

ANALYTICS FOR HOSPITALS' HEALTH-CARE DATA

A PROJECT REPORT

SUBMITTED BY

DEEPAN P
DHIVIN T
PRASANNA K
SANJAY M

of
INFORMATION TECHNOLOGY DEPARTMENT

KARPAGAM COLLEGE OF ENGINEERING
COIMBATORE -641032

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	CHAPTER 1	

INTRODUCTION

1. **Project Overview :**

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 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.

2. **Purpose :**

By using this application in addition to improving patient safety and lowering costs, reducing LOS can release capacity in the system (including beds and staff time) and improve throughput, enabling the hospital to serve more patients. Predicting the LOS of patients is important because it helps hospitals to more effectively manage its resources and patients. Suggesting a cost efficient hospital with bed availability and to get well soon. To receive good care from the hospital, to predict the number of days of stay and to predict the amount of time to get a bed. Getting discharged or cured before the estimated time. For this purpose our objective is to accurately predict the Length of Stay for each patient on a case by case basis so that the Hospitals can use this information for optimal resource allocation and better functioning. The optimal resource allocation will help in better care of patients.

CHAPTER 2

LITERATURE SURVEY

2.1 Existing problem:

The recent Covid-19 Pandemic has raised alarms over one of the most overlooked areas to focus on Healthcare Management. From which doctors and hospital management were not able to handle multiple numbers of patients at the same time. And due to the lack of proper treatment, the patient's conditions used to get worse.

2.2 References:

Ref No	Research paper	Authors	Findings
1	Health Big Data Analytics: A Technology Survey	Gaspard Harerimana, Beakcheol Jang, Jong Wook Kim	Because of the vast availability of data, there has been an additional focus on the health industry and an increasing number of studies that aim to leverage the data to improve healthcare have been conducted. Health data are growing increasingly large, and more complex, and its sources have increased tremendously to include computerized physician order entry, electronic medical records, clinical notes, medical images, cyber-physical systems, medical Internet of Things, genomic data, and clinical decision support systems. New types of data from sources like social network services and genomic data are used to build personalized healthcare systems, hence health data are obtained in various forms, from varied sources, contexts, and technologies, and their nature can impede a proper analysis. Any analytical research must overcome these obstacles to mine data and produce meaningful insights to save lives. In this paper, investigate the key challenges, data sources, techniques, technologies, as well as future directions in the field of big data analytics in healthcare. provided a do-it-yourself review that delivers a holistic, simplified and easily understandable view of various technologies that are used to develop an integrated health analytic application.
2	Saving Lives and Money with Smarter Hospitals	Leslie Mertz	One of the medical institutions that got an early start on smart hospital technology is the Veterans Administration (VA), according to Keith Salzman, M.D. (Figure 1), who has experience with both the U.S. Department of Defense (DoD) and the VA, and is now the chief medical information officer for IBM's U.S. Federal Healthcare Practice, which addresses the technology needs of American public-sector health institutions. "In 2004, I started working with informatics at Madigan Army Medical Center in Tacoma, Washington. We had received a National Defense Authorization Act grant to demonstrate interoperability between the DoD and VA health care in terms of sharing both data and documents," he says. It was a big undertaking because DoD and VA health care delivery systems have patient populations that are equivalent to the size of Kaiser Permanente—one of the biggest health care delivery organizations in the country.

3	Emerging Technologies for Next Generation Remote Health Care and Assisted Living	IJAZ AHMAD, ZEESHAN ASGHAR, TANESH KUMAR,GAOLEI LI, AHSAN MANZOOR, KONSTANTIN MIKHAYLOV, SYED ATTIQUE SHAH, MARKO HÖYHTYÄ ,JARMO REPONEN,JYRKI HUUSKO, AND ERKKI HARJULA	According to the International Labour Organization (ILO), the aging of population is one of the main problems of this century, since it increases the proportion of old people within the total population. Along with aging population, according to World Health Organization (WHO), the worldwide prevalence of chronic diseases increases fast and new threats, such as Covid-19 pandemic, continue to emerge. Together, these challenges will cause enormous pressure on the efficacy and cost-efficiency of healthcare systems worldwide. The introduction of novel intelligent remote healthcare services is a prominent solution to ensure a high level of treatment outcome, cost-efficiency and sustainability of the healthcare The associate editor coordinating the review of this manuscript and approving it for publication was Lorenzo Mucchi . system in this situation.
4	Large Scale Infrastructure for Health Data Analytics	Samantha Crossfield, Owen Johnson, Thomas Fleming	The opportunities for data analytics to inform the science and practice of health care are growing. For example, in the UK, 65 million citizens have lifelong e-health records that can be used to examine patterns of disease, treatment, and outcomes. Similarly, the real-world impact of interventions such as new drugs can be evaluated in these
5	A Systematic Review on Healthcare Analytics: Application and Theoretical Perspective of Data Mining	S.Siva Parvathy M.Bhuvaneswri	The growing healthcare industry is generating a large volume of useful data on patient demographics, treatment plans, payment, and insurance coverage—attracting the attention of clinicians and scientists alike. In recent years, a number of peer-reviewed article real-time dressed different dimensions of data mining applications in healthcare. However, the lack of a comprehensive and systematic narrative motivated us to construct a literature review on this topic. In this paper, Presented a review of the literature on healthcare analytics using data mining and big data. Following Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, and conducted a database search between 2005 and 2016. Critical elements of the selected studies—healthcare sub-areas, data mining techniques, types of analytics, data, and data sources—were extracted to provide a systematic view of development in this field and possible future directions. Found that the existing literature mostly examines analytics in clinical and administrative decision-making. The use of human-generated data is predominant considering the wide adoption of Electronic Medical records in clinical care. However, analytics based on website and social media data has been increasing in recent years. The lack of prescriptive analytics in practice and the integration of domain expert knowledge in the decision-making process emphasizes the necessity of future research.

2.3 Problem Statement Definition:

The hospitals need a way to accurately predict the Length of stay for each patient at the time of admission so that the patients with high LOS have their treatment plan optimized on minimum LOS and also the hospital resources such as rooms and beds are efficiently utilized.

IN AN ELABORATE MANNER: The recent Covid-19 Pandemic has raised alarms over one of the most overlooked areas to focus on: Healthcare Management. In earlier days, doctors and hospital management were not able to handle multiple numbers of patients at the same time. And due to the lack of proper treatment, the patient's conditions used to get worse. With the help of the application of Data Science in healthcare, it has now become possible to detect the symptoms of a disease at a very early stage. Also, with the advent of various innovative tools and technologies, doctors are able to monitor patients' conditions from remote locations. Data science is an interdisciplinary field that extracts knowledge and insights from structural and unstructured data, using scientific methods, data mining techniques, machine-learning algorithms, and big data. The healthcare industry generates large datasets of useful information on patient demography, treatment plans, results of medical examinations, insurance, etc. While healthcare

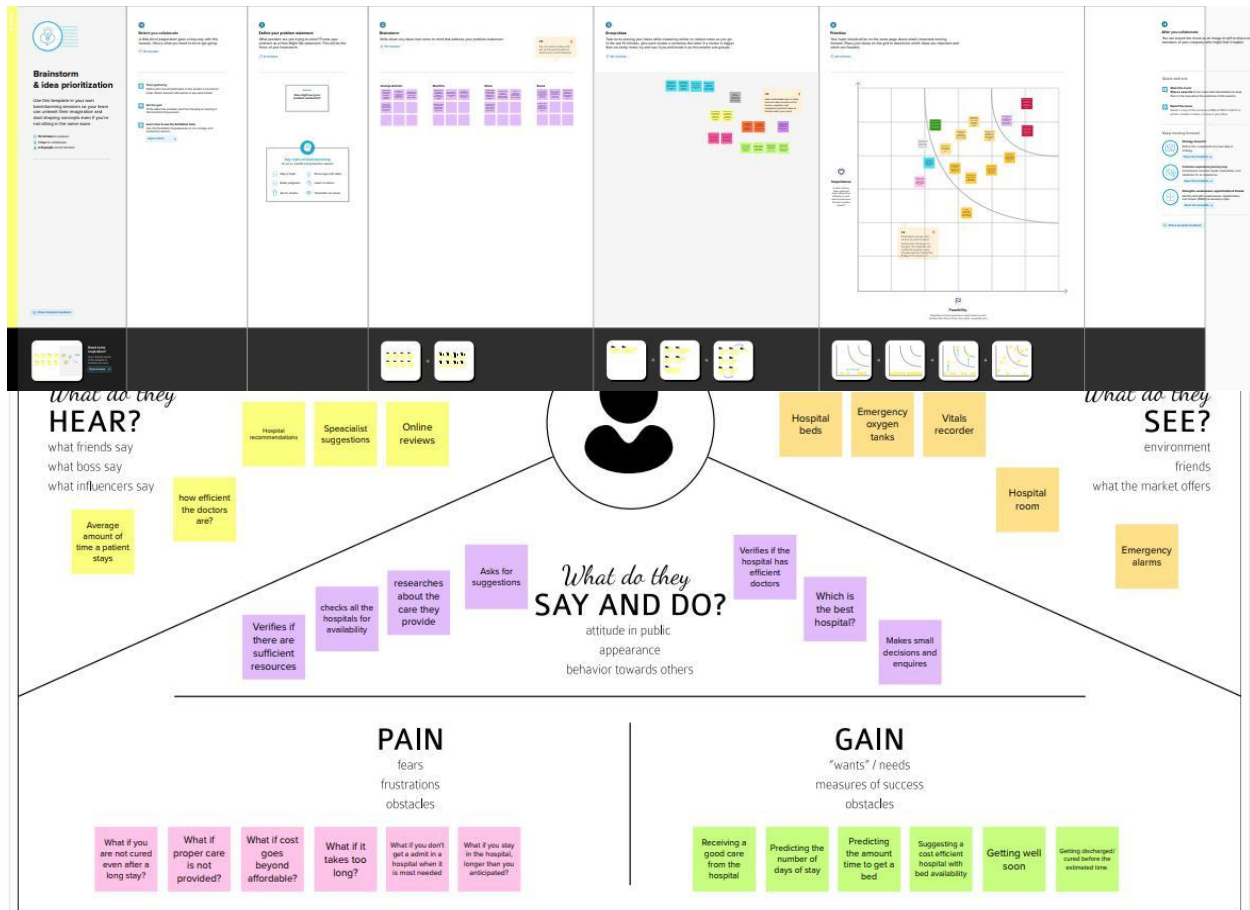
6	VACCINATED - Visual Analytics for Characterizing a Pandemic Spread VAST 2010 Mini Challenge 2 Award: Support for Future Detection	Abish Malik, Shehzad Afzal, Erin Hodges† David S. Ebert, Ross Maciejewsk	Once the data was classified, we utilized and extended work done by the Purdue University Visual Analytics Center on healthcare analysis . Our system consists of a combination of linked views, showing time series views of syndromes and death rates through line graph views , stacked graph views showing deaths, geographical map views showing the impact by country (not illustrated in this paper), and summary windows providing statistical breakdowns of the data (not illustrated in this paper). All views are linked through an interactive time slider that allows users to explore the data over time. Extensions to our previous work include the stacked graph view, summary windows, new control chart methods, and an interactive 'tape measure' tool
7	METEOR: An Enterprise Health Informatics Environment to Support Evidence-Based Medicine	Mamta Puppala, Tiancheng He, Shenyi Chen, Richard Ogunti, Xiaