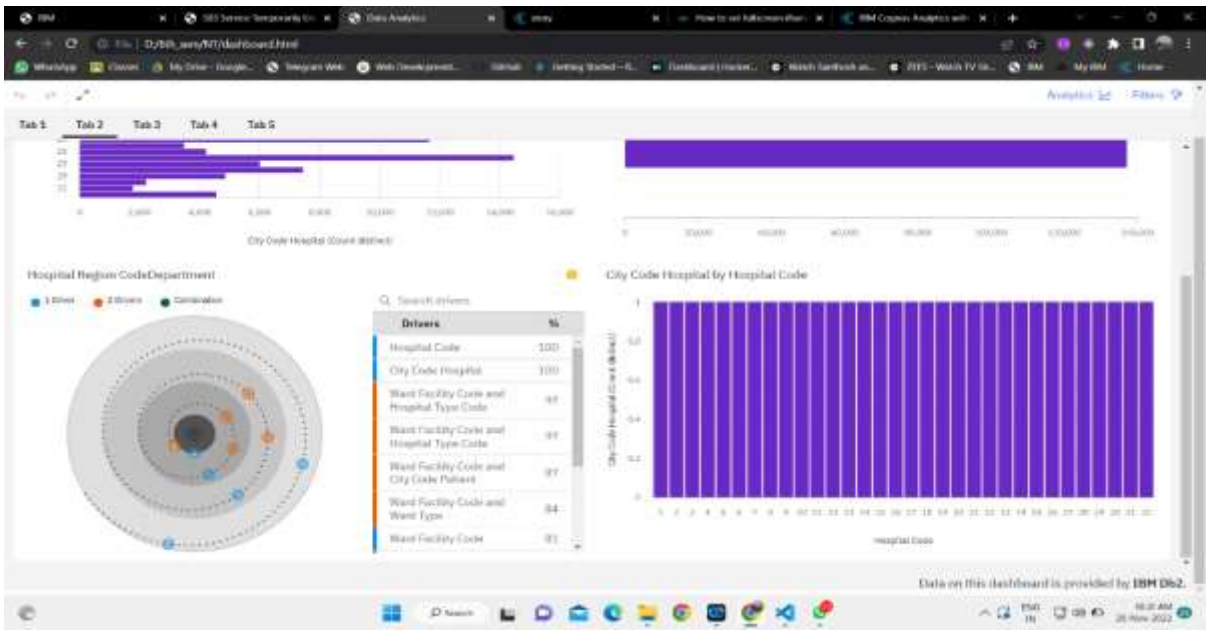

Analytics for Hospitals' Health-Care Data
Home
About
Exploration
Dashboard
Report
Story
Admission Deposit by Available Extra Rooms In Hospital colored by Severity Of Illness
Details
Loading details...

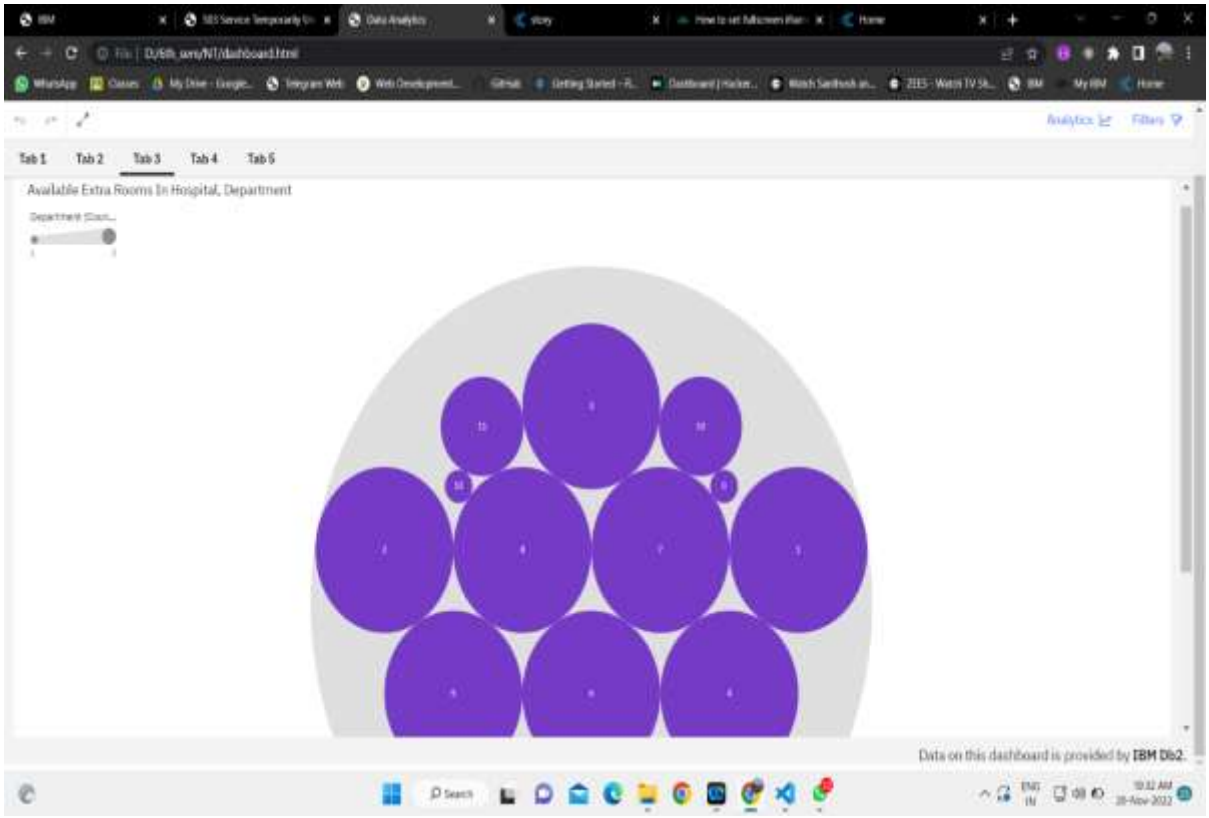
4. DASHBOARD :

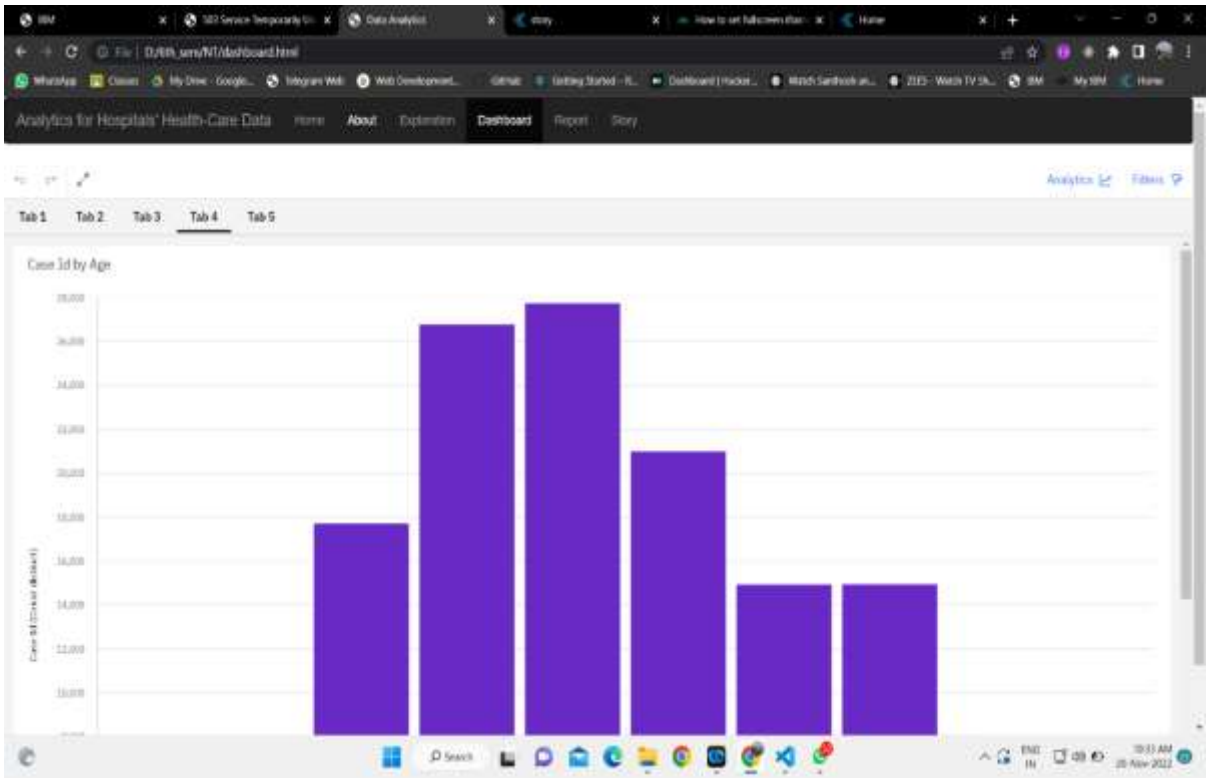

Analytics for Hospitals' Health-Care Data
Home
About
Exploration
Dashboard
Report
Story
Tab 1
Tab 2
Tab 3
Tab 4
Tab 5
Department
Ward Type
Type Of Admission
Severity Of Illness
5
Department
6
Ward Type
3
Type Of Admission
3
Severity Of Illness
Hospital Code by Ward Type

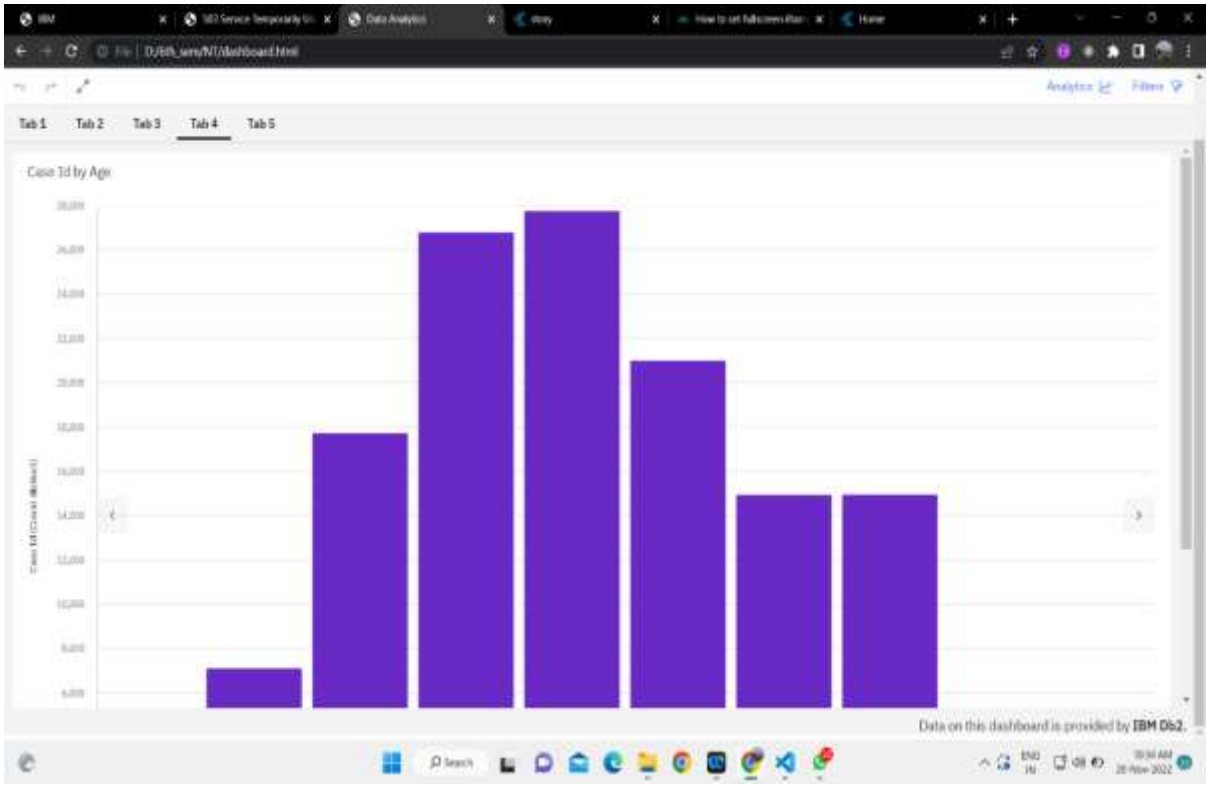

Tab 1
Tab 2
Tab 3
Tab 4
Tab 5
Department
Ward Type
Type Of Admission
Severity Of Illness
5
Department
6
Ward Type
3
Type Of Admission
3
Severity Of Illness
Hospital Code by Ward Type
Data on this dashboard is provided by IBM Db2.

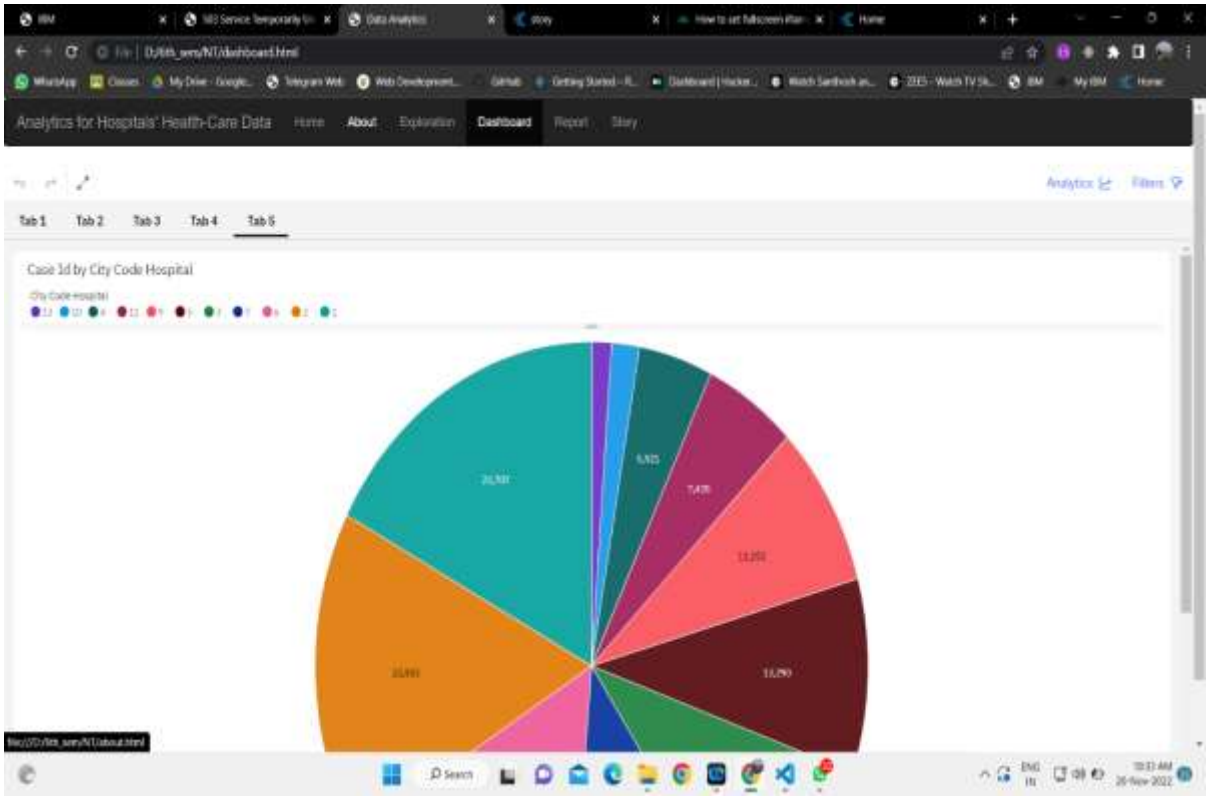

Analytics for Hospitals' Health-Care Data
Home
About
Exploration
Dashboard
Report
Story
Tab 1
Tab 2
Tab 3
Tab 4
Tab 5
City Code Hospital by Hospital Code
Case Id
Hospital Region CodeDepartment
City Code Hospital by Hospital Code
Drivers
%

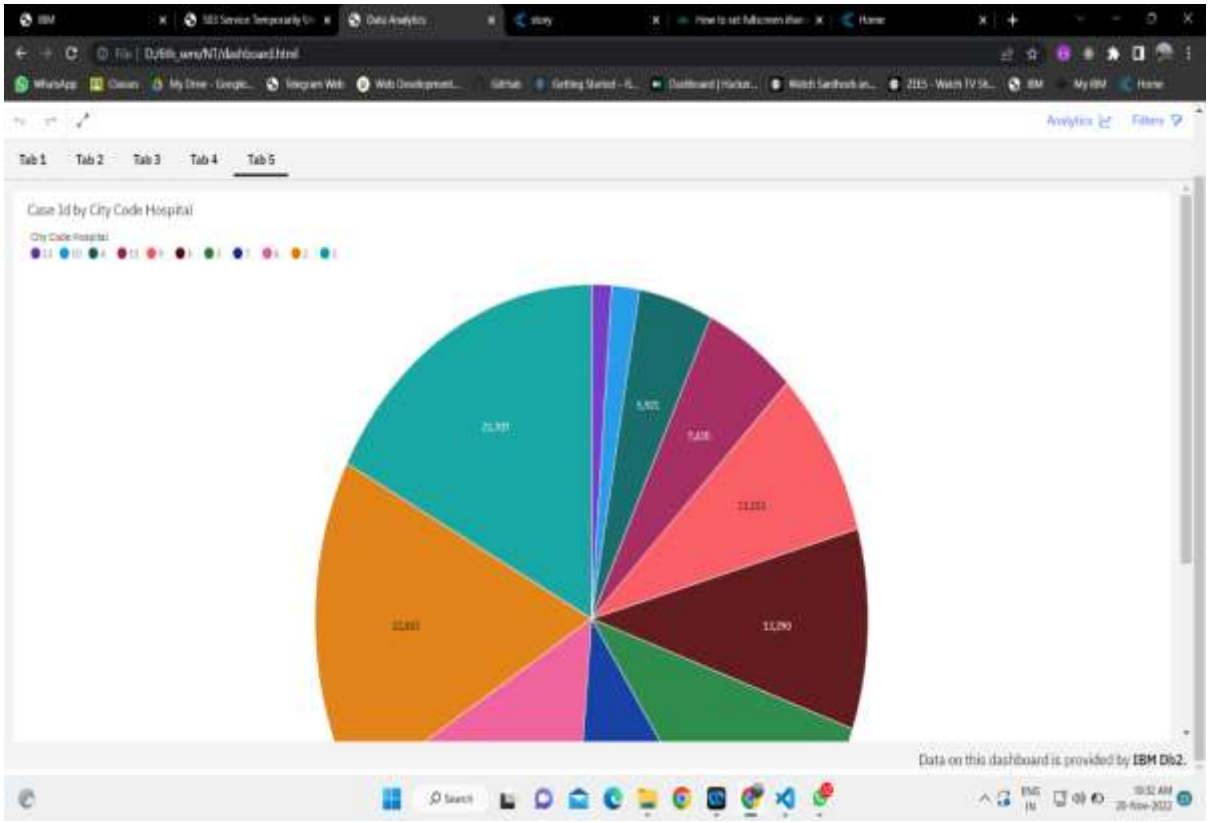

Tab 1
Tab 2
Tab 3
Tab 4
Tab 5
Hospital Region CodeDepartment
City Code Hospital by Hospital Code
Drivers
%
Data on this dashboard is provided by IBM Db2.


Tab 1
Tab 2
Tab 3
Tab 4
Tab 5
Available Extra Rooms In Hospital, Department
Data on this dashboard is provided by IBM Db2.

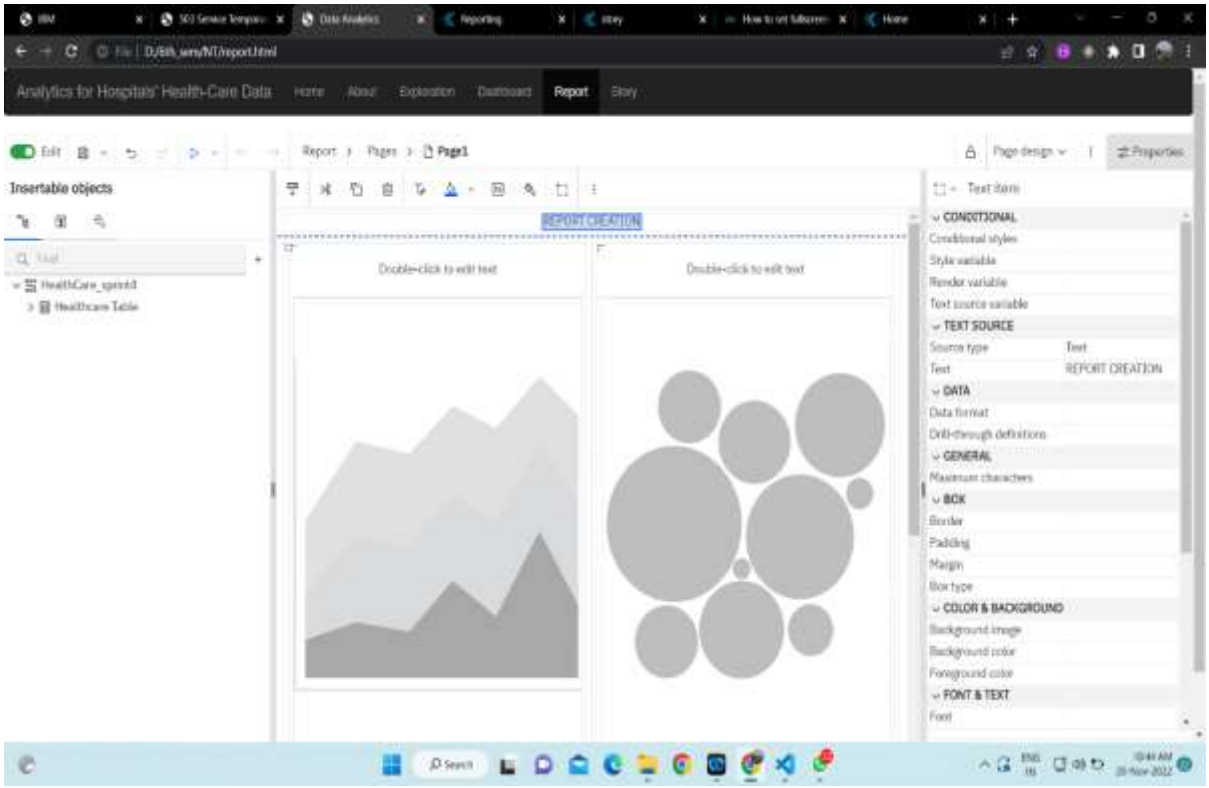

Analytics for Hospitals' Health-Care Data
Home
About
Exploration
Dashboard
Report
Story
Tab 1
Tab 2
Tab 3
Tab 4
Tab 5
Case Id by Age

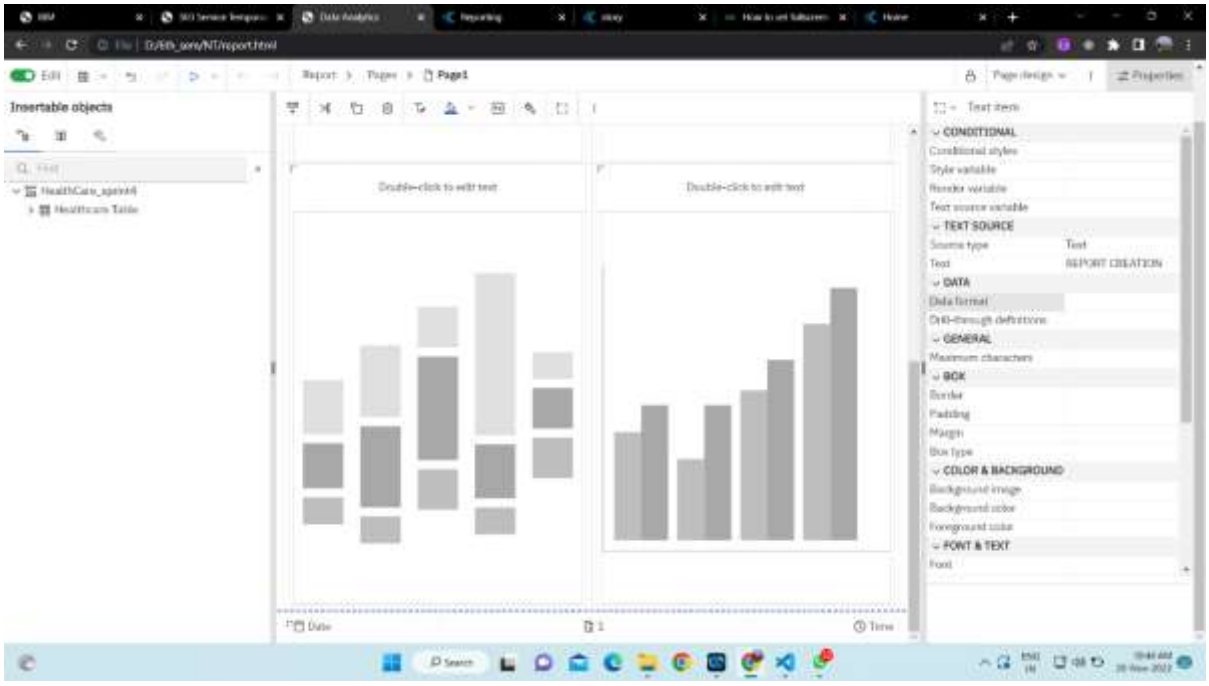

Tab 1
Tab 2
Tab 3
Tab 4
Tab 5
Case 1d by Age
Data on this dashboard is provided by IBM Db2.

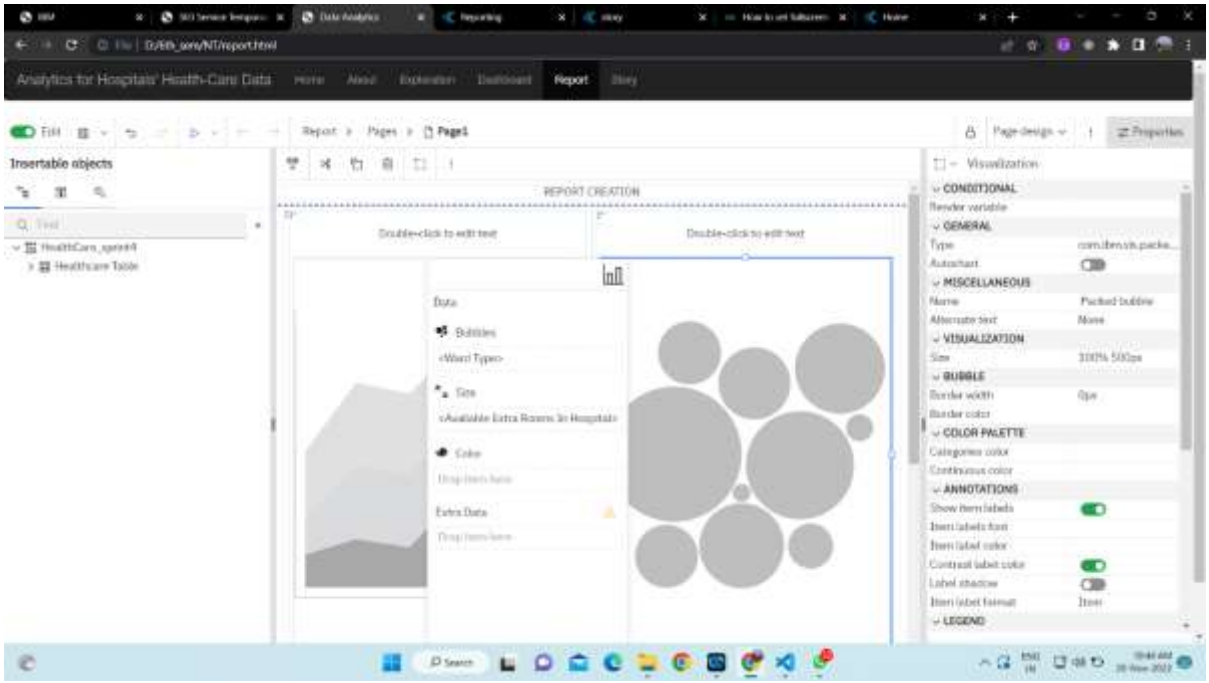

Analytics for Hospitals' Health-Care Data
Home
About
Exploration
Dashboard
Report
Story
Tab 1
Tab 2
Tab 3
Tab 4
Tab 5
Case 1d by City Code Hospital

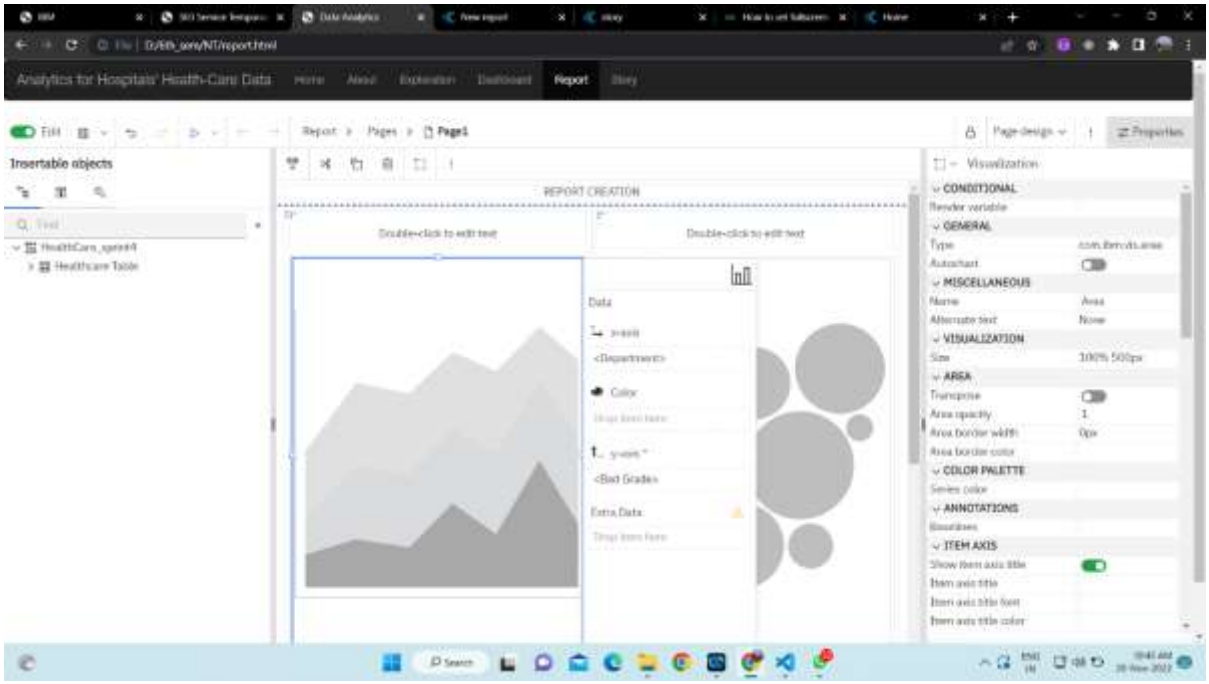

Tab 1
Tab 2
Tab 3
Tab 4
Tab 5
Case 1d by City Code Hospital
City Code Hospital
Data on this dashboard is provided by IBM Db2.

5. REPORT CREATION :

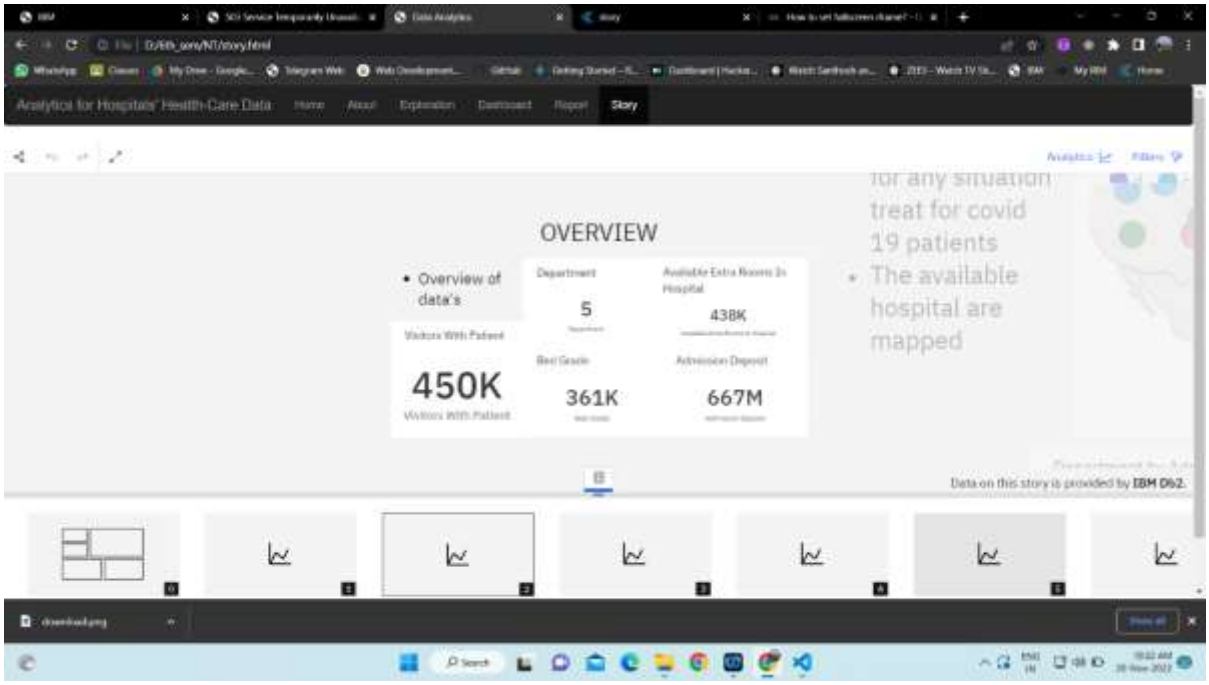


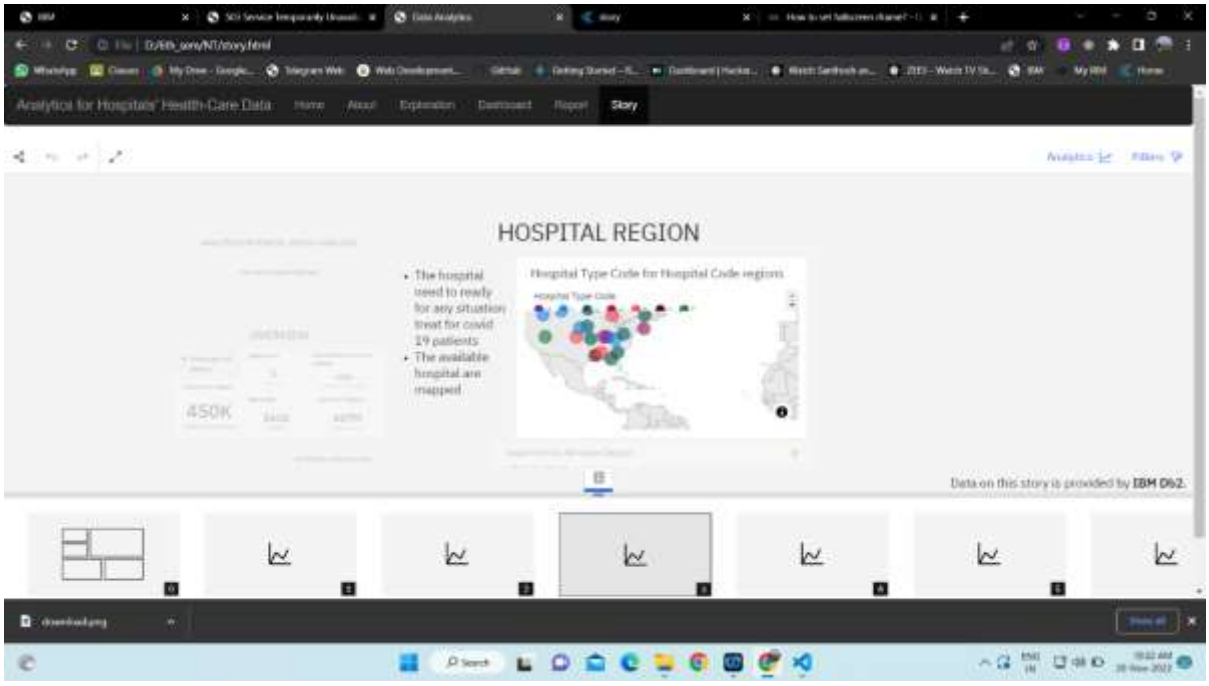


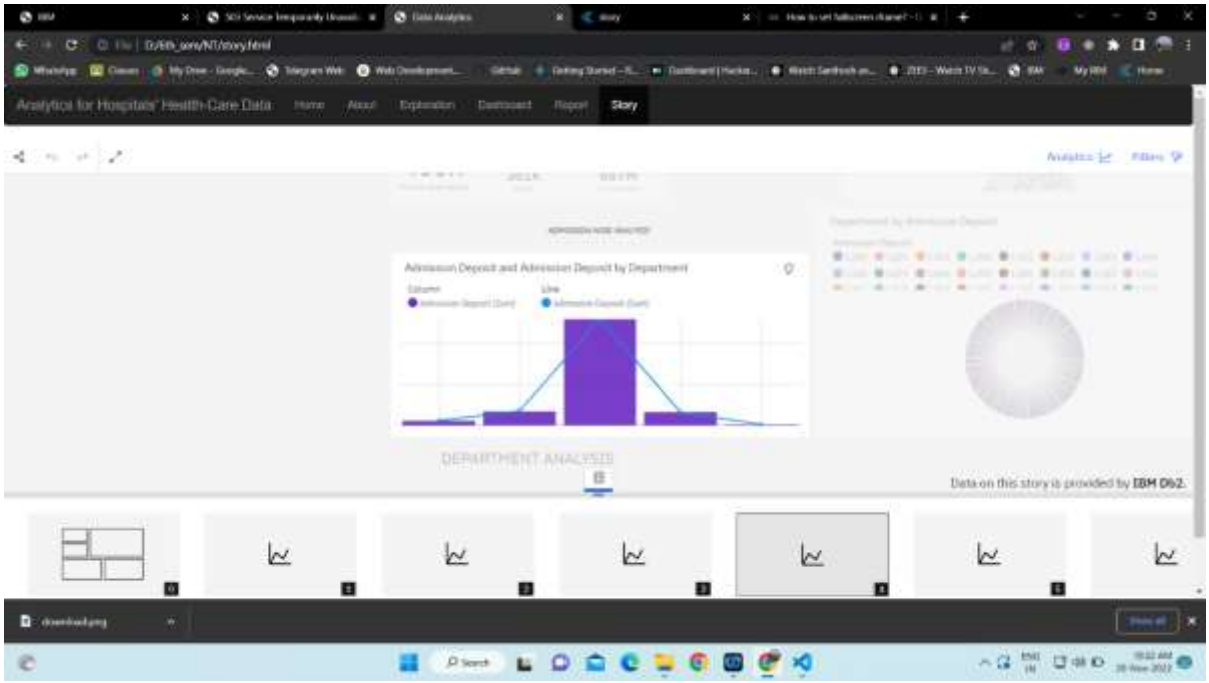

Analytics for Hospitals' Health-Care Data
Home
About
Exploration
Dashboard
Report
Story
Insertable objects
REPORT CREATION
Double-click to edit text
Visualization
CONDITIONAL
GENERAL
MISCELLANEOUS
VISUALIZATION
BUBBLE
COLOR PALETTE
ANNOTATIONS
LEGEND

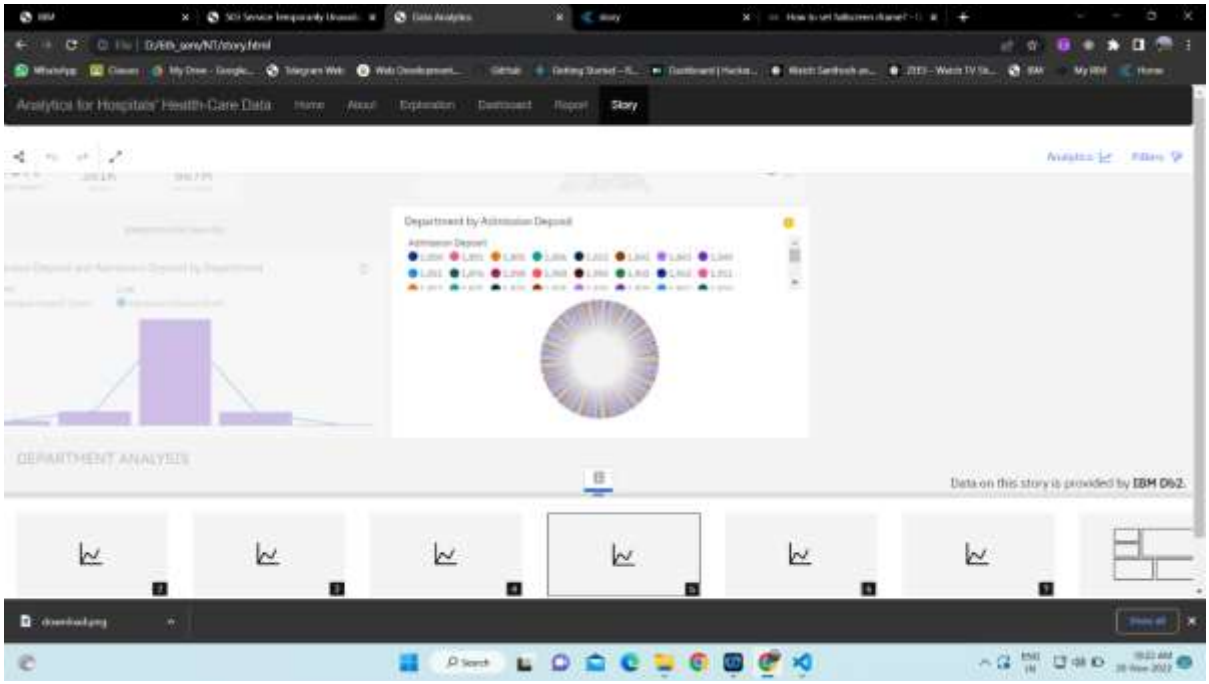

Analytics for Hospitals' Health-Care Data
Home
About
Exploration
Dashboard
Report
Story
Insertable objects
REPORT CREATION
Double-click to edit text
Visualization
CONDITIONAL
GENERAL
MISCELLANEOUS
VISUALIZATION
AREA
COLOR PALETTE
ANNOTATIONS
ITEM AXIS

6. STORY CREATION :






Analytics for Hospitals' Health-Care Data
Home
About
Exploration
Dashboard
Report
Story
Admission Deposit and Admission Deposit by Department
DEPARTMENT ANALYSIS
Data on this story is provided by IBM Db2.


Analytics for Hospitals' Health-Care Data
Home
About
Exploration
Dashboard
Report
Story
Department by Admission Deposit
DEPARTMENT ANALYSIS
Data on this story is provided by IBM Db2.