ADHIYAMAAN COLLEGE OF ENGINEERING

DR. M.G.R NAGAR, HOSUR-635130

TEAM ID : PNT2022TMID07957

A MINI PROJECT REPORT

ANALYTICS FOR HOSPITAL'S HEALTH-CARE DATA

Submitted by

JAYAKEERTHANA R	**(AC19UCS040)**
DHANUSHYA M	**(AC19UCS024)**
GAYATHRI S	**(AC19UCS030)**
NAVEENKUMAR S	**(AC19UCS077)**

In partial fulfilment for the award of the degree

of

BACHELOR OF ENGINEERING

In

COMPUTER SCIENCE AND ENGINEERING

ADHIYAMAAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

DR. M.G.R NAGAR, HOSUR-635130

ANNA UNIVERSITY: CHENNAI 600025

NOVEMBER 2022

ANNA UNIVERSITY: CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this mini project report **"ANALYTICS FOR HOSPITALS' HEALTH-CARE DATA"** is the bonafide work of **""** who carried out the project under my supervision.

SIGNATURE

Dr.G.FATHIMA, M.E.,ph.D.

HEAD OF THE DEPARTMENT

PROFESSOR,

Department of CSE,

Adhiyamaan College of Engineering

(Autonomous)

Dr. M.G.R. Nagar,

Hosur – 635 130.

SIGNATURE

Dr.M.LILLY FLORENCE,M.Tech

.,ph.D.

PROFESSOR,

Department of CSE,

Adhiyamaan College of Engineering

(Autonomous)

Dr. M.G.R. Nagar,

Hosur – 635 130.

Submitted for the Mini project VIVA-VOCE Examination held on_____at **Adhiyamaan College of Engineering (Autonomous), Hosur-635 130.**

INTERNAL EXAMINER **EXTERNAL EXAMINER**

TABLE OF CONTENT

CHAPTER 1

INTRODUCTION

1.1 PROJECT OVERVIEW

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

1.2 PURPOSE

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.

a) Length of stay for each Case of Patients.
b) Stay by patient ID using Column Chart.
c) Severity of illness by Patient-ID using Tree Map.
d) Age, Department wise patient using Table.
e) Room availability by Pie Chart.
f) Dashboard Creation.
g) Department wise no. of Admissions by Waterfall Chart.

CHAPTER 2

LITERATURE SURVEY

2.1 EXISTING SOLUTION

A dashboard solution for a private practice enables private practitioners and clinicians to optimize resource allocation and improve the standards of the quality of care they deliver. Typically, it includes KPIs such as patient satisfaction and average time spent per consultation and aims to find ways to drive patient engagement and increase profitability.

USES

-Helps to view patient's information within a fraction of seconds.

-Personal care.

Advantage: saves time, can minimize spreading of infections to others, personalized care.

Disadvantage: The main disadvantage is Heterogenous data**.**

2.2 REFERENCES

1. Smart Healthcare System using big Data analytics(2022).

In this paper,it gives a review on Big Data technologies,big data analytics, its implementation and challenges in making a smart healthcare system.

Tools: Apache Hadoop,Tableau.

Technology: Big Data analytics

Advantages:-Automation of hospital administrative process.

-Acurate calculation of health insurance rates.

Disadvantages:-Lots of big data is unstructured.

-High cost to store more data.

2.Development of the health information analytics Dashboard using big data analytics(2020).

In this paper,they have created a dashboard that contains health information of the patients.

Technology:Big Data analytics

Advantage:-Health information dashboard can improve the ability of health service facilities.

3. Concurrence of big data analytics and healthcare(2018)

The application of big data analytics in healthcare has immense potential for improving the quality of care,reducing waste and error and reducing the cost of care.

Technology: Big Data analytics

Advantage:-Big data analytics helps in understanding and targeting customers.

-It helps in optimizing business processes.

Disadvantage: -It needs to be analyzed for longer duration to leverage its benefits.

4.Systematic perspective on the applications of big Data analytics in healthcare management(2018).

The exponential growth in the data collected in the form of electronic healthrecords,wear able sensors has bought revolution. Software integration platform and messaging system.

Technology: Big Data analytics

Advantage:-Increase productivity.

-Reducing cost.

Disadvantage:-Speedy updates in big data can mismatch real figure.

2.3 PROBLEM STATEMENT DEFINITION

Customer Problem Statement

A well articulated customer problem statement allows us to find the ideal solution for the challenges our customers face. Throughout the process you will also be able to empathize with your customer which helps you understand how they perceive your service.

Problem Statements:

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	Hospital Management	Predict how long the patient will stay in the hospital.	It is difficult to predict the stay of patients all the time.	It takes a lot of time to do it manually.	Frustrated to wait till the complete.
PS-2	Hospital Management	Predict how long the patient will stay in the hospital.	It is difficult to predict the stay of patients all the time.	It requires a lot of staffs.	Dependent on them all the time.

CHAPTER 3

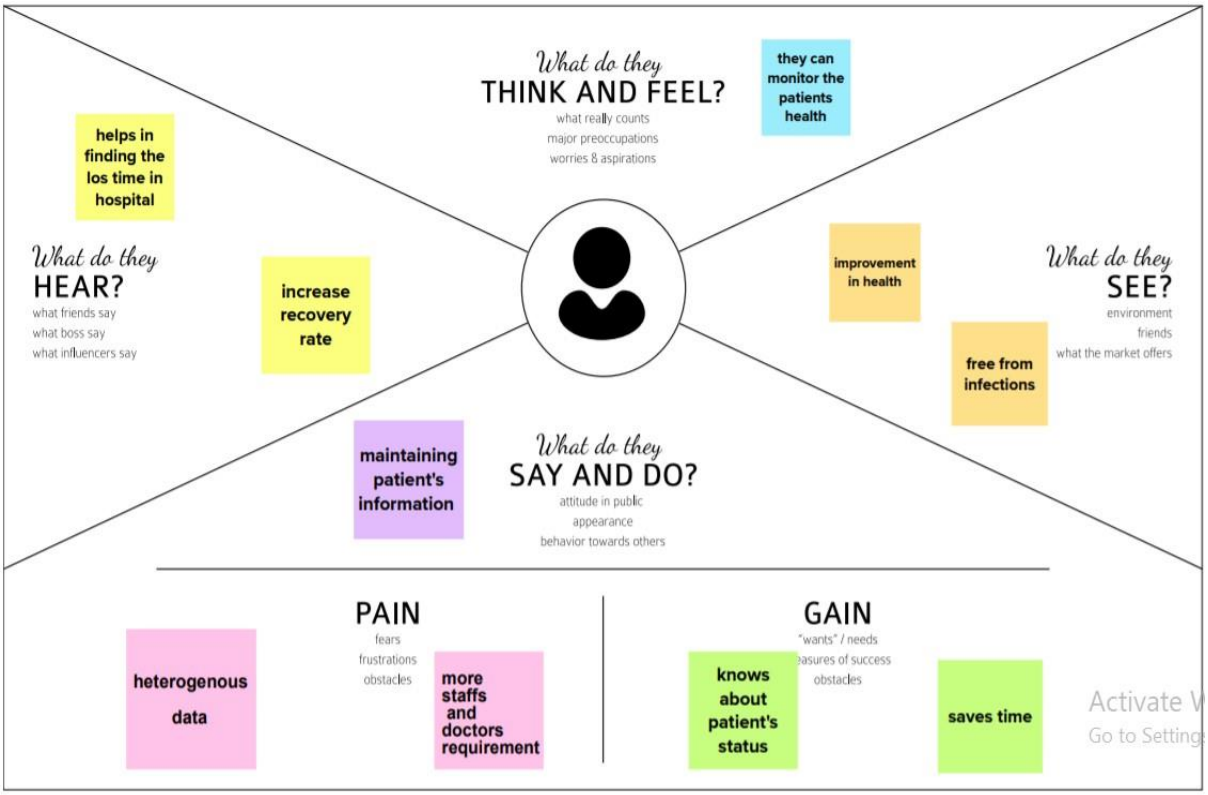
IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS

Empathy map canvas:

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes.

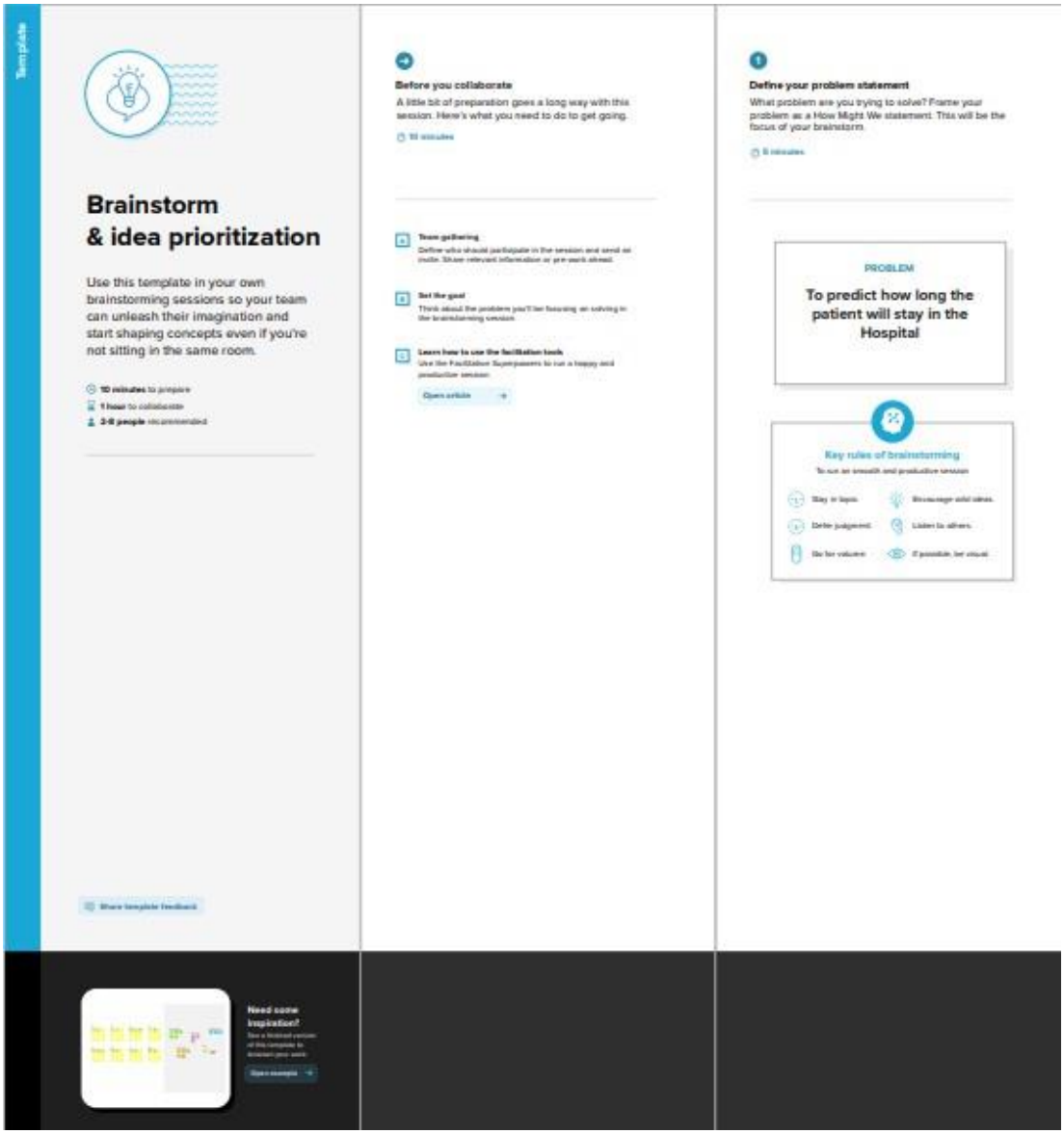
It is a useful tool to helps teams better understand their users. Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.



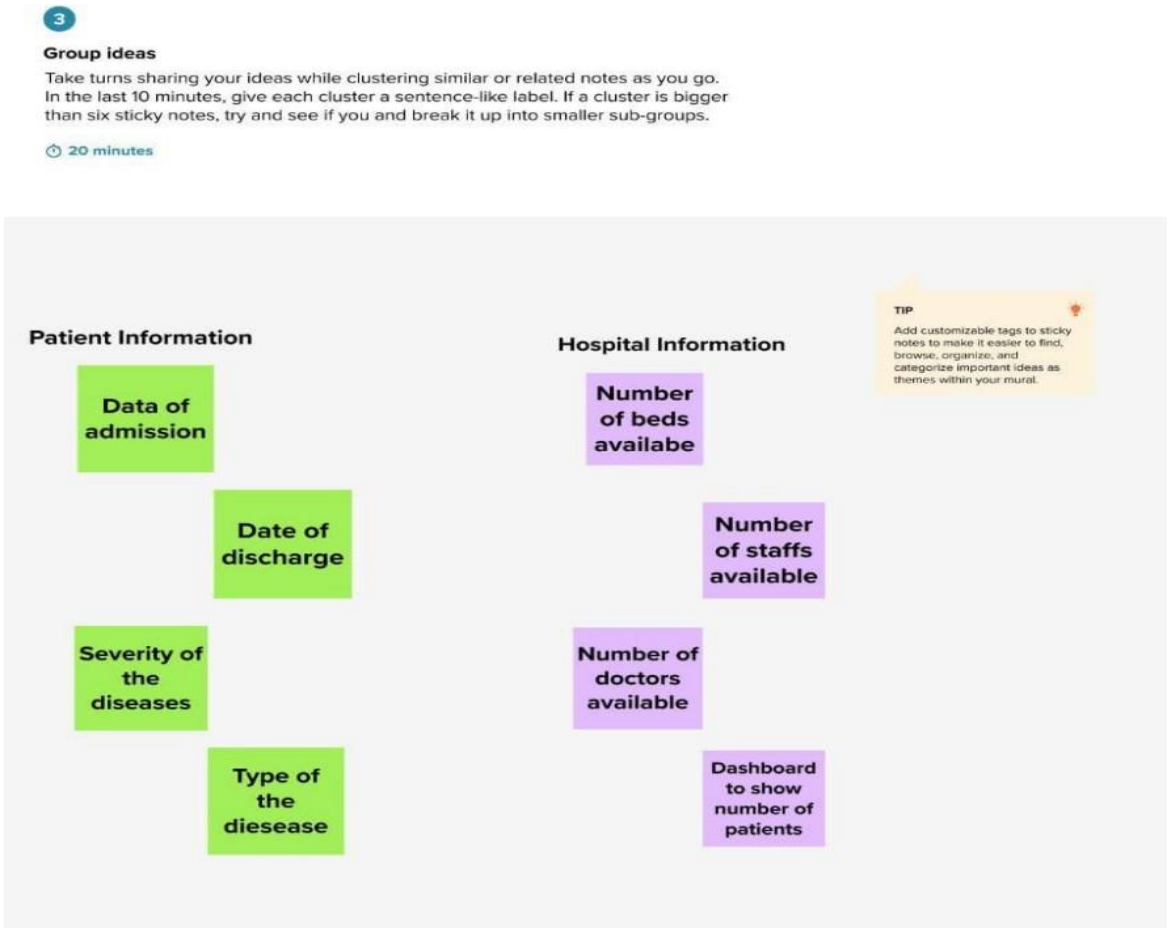
3.2 Brainstorm & Idea Prioritization Template:

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the 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 amount of creative solutions. Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

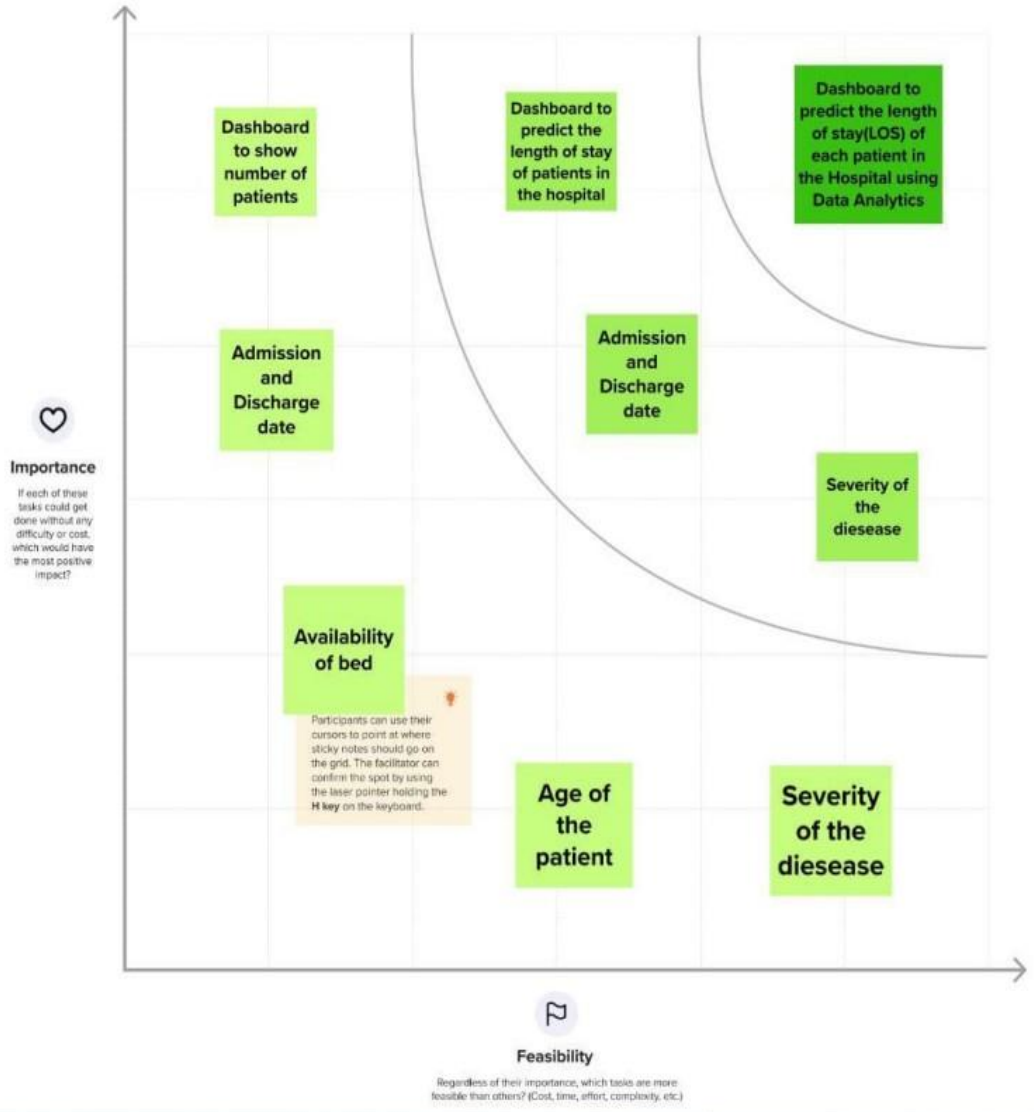
Step-1: Team Gathering, Collaboration and Select the Problem Statement



Step-2: Brainstorm, Idea Listing and Grouping



Step 3: idea prioritization


Dashboard to show number of patients
Dashboard to predict the length of stay of patients in the hospital
Dashboard to predict the length of stay(LOS) of each patient in the Hospital using Data Analytics
Admission and Discharge date
Admission and Discharge date
Severity of the diesease
Availability of bed
Participants can use their cursors to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the laser pointer holding the H key on the keyboard.
Age of the patient
Severity of the diesease
Importance
If each of these tasks could get done without any difficulty or cost, which would have the most positive impact?
Feasibility
Regardless of their importance, which tasks are more feasible than others? (Cost, time, effort, complexity, etc.)

3.3 PROPOSED SOLUTION

S.NO	Parameter	Description
1.	Problem Statement (Problem to be solved)	To predict (LOS) how long the patient will stay in the Hospital.
2.	Idea / Solution description	• 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 LOSrisk (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.
3.	Novelty / Uniqueness	In this project, we will create a dashboard that contain prediction about how long the patient will stay in the hospital.
4.	Social Impact / Customer Satisfaction	• Access to primary healthcare • Less casualty.
5.	Business Model (Revenue Model)	• Pharmacy companies will sell their medical products to generate more revenue. • Insurance companies will sell their health policies to needed people.
6.	Scalability of the Solution	Prior knowledge of LOS can aid in logistics such as room and bed allocation planning.

3.4 PROBLEM SOLUTION FIT

The Problem-Solution Fit simply means that you have found a problem with your customer and thatthe solution you have realized for it actually solves the customer's problem. It helps entrepreneurs, marketers and corporate innovators identify behavioral patterns and recognize what would work and why.

PURPOSE OF SOLUTON FIT:

- Solve complex problems in a way that fits the state of your customers.
- Succeed faster and increase your solution adoption by tapping into existing mediums andchannels of behavior.
- Sharpen your communication and marketing strategy with the right triggers and messaging.
- Increase touch-points with your company by finding the right problembehavior fit andbuilding trust by solving frequent annoyances, or urgent or costly problems.
- Understand the existing situation in order to improve it for your target group.

CHAPTER 4

REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

FR no	Functional requirement (epic)	Sub Requirement (story/sub-task)
FR-1	Registration process of SRS(Software Requirements Specification)	Adding Patients: The Hospital Management enables the staff at the front desk to include new patients in the system.
FR-2	Check Out of SRS:	Deleting Patient ID: The staff in the administration section of the ward can delete the patient ID from the system when the patient checkout from the hospital.
FR-3	Report Generation of SRS:	Information of the Patient: 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.
FR-4	Database of SRS:	Mandatory Patient Information: 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.

4.2 NON-FUNCTIONAL REQUIREMENTS

NFR No	Non-Functional Requirement	Description
NFR-1	Security	●Patient Identification: The system needs the patient to recognize herself or himself using the phone. ● Logon ID: Any users who make use of the system need to hold a Logon ID and password. ● Modifications: Any modifications like insert, delete, update, etc. for the database can be synchronized quickly and executed only by the ward administrator.
NFR-2	Performance	●Response Time: The system provides acknowledgment in just one second

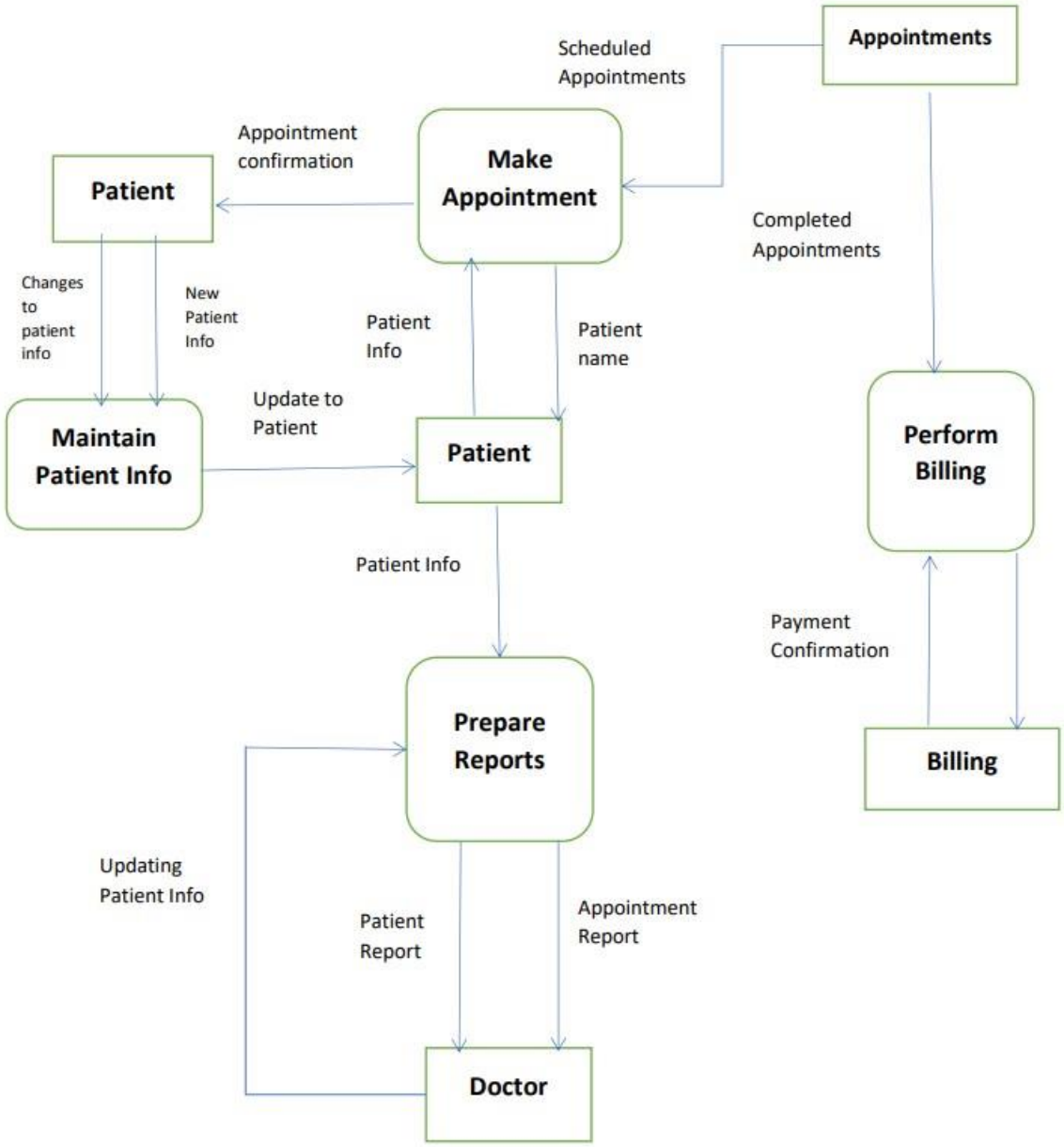
		once the 'patient's information is checked.
NFR-3	Capacity	The system needs to support at least 1000 people at once. Maintainability ● Back-Up: The system offers efficiency for data backup. ● Errors: The system will track every mistake as well as keep a log of it.
NFR-4	Errors	● Availability: The system is available all the time

CHAPTER 5

PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.



5.2 SOLUTION & TECHNICAL ARCHITECTURE

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

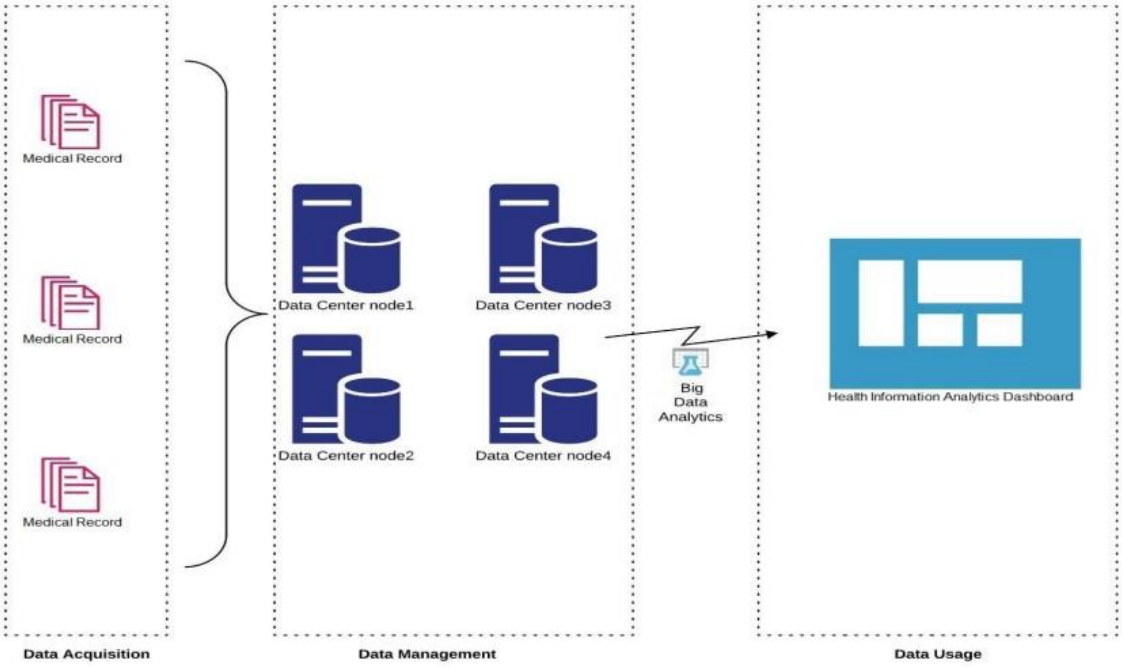
Its goals are to:

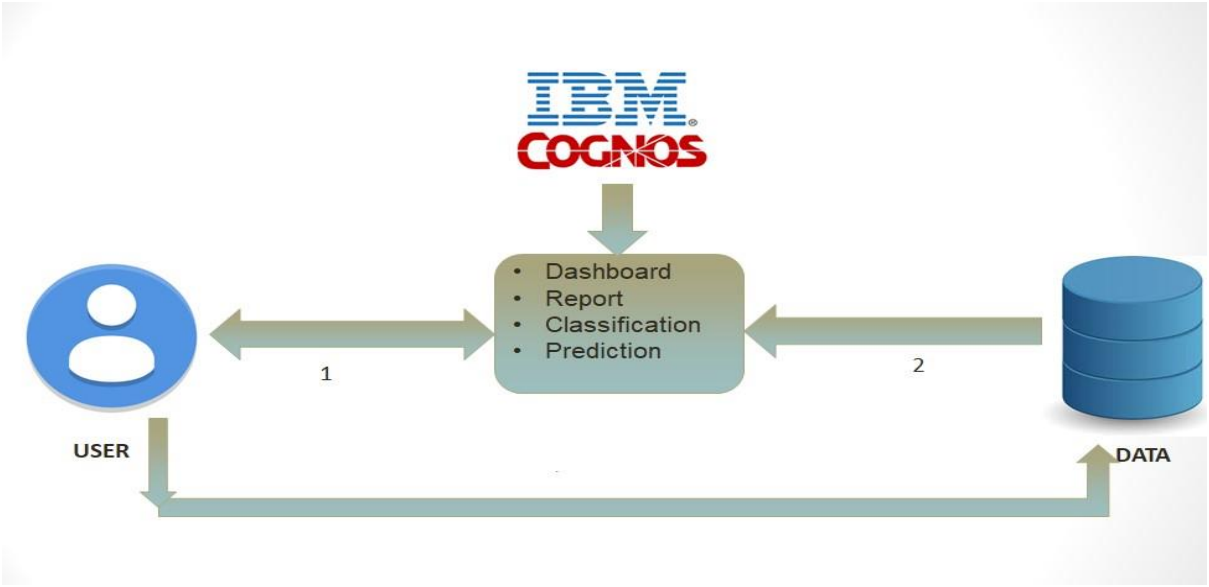
• Find the best tech solution to solve existing business problems.

• Describe the structure, characteristics, behavior, 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.





5.3 USER STORIES

Use the below template to list all the user stories for the product.

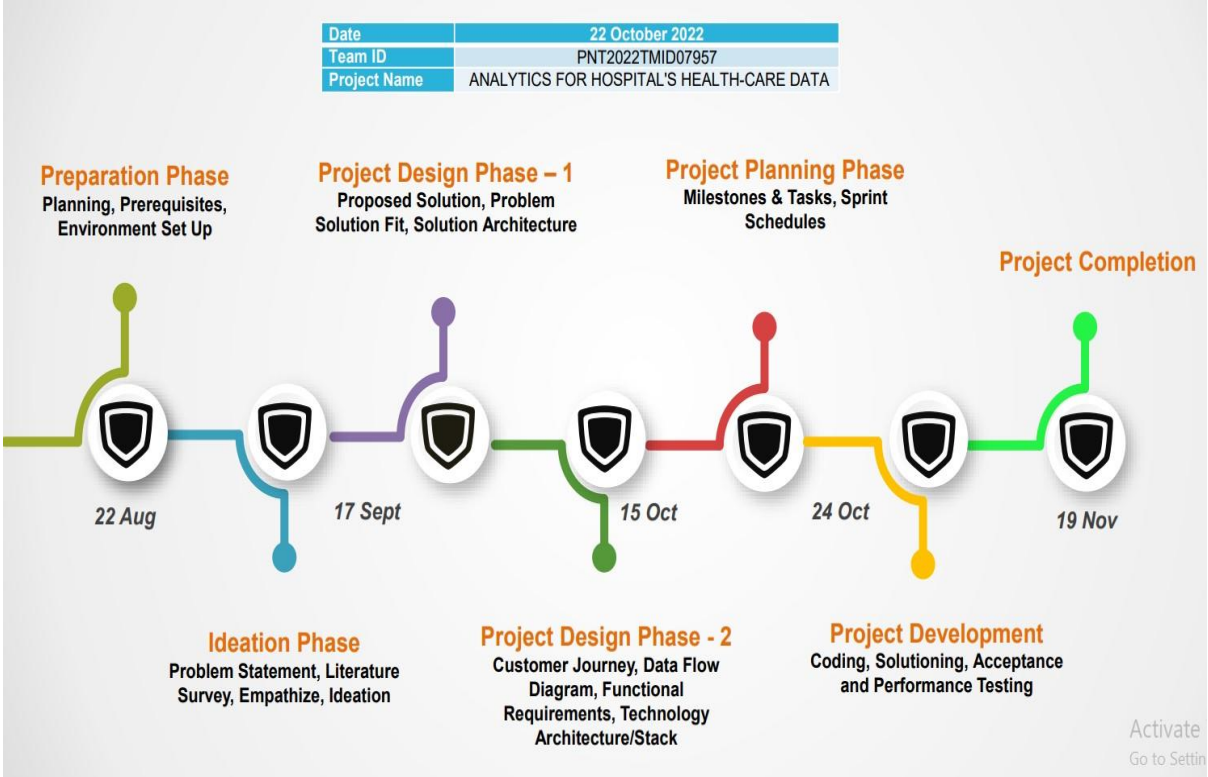
User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Patient	Patient_name	USN-1	The preferred name of the patient	Name of the patient	High	Sprint-1
Patient	Patient _id	USN-2	Patient identification is the process of correctly matching a patient to appropriately intended interventions and communicating information about the patient	matching a patient identification	High	Sprint-1
Patient	Patient_room	USN-3	The space where patients receive care and treatment from medical staff	patient receive care and treatment	High	Sprint-1
Patient	Appointment report	USN-4	Including patient name,clinic location treatment appointment date and booking date	Appointment date and booking date	High	Sprint-1
Patient	Bed	USN-5	Hospital and to	Which	High	Sprint-2

	allocated		efficiently which patient to where	patient to where		
Patient	Maintain patient info	USN-6	Patient demographics progress notes problem medications	problem medications	High	Sprint-2
Patient	Updating patient info	USN-7	Improving health care quality safety and patient	Health care quality	High	Sprint-3
Patient	Changes to patient info	USN-8	Change patient details	Patient details	High	Sprint-3
Patient	payment confirmation	USN-9	A transaction document that can be part of receipt	Payment	High	Sprint-3
Patient	Perform billing	USN-10	To bill the claims for in patient and out patient services provided by hospitals	patient services provided by hospitals	High	Sprint-4
Patient	Patient info	USN-11	Patient during consultations health disease	patient information	High	Sprint-4
Patient	Health condition	USN-12	Medical records	information that refers individual’s	High	Sprint-4

CHAPTER 6

PROJECT PLANNING & SCHEDULING

6.1 SPRINT PLANNING AND ESTIMATION



6.2 SPRINT DELIVERY SCHEDULE

sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story points	Priority	Team members
Sprint1	Patient_name	USN-1	The preferred name of the patient	2	high	Jayakeerthana R
	Patient _id	USN-2	Patient identification	1	high	Dhanushya M
	Patient_room	USN-3	The space for patients	1	high	Gayathri S
	Appointment report	USN-4	name,clinic location treatment appointment	2	high	Naveenkumar S

Sprint 2	Bed allocated	USN-5	Hospital and to efficiently which patient to where	2	high	Jayakeerthana R
	Maintain patient info	USN-6	Patient demographics progress notes problem medications	2	high	Dhanushya M

Sprint 3	Updating patient info	USN-7	Improving health care quality safety and patient	2	high	Gayathri S
	Changes to patient info	USN-8	change patient details	2	high	Naveenkumar S
	Payment confirmation	USN-9	A transaction document that can be part of receipt	2	high	Jayakeerthana R

Sprint 4	Perform billing	USN-10	To bill the claims for in patient and out patient services provided by hospitals	2	high	Dhanushya M
	Patient info	USN-11	Patient during consultations health disease	2	high	Gayathri S
	Health condition	USN-12	Medical records	2	high	Naveenkumar S

CHAPTER 7

CODING & SOLUTIONING

Index.html

```
<!DOCTYPE html>
<html lang="en">

<head>
  <meta charset="utf-8">
  <meta content="width=device-width, initial-scale=1.0" name="viewport">

  <title>IBM Nalaiyathiran Project</title>
  <meta content="" name="description">
  <meta content="" name="keywords">

  <!-- Favicons -->
  <link href="assets/img/anonymus.png" rel="anonymus">
  <link href="assets/img/anonymus.png" rel="anonymus">

  <!-- Google Fonts -->
  <link
href="https://fonts.googleapis.com/css?family=Open+Sans:300,300i,400,400i,600,600i,700,700i|Jost:300,300i,400,400i,500,500i,600,600i,700,700i|Poppins:300,300i,400,400i,500,500i,600,600i,700,700i" rel="stylesheet">
```

```
  <!-- Vendor CSS Files -->
  <link href="assets/vendor/aos/aos.css" rel="stylesheet">
  <link href="assets/vendor/bootstrap/css/bootstrap.min.css" rel="stylesheet">
  <link href="assets/vendor/bootstrap-icons/bootstrap-icons.css"
rel="stylesheet">
  <link href="assets/vendor/boxicons/css/boxicons.min.css" rel="stylesheet">
  <link href="assets/vendor/glightbox/css/glightbox.min.css" rel="stylesheet">
  <link href="assets/vendor/remixicon/remixicon.css" rel="stylesheet">
  <link href="assets/vendor/swiper/swiper-bundle.min.css" rel="stylesheet">

  <!-- Template Main CSS File -->
  <link href="assets/css/style.css" rel="stylesheet">

</head>
<body>

  <!-- ======= Header ======= -->
  <header id="header" class="fixed-top ">
    <div class="container d-flex align-items-center">

      <h1 class="logo me-auto"><a href="index.html">IBM Project</a></h1>
      <!-- Uncomment below if you prefer to use an image logo -->
      <!-- <a href="index.html" class="logo me-auto"><img
src="assets/img/logo.png" alt="" class="img-fluid"></a>-->
```

```
      <nav id="navbar" class="navbar">
        <ul>
          <li><a class="nav-link scrollto active" href="#hero">Home</a></li>
          <li><a class="nav-link scrollto" href="#Project">Project Idea</a></li>
          <li><a class="nav-link scrollto" href="#Dashboard">Cognos Dashboard</a></li>
          <li><a class="nav-link scrollto" href="#Report">Report</a></li>
          <li><a class="nav-link scrollto" href="#Story">Story</a></li>
          <li><a class="nav-link scrollto" href="#Prediction">Prediction</a></li>
          <li><a class="nav-link scrollto" href="#team">Team</a></li>
          <li><a class="nav-link scrollto" href="#Contact">Contact</a></li>
        </ul>
        <i class="bi bi-list mobile-nav-toggle"></i>
      </nav><!-- .navbar -->

    </div>
  </header><!-- End Header -->

  <!-- ======= Hero Section ======= -->
  <section id="hero" class="d-flex align-items-center">

    <div class="container">
      <div class="row">
        <div class="col-lg-6 d-flex flex-column justify-content-center pt-4 pt-lg-0 order-2 order-lg-1" data-aos="fade-up" data-aos-delay="200">
```

<h1>Analytics for Hospital's Health Care Data</h1>

<h2>Being a developing country, India has gone through many issues especially during the pandemic period. The most unforgettable era for India is the second wave of the covid-19 pandemic. Data analytics in health care sector can help us to face any situations in the future</h2>

Get Started

<img src="assets/img/cover-pic-medical-data-analytics.png" class="img-fluid animated" alt="">

</section><!-- End Hero -->

<main id="main">

<!-- ======= Clients Section ======= -->

<section id="clients" class="clients section-bg">

```
<div class="col-lg-2 col-md-4 col-6 d-flex align-items-center justify-content-center">
  <img src="assets/img/clients/sns.png" class="img-fluid" alt="">
</div>

<div class="col-lg-2 col-md-4 col-6 d-flex align-items-center justify-content-center">
  <img src="assets/img/clients/DT.png" class="img-fluid" alt="">
</div>

<div class="col-lg-2 col-md-4 col-6 d-flex align-items-center justify-content-center">
  <img src="assets/img/clients/doctor.png" class="img-fluid" alt="">
</div>

<div class="col-lg-2 col-md-4 col-6 d-flex align-items-center justify-content-center">
  <img src="assets/img/clients/analytics.png" class="img-fluid" alt="">
</div>

<div class="col-lg-2 col-md-4 col-6 d-flex align-items-center justify-content-center">
  <img src="assets/img/clients/naive.png" class="img-fluid" alt="">
</div>
```

```
        <div class="col-lg-2 col-md-4 col-6 d-flex align-items-center justify-content-center">
          <img src="assets/img/clients/Team.png" class="img-fluid" alt="">
        </div>

      </div>

    </div>
  </section><!-- End Cliens Section -->

  <!-- ======= Project Idea Section ======= -->
  <section id="Project" class="about">
    <div class="container" data-aos="fade-up">

      <div class="section-title">
        <h2>Project Idea</h2>
      </div>

      <div class="row content">
        <div class="col-lg-6">
          <p>
            Main Idea of this Project is:
          </p>
          <ul>
            <li><i class="ri-check-double-line"></i>Data Collection</li>
```

```
            <li><i class="ri-check-double-line"></i>Data Cleaning</li>
            <li><i class="ri-check-double-line"></i>Data Exploration</li>
            <li><i class="ri-check-double-line"></i>Visualization</li>
            <li><i class="ri-check-double-line"></i> Story Creation</li>
            <li><i class="ri-check-double-line"></i> Prediction</li>
            <li><i class="ri-check-double-line"></i> Report Creation </li>
          </ul>
        </div>
        <div class="col-lg-6 pt-4 pt-lg-0">
          <div class="pic"><img src="assets/img/Data Analytics.png"
class="img-fluid" alt=""></div>
        </div>
      </div>

    </div>
  </section><!-- End Project Idea Section -->

  <!-- ======= Dashboard Section ======= -->
  <section id="Dashboard" class="Dashboard section-bg">
    <div class="container" data-aos="fade-up">

      <div class="section-title">
```

```
        <h2>Dashboard</h2>

        <p>This Dashboard is created in Cognos Analytics</p>

       </div>


       <iframe
src="https://us3.ca.analytics.ibm.com/bi/?perspective=dashboard&amp;pathRef
=.my_folders%2FSprint%2B3%2BDashboard%2B2&amp;closeWindowOnLas
tView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=em
bedded&amp;action=view&amp;mode=dashboard&amp;subView=model00000
18488cd6a1f_00000002" width="1500" height="1000" frameborder="0"
gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>


     </div>

   </section><!-- End Dashboard Section -->

   <!-- ======= Report Section ======= -->

   <section id="Report" class="Report section-bg">

     <div class="container" data-aos="fade-up">


     <div class="section-title">

       <h2>Report</h2>

       <p>This Report is created in Cognos Analytics</p>

     </div>

     <iframe
src="https://us3.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2FSprint%2B4
%2Breport%2B2&amp;closeWindowOnLastView=true&amp;ui_appbar=false
&amp;ui_navbar=false&amp;shareMode=embedded&amp;action=run&amp;for
mat=HTML&amp;prompt=false" width="1500" height="1000"
frameborder="0" gesture="media" allow="encrypted-media"
allowfullscreen=""></iframe>
```

```
    </div>
  </section>
    <!-- ======= Report Section ======= -->
    <!-- ======= Story Section ======= -->
    <section id="Story" class="Story section-bg">
      <div class="container" data-aos="fade-up">


      <div class="section-title">
        <h2>Story</h2>
        <p>This Story is created in Cognos Analytics</p>
      </div>
      <iframe
src="https://us3.ca.analytics.ibm.com/bi/?perspective=story&amp;pathRef=.my_folders%2FSprint%2B4%2BStory&amp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedded&amp;action=view&amp;sceneId=model00000184850abab4_00000002&amp;sceneTime=0" width="1500" height="1000" frameborder="0" gesture="media"
allow="encrypted-media" allowfullscreen=""></iframe>    </div>
  </section>
    <!-- ======= Story Section ======= -->
    <!-- ======= Goal Section ======= -->
    <section id="cta" class="cta">
      <div class="container" data-aos="zoom-in">


        <div class="row">
```

```
        <div class="col-lg-9 text-center text-lg-start">
          <h3>Goal</h3>
          <p> 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>
        </div>
        <div class="col-lg-3 cta-btn-container text-center">
          <a class="cta-btn align-middle" href="#">Description</a>
        </div>
      </div>

    </div>
  </section><!-- End Goal Section -->
  <!-- ======= Prediction Section ======= -->
  <section id="Prediction" class="Prediction section-bg">
    <div class="container" data-aos="fade-up">

    <div class="section-title">
      <h2>Prediction</h2>
      <p>This Prediction was done in google colab by using Naive Bayes Algorithm</p>
    </div>
    <button class="btn text-light bg-dark button1">
      <a class="" href="./Prediction.html">Predit the length of stay (LoS)</a>
    </button>
```

```
    </div>
  </section>
    <!-- ======= Report Section ======= -->




    <!-- ======= Team Section ======= -->
    <section id="team" class="team section-bg">
      <div class="container" data-aos="fade-up">


        <div class="section-title">
          <h2>Team</h2>
          <p>Team Work is so essential for this whole project without them this project will be just few lines of unexcecutable codes</p>
        </div>


        <div class="row">


          <div class="col-lg-6">
            <div class="member d-flex align-items-start" data-aos="zoom-in" data-aos-delay="100">
              <div class="member-info">
                <h4>JAYAKEERTHANA R</h4>
                <span>Team Leader</span>
```

```
            <p>Worked on Model Creation , Cognos Analytics , Colab</p>
          </div>
        </div>
      </div>

      <div class="col-lg-6 mt-4 mt-lg-0">
        <div class="member d-flex align-items-start" data-aos="zoom-in" data-aos-delay="200">
          <div class="member-info">
            <h4>DHANUSHYA M</h4>
            <span>Team Member 1</span>
            <p>Worked on Idea Creation, Cognos Analytics , Documentation</p>
          </div>
        </div>
      </div>

      <div class="col-lg-6 mt-4">
        <div class="member d-flex align-items-start" data-aos="zoom-in" data-aos-delay="300">
          <div class="member-info">
            <h4>GAYATHRI S</h4>
            <span>Team member 2</span>
            <p>Worked on Story Creation , Predictive Analysis , Colab , Cognos Analytics</p>
          </div>
```

```
          </div>
        </div>

        <div class="col-lg-6 mt-4">
          <div class="member d-flex align-items-start" data-aos="zoom-in" data-aos-delay="400">
            <div class="member-info">
              <h4>NAVEENKUMAR S</h4>
              <span>Team Member 3</span>
              <p>Worked on Literature Survey , Delivery Plan , Technical Stack</p>
            </div>
          </div>
        </div>

      </div>

    </div>
  </section><!-- End Team Section -->

  <!-- ======= Frequently Asked Questions Section ======= -->
  <section id="faq" class="faq section-bg">
    <div class="container" data-aos="fade-up">
```

<h2>Frequently Asked Questions</h2>

Data Analytics in Hospital Data is very challenging task since a minor error in data can risk people life so there are some of the questions listed below

<li data-aos="fade-up" data-aos-delay="100">

 <a data-bs-toggle="collapse" class="collapse" data-bs-target="#faq-list-1">How does Data analytics helps us in Hospital Data?

During Covid 19 we faced a lot of trouble because of wrong prediction analysis which was made manually , if Data Analytics was used then there will be pre prediction which can reduce the mortality rate and avoids last minute chaos

<li data-aos="fade-up" data-aos-delay="200">

 <a data-bs-toggle="collapse" data-bs-target="#faq-list-2" class="collapsed">Will it makes major error in prediction and Visualization

IBM Cognos has low level of error in prediction and visualization this can help us to make accurate results

<li data-aos="fade-up" data-aos-delay="300">

 <a data-bs-toggle="collapse" data-bs-target="#faq-list-3" class="collapsed">How it will help people?

This project can help people to make analysis so that resource allocation can be done easily and better than the manual method

<li data-aos="fade-up" data-aos-delay="400">

 <a data-bs-toggle="collapse" data-bs-target="#faq-list-4" class="collapsed">Why we use IBM cognos?

IBM Cognos can help us to make visualization faster than we do in python IDE , also it has a AI feature to predict and produce insights from the visualizations made

</section><!-- End Frequently Asked Questions Section -->

<!-- ======= Contact Section ======= -->

<section id="contact" class="contact">

<h2>Contact</h2>

```
        </div>

        <div class="row">

          <div class="col-lg-5 d-flex align-items-stretch">
            <div class="info">
              <div class="address">
                <i class="bi bi-geo-alt"></i>
                <h4>Location:</h4>
                <p>Computer Science and Engineering , Adhiyamaan College of Engineering, Hosur</p>
              </div>

              <div class="email">
                <i class="bi bi-envelope"></i>
                <h4>Email:</h4>
                <p>jayakeerthana816@gmail.com</p>
              </div>

          </div>

          <div class="col-lg-7 mt-5 mt-lg-0 d-flex align-items-stretch">
            <form action="forms/contact.php" method="post" role="form" class="php-email-form">
              <div class="row">
```

```
            <div class="form-group col-md-6">
              <label for="name">Your Name</label>
              <input type="text" name="name" class="form-control" id="name"
required>
            </div>
            <div class="form-group col-md-6">
              <label for="name">Your Email</label>
              <input type="email" class="form-control" name="email" id="email"
required>
            </div>
          </div>
          <div class="form-group">
            <label for="name">Subject</label>
            <input type="text" class="form-control" name="subject" id="subject"
required>
          </div>
          <div class="form-group">
            <label for="name">Message</label>
            <textarea class="form-control" name="message" rows="10"
required></textarea>
          </div>
          <div class="my-3">
            <div class="loading">Loading</div>
            <div class="error-message"></div>
            <div class="sent-message">Your message has been sent. Thank
you!</div>
```

```
            </div>
            <div class="text-center"><button type="submit">Send Message</button></div>
          </form>
        </div>

      </div>

    </div>
  </section><!-- End Contact Section -->

</main><!-- End #main -->

<!-- ======= Footer ======= -->
<footer id="footer">

  <div class="footer-newsletter">
    <div class="container">
      <div class="row justify-content-center">
        <div class="col-lg-6">
          <h4>Join Us</h4>
          <p>Health is Wealth , Technology can change the World</p>
          <form action="" method="post">
            <input type="email" name="email"><input type="submit" value="Join Us ...">
```

```
          </form>
        </div>
      </div>
    </div>
  </div>

  <div class="footer-top">
    <div class="container">
      <div class="row">

        <div class="col-lg-3 col-md-6 footer-contact">
          <h3>JAYAKEERTHANA R</h3>
          <p>Computer Science and Engineering , Adhiyamaan College of Engineering, Hosur<br><br>
            <strong>Email:</strong>jayakeerthana816@gmail.com<br>
          </p>
        </div>

        <div class="col-lg-3 col-md-6 footer-links">
          <h4>Go to</h4>
          <ul>
            <li><i class="bx bx-chevron-right"></i> <a href="#">Home</a></li>
            <li><i class="bx bx-chevron-right"></i> <a href="#">Project Idea</a></li>
```

```
            <li><i class="bx bx-chevron-right"></i> <a href="#">Cognos Dashboard</a></li>

            <li><i class="bx bx-chevron-right"></i> <a href="#">Report</a></li>

            <li><i class="bx bx-chevron-right"></i> <a href="#">Story</a></li>

            <li><i class="bx bx-chevron-right"></i> <a href="#">team</a></li>

          </ul>

        </div>


        <div class="col-lg-3 col-md-6 footer-links">

          <h4>Project Idea</h4>

          <ul>

            <li><i class="bx bx-chevron-right"></i> <a href="#">Data Collection</a></li>

            <li><i class="bx bx-chevron-right"></i> <a href="#">Data Exploration</a></li>

            <li><i class="bx bx-chevron-right"></i> <a href="#">Visualization</a></li>

            <li><i class="bx bx-chevron-right"></i> <a href="#">Prediction</a></li>

            <li><i class="bx bx-chevron-right"></i> <a href="#">Dashboard Creation</a></li>

            <li><i class="bx bx-chevron-right"></i> <a href="#">Report Creation</a></li>

            <li><i class="bx bx-chevron-right"></i> <a href="#">Story Creation</a></li>

          </ul>

        </div>
```

```
          <div class="col-lg-3 col-md-6 footer-links">
            <h4>Our Social Networks</h4>
            <div class="social-links mt-3">
              <a href="#" class="twitter"><i class="bx bxl-twitter"></i></a>
              <a href="#" class="facebook"><i class="bx bxl-facebook"></i></a>
              <a href="#" class="instagram"><i class="bx bxl-instagram"></i></a>
              <a href="#" class="google-plus"><i class="bx bxl-skype"></i></a>
              <a href="#" class="linkedin"><i class="bx bxl-linkedin"></i></a>
            </div>
          </div>

        </div>
      </div>
    </div>

    <div class="container footer-bottom clearfix">
      <div class="copyright">
        &copy; Belongs to <strong><span>Dharshan</span></strong>. Please Don't Copy
      </div>
      </div>
    </div>
  </footer><!-- End Footer -->
```

```
  <div id="preloader"></div>

  <a href="#" class="back-to-top d-flex align-items-center justify-content-center"><i class="bi bi-arrow-up-short"></i></a>


  <!-- Vendor JS Files -->

  <script src="assets/vendor/aos/aos.js"></script>

  <script src="assets/vendor/bootstrap/js/bootstrap.bundle.min.js"></script>

  <script src="assets/vendor/glightbox/js/glightbox.min.js"></script>

  <script src="assets/vendor/isotope-layout/isotope.pkgd.min.js"></script>

  <script src="assets/vendor/swiper/swiper-bundle.min.js"></script>

  <script src="assets/vendor/waypoints/noframework.waypoints.js"></script>

  <script src="assets/vendor/php-email-form/validate.js"></script>


  <!-- Template Main JS File -->

  <script src="assets/js/main.js"></script>

</body>

</html>
```

LOS.pynb

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
np.set_printoptions(suppress=True)
import warnings
warnings.filterwarnings('ignore')
from google.colab import drive
drive.mount('/content/drive')
#load data
d1 = pd.read_csv('/content/drive/My Drive/Healthcare_Data/sample_sub.csv')
```

```
d2 = pd.read_csv('/content/drive/My
Drive/Healthcare_Data/train_data_dictionary.csv')
test = pd.read_csv('/content/drive/My Drive/Healthcare_Data/test_data.csv')
train = pd.read_csv('/content/drive/My Drive/Healthcare_Data/train_data.csv')
train.head()
train.info()
train.Stay.unique()
# NA values in train dataset :
train.isnull().sum().sort_values(ascending = False)
# NA values in test dataset :
test.isnull().sum().sort_values(ascending = False)
# Dimension of train dataset
train.shape
# Dimension of test dataset
test.shape
# Number of distinct observations in test dataset
for i in test.columns:
    print(i, ':', test[i].nunique())
#Replacing NA values in Bed Grade Column for both Train and Test datssets
train['Bed Grade'].fillna(train['Bed Grade'].mode()[0], inplace = True)
test['Bed Grade'].fillna(test['Bed Grade'].mode()[0], inplace = True)

#Replacing NA values in  Column for both Train and Test datssets
train['City_Code_Patient'].fillna(train['City_Code_Patient'].mode()[0], inplace =
True)
test['City_Code_Patient'].fillna(test['City_Code_Patient'].mode()[0], inplace =
True)

# Label Encoding Stay column in train dataset
from sklearn.preprocessing import LabelEncoder
le = LabelEncoder()
train['Stay'] = le.fit_transform(train['Stay'].astype('str'))

train.head()
#Imputing dummy Stay column in test datset to concatenate with train dataset
test['Stay'] = -1
df = pd.concat([train, test])
df.shape
#Label Encoding all the columns in Train and test datasets
for i in ['Hospital_type_code', 'Hospital_region_code', 'Department',
        'Ward_Type', 'Ward_Facility_Code', 'Type of Admission', 'Severity of
Illness', 'Age']:
```

```
    le = LabelEncoder()
    df[i] = le.fit_transform(df[i].astype(str))

#Spearating Train and Test Datasets
train = df[df['Stay']!=-1]
test = df[df['Stay']==-1]

def get_countid_enocde(train, test, cols, name):
  temp = train.groupby(cols)['case_id'].count().reset_index().rename(columns =
{'case_id': name})
  temp2 = test.groupby(cols)['case_id'].count().reset_index().rename(columns =
{'case_id': name})
  train = pd.merge(train, temp, how='left', on= cols)
  test = pd.merge(test,temp2, how='left', on= cols)
  train[name] = train[name].astype('float')
  test[name] = test[name].astype('float')
  train[name].fillna(np.median(temp[name]), inplace = True)
  test[name].fillna(np.median(temp2[name]), inplace = True)
  return train, test
train, test = get_countid_enocde(train, test, ['patientid'], name =
'count_id_patient')
train, test = get_countid_enocde(train, test,
                          ['patientid', 'Hospital_region_code'], name =
'count_id_patient_hospitalCode')
train, test = get_countid_enocde(train, test,
                          ['patientid', 'Ward_Facility_Code'], name =
'count_id_patient_wardfacilityCode')
# Droping duplicate columns
test1 = test.drop(['Stay', 'patientid', 'Hospital_region_code',
'Ward_Facility_Code'], axis =1)
train1 = train.drop(['case_id', 'patientid', 'Hospital_region_code',
'Ward_Facility_Code'], axis =1)
```

I

```
# Splitting train data for Naive Bayes and XGBoost
X1 = train1.drop('Stay', axis =1)
y1 = train1['Stay']
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X1, y1, test_size =0.20,
random_state =100)
```

MODEL

```
from sklearn.naive_bayes import GaussianNB
target = y_train.values
features = X_train.values
classifier_nb = GaussianNB()
model_nb = classifier_nb.fit(features, target)
```

I

```
prediction_nb = model_nb.predict(X_test)
from sklearn.metrics import accuracy_score
acc_score_nb = accuracy_score(prediction_nb,y_test)
print("Acurracy:", acc_score_nb*100)
# Segregation of features and target variable
X = train.drop('Stay', axis =1)
y = train['Stay']
print(X.columns)
z = test.drop('Stay', axis = 1)
print(z.columns)

# Data Scaling
from sklearn import preprocessing
X_scale = preprocessing.scale(X)
X_scale.shape
X_train, X_test, y_train, y_test = train_test_split(X_scale, y, test_size =0.20,
random_state =100)

import keras
from keras.models import Sequential
from keras.layers import Dense
import tensorflow as tf

from keras.utils import to_categorical
#Sparse Matrix
a = to_categorical(y_train)
b = to_categorical(y_test)

model = Sequential()
model.add(Dense(64, activation='relu', input_shape = (254750, 20)))
model.add(Dense(128, activation='relu'))
model.add(Dense(256, activation='relu'))
model.add(Dense(512, activation='relu'))
model.add(Dense(512, activation='relu'))
```

```
model.add(Dense(11, activation='softmax'))

model.summary()
model.compile(optimizer= 'SGD',
              loss='categorical_crossentropy',
              metrics=['accuracy'])
```

PREDICTION

```
pred_nb = classifier_nb.predict(test1.iloc[:,1:])
result_nb = pd.DataFrame(pred_nb, columns=['Stay'])
result_nb['case_id'] = test1['case_id']
result_nb = result_nb[['case_id', 'Stay']]

result_nb['Stay'] = result_nb['Stay'].replace({0:'0-10', 1: '11-20', 2: '21-30',
3:'31-40', 4: '41-50', 5: '51-60', 6: '61-70', 7: '71-80', 8: '81-90', 9: '91-100', 10:
'More than 100 Days'})
result_nb.head()
test_scale = preprocessing.scale(z)
test_scale.shape
print(result_nb.groupby('Stay')['case_id'].nunique())
```

CHAPTER 8

TESTING

8.1 TEST CASE

SECTION	TOTAL CASES	NOT TESTED	FAIL	PASS
Print Engine	7	0	0	7
Client Application	51	0	0	51
Security	2	0	0	2
Outsource Shipping	3	0	0	3
Excepting reporting	9	0	0	
Final report out put	4	0	0	4

Version control	2	0	0	2

8.2 USER ACCEPTANCE TESTING

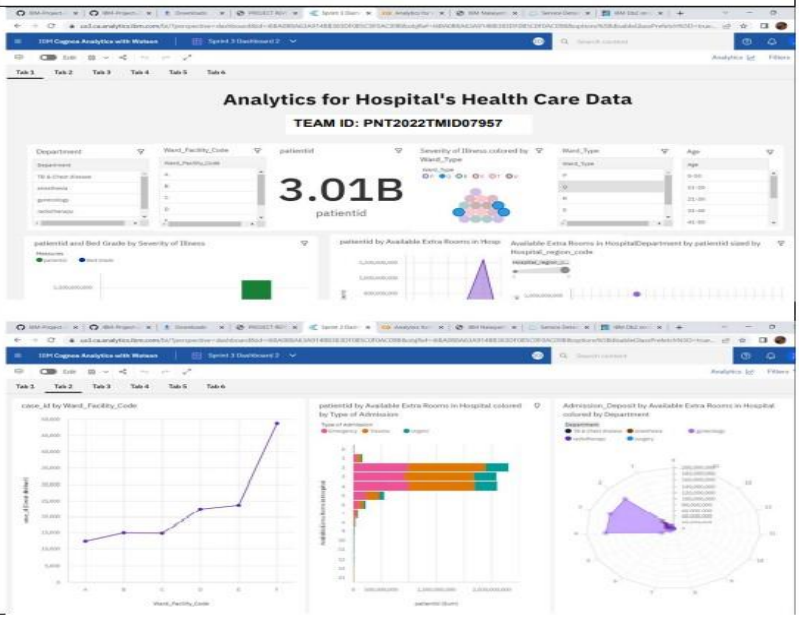
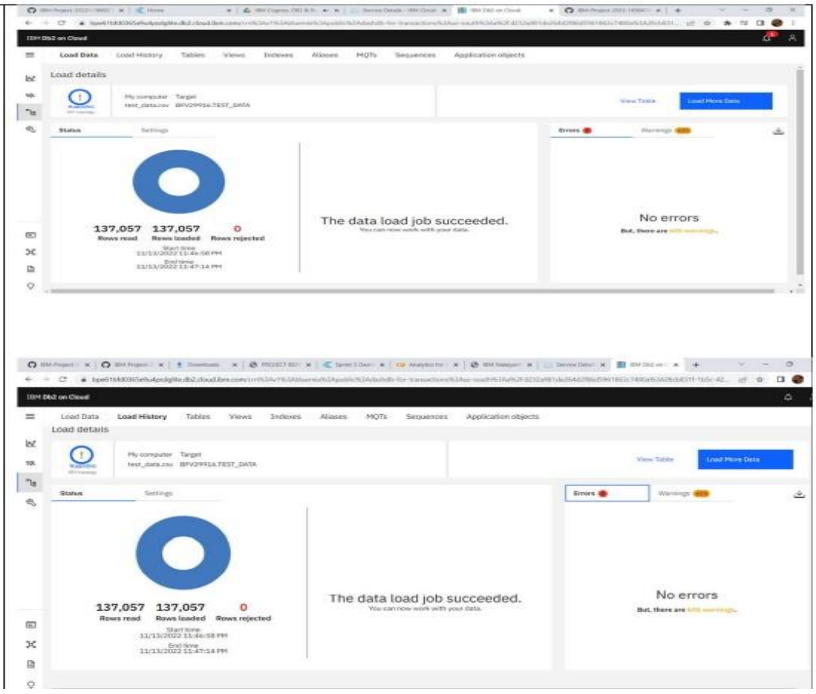
Resolution	Severity 1	Severity 2	Severity 3	Severity 4	subtotal
By Design	5	5	4	0	14
Duplicate	0	0	0	0	0
External	7	8	6	0	21
Fixed	11	4	0	6	21
Not reproduced	1	3	0	0	4
Skipped	0	0	0	0	0
Won’t fix	0	0	0	0	0
Total	24	20	10	6	60

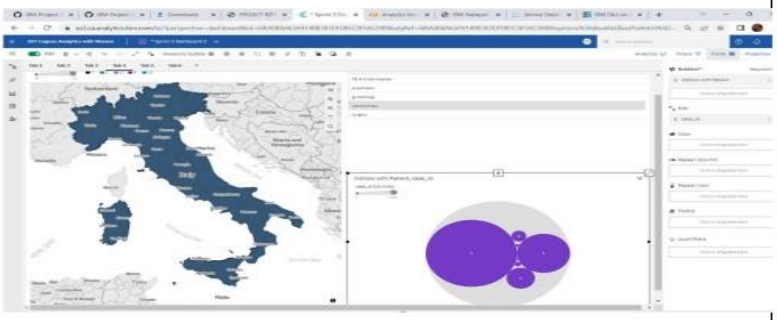
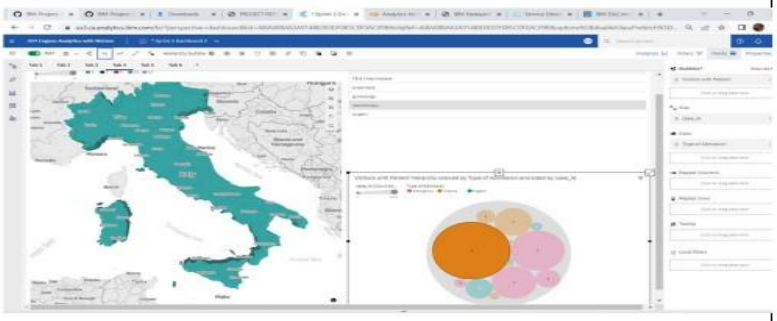
CHAPTER 9

RESULTS

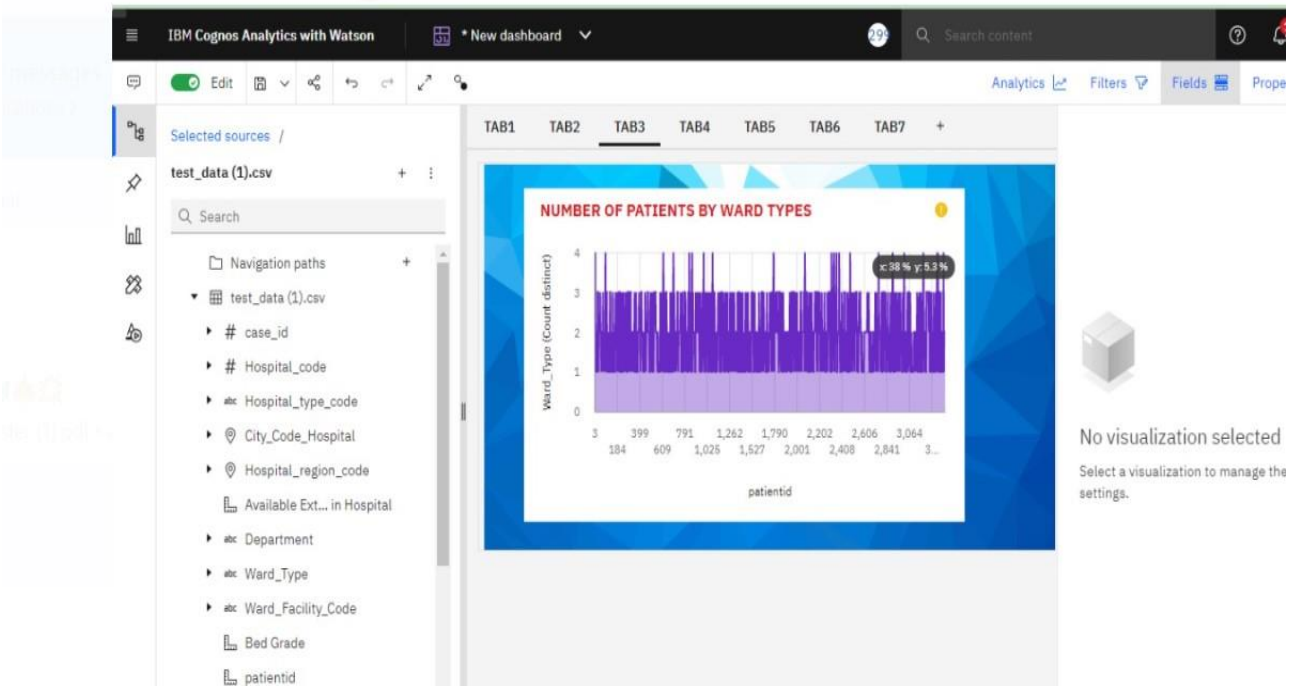
PERFORMANCE METRICS

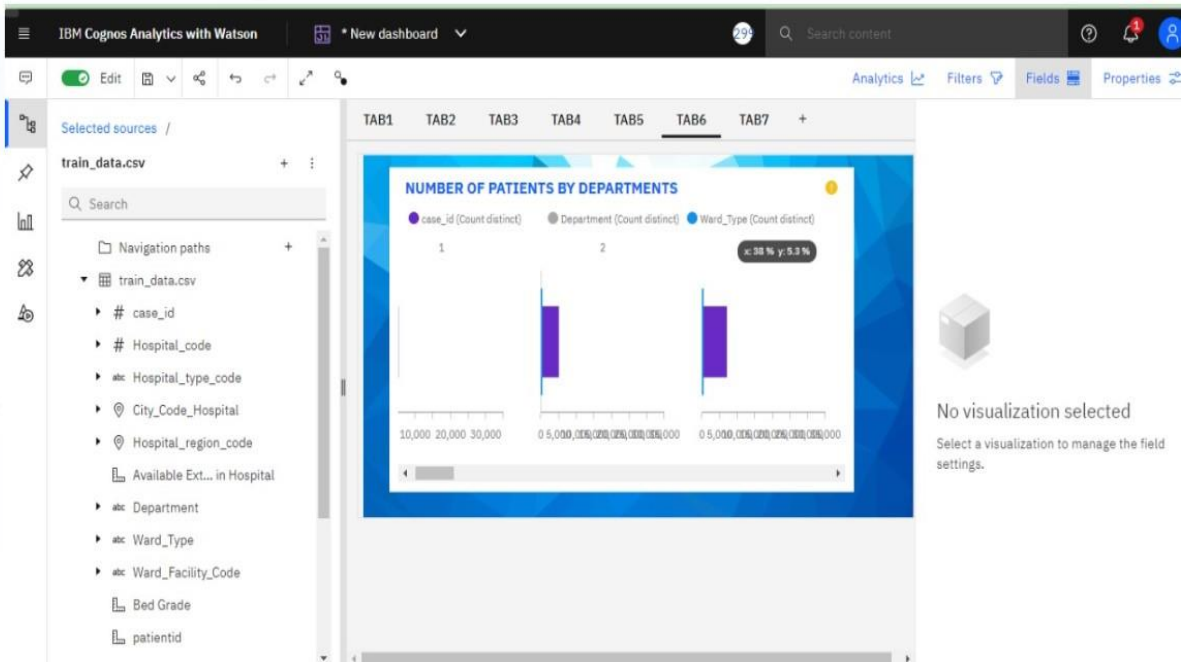
Model Performance Testing:

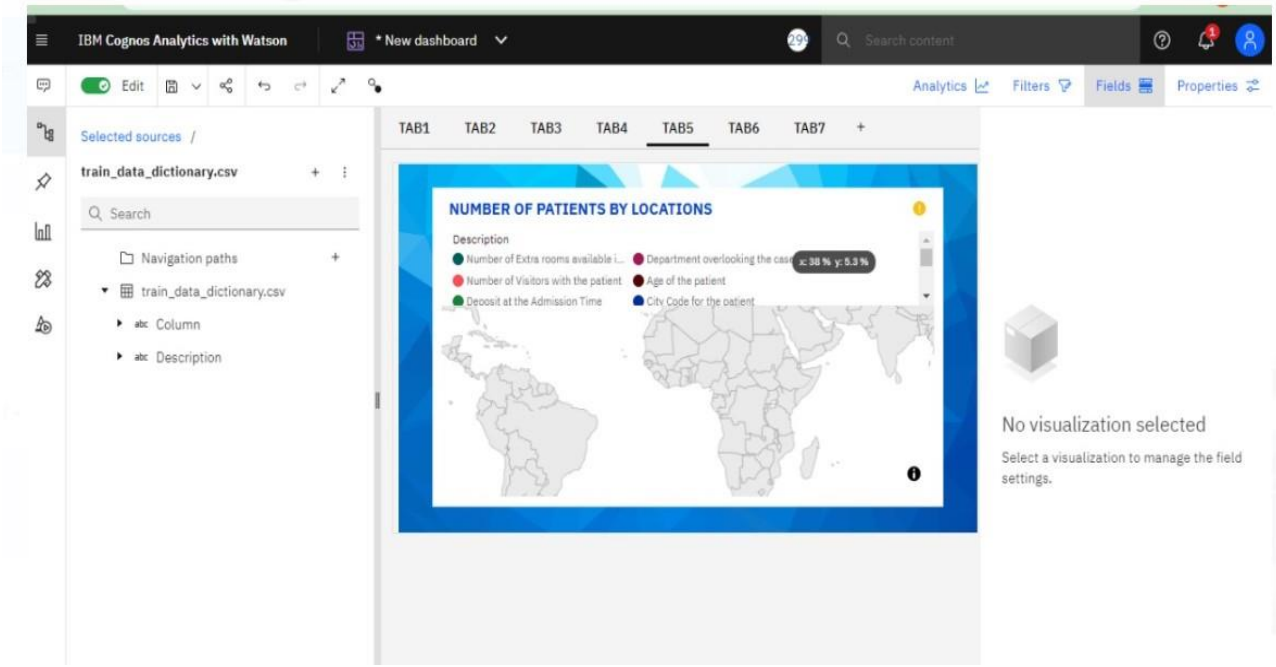
S.No.	Parameter	Screenshot / Values
1.	Dashboard design	No of Visualizations / Graphs - 28
2.	Data Responsiveness	
3.	Amount Data to Rendered (DB2 Metrics)	

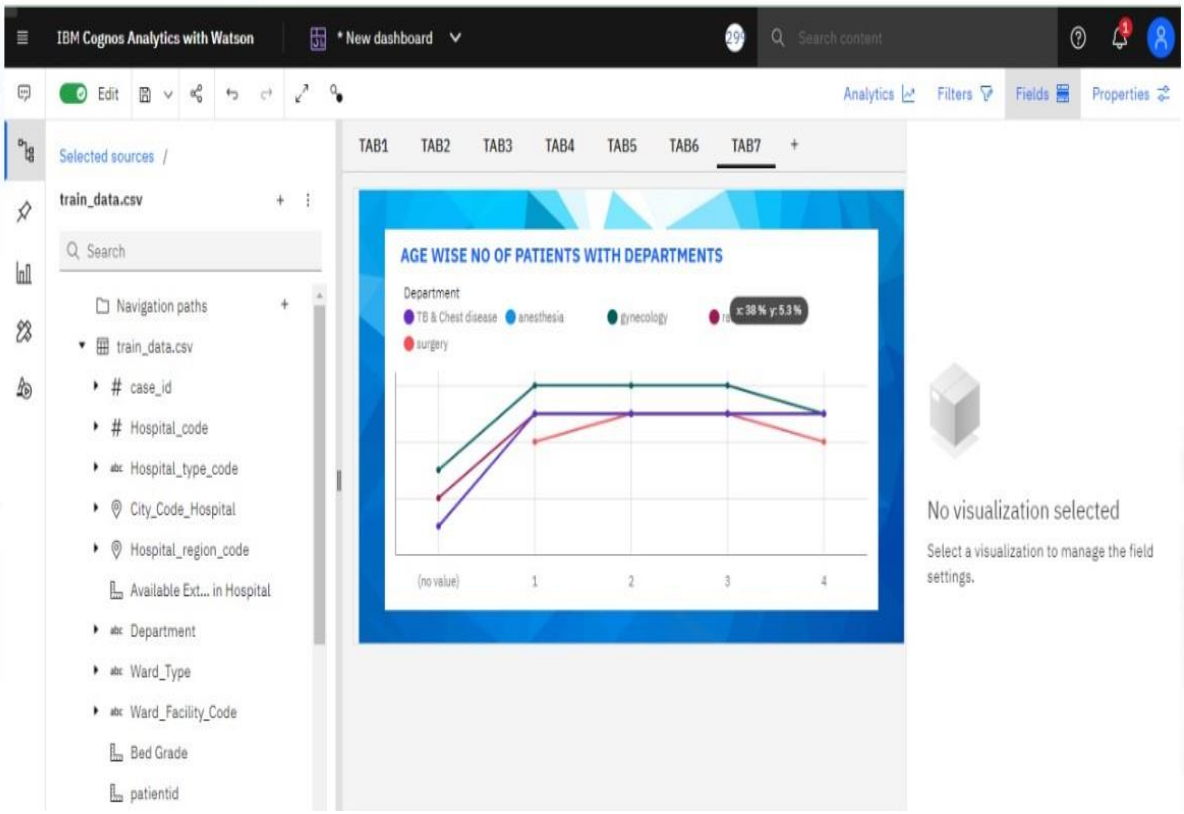
4.	Utilization of Data Filters	Without applying any filter  With Filter 
5.	Effective User Story	No of Scene Added - 5
6.	Descriptive Reports	No of Visualizations / Graphs - 8Pages - 2

DASHBOARD

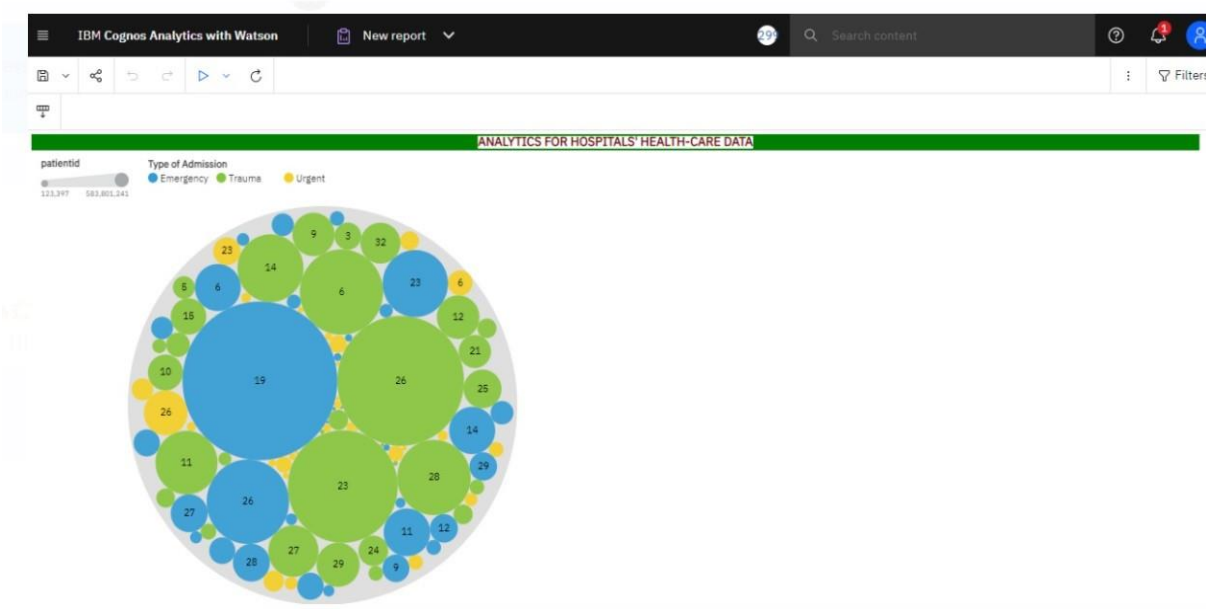

IBM Cognos Analytics with Watson
* New dashboard
Edit
Analytics
Filters
Fields
Selected sources /
test_data (1).csv
Search
Navigation paths
test_data (1).csv
case_id
Hospital_code
Hospital_type_code
City_Code_Hospital
Hospital_region_code
Available Ext... in Hospital
Department
Ward_Type
Ward_Facility_Code
Bed Grade
patientid
TAB1
TAB2
TAB3
TAB4
TAB5
TAB6
TAB7
NUMBER OF PATIENTS BY WARD TYPES
Ward_Type (Count distinct)
patientid
No visualization selected
Select a visualization to manage the settings.


IBM Cognos Analytics with Watson
* New dashboard
Edit
Analytics
Filters
Fields
Properties
Selected sources /
train_data.csv
Search
Navigation paths
train_data.csv
case_id
Hospital_code
Hospital_type_code
City_Code_Hospital
Hospital_region_code
Available Ext... in Hospital
Department
Ward_Type
Ward_Facility_Code
Bed Grade
patientid
TAB1
TAB2
TAB3
TAB4
TAB5
TAB6
TAB7
NUMBER OF PATIENTS BY DEPARTMENTS
case_id (Count distinct)
Department (Count distinct)
Ward_Type (Count distinct)
No visualization selected
Select a visualization to manage the field settings.

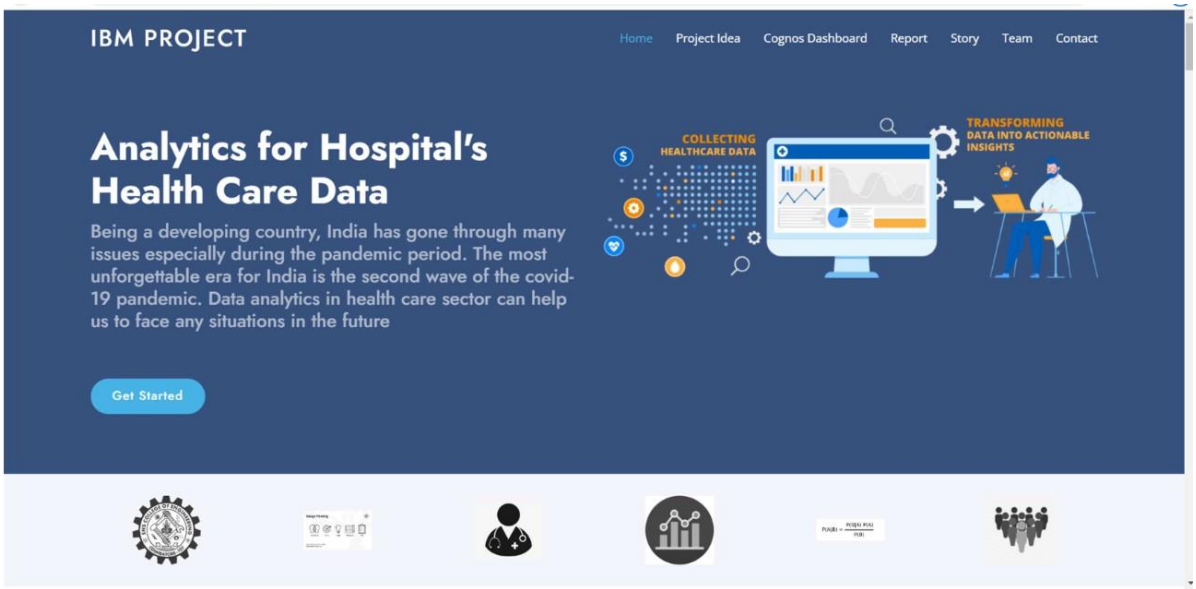

IBM Cognos Analytics with Watson
* New dashboard
Search content
Edit
Analytics
Filters
Fields
Properties
Selected sources /
train_data_dictionary.csv
Search
Navigation paths
train_data_dictionary.csv
Column
Description
TAB1
TAB2
TAB3
TAB4
TAB5
TAB6
TAB7
NUMBER OF PATIENTS BY LOCATIONS
Description
Number of Extra rooms available i...
Department overlooking the case
Number of Visitors with the patient
Age of the patient
Deposit at the Admission Time
City Code for the patient
x: 38 % y: 5.3 %
No visualization selected
Select a visualization to manage the field settings.


IBM Cognos Analytics with Watson
* New dashboard
Search content
Edit
Analytics
Filters
Fields
Properties
Selected sources /
train_data.csv
Search
Navigation paths
train_data.csv
case_id
Hospital_code
Hospital_type_code
City_Code_Hospital
Hospital_region_code
Available Ext... in Hospital
Department
Ward_Type
Ward_Facility_Code
Bed Grade
patientid
TAB1
TAB2
TAB3
TAB4
TAB5
TAB6
TAB7
AGE WISE NO OF PATIENTS WITH DEPARTMENTS
Department
TB & Chest disease
anesthesia
gynecology
surgery
x: 38 % y: 5.3 %
(no value)
1
2
3
4
No visualization selected
Select a visualization to manage the field settings.

REPORT



WEBPAGE



FINAL OUTPUT

Stay

0-10 2598

11-20 26827

21-30 72206

31-40 15639

41-50 469

51-60 13651

61-70 92

71-80 955

81-90 296

91-100 2

More than 100 Days 4322

Name: case_id, dtype: int64

CHAPTER 10

ADVANTAGES & DISADVANTAGES

ADVANTAGES:

• Helps an organization to make a better decision

• Increase the efficiency of the work

• The analytics keeps you updated of your customer behavioral changes.

• Personalization of hospital details.

• Improving quality of service and health care.

DISADVANTAGES:

• Lack of alignment within teams

• Lack of commitment and patience

• Low quality of data

• Privacy Concerns

• Complexity and Bias

CHAPTER 11

CONCLUSION

Data analytics in health care is vital. It helps health care organizations to evaluate and develop Number of patients by ward, Age wise patients with department details, Various types ofvisualizations to analyze the hospital's datasets and hence predict outbreaks in illness, Data analytics can also lower costs for health care organizations and boost business intelligence.

CHAPTER 12

FUTURE SCOPE

While every fact of the industry stands to be changed by data analytics in healthcare, data has significantly improved healthcare in three areas: conducting medical studies, understanding the cost of medical tests and health insurance, and making preventative recommendations to patients. Hospital Healthcare data analytics helps in analyzing the patient details via hospital that the availability of doctors and number of beds to the patients and hence, it reduce the man power and time of the respective Hospital.

CHAPTER 13

APPENDIX

GITHUB LINK: https://github.com/IBM-EPBL/IBM-Project-8340-1658915735

PROJECT DEMO LINK:
https://www.mediafire.com/file/j25myxfylwb4nd3/VID-20221120-WA0066.mp4/file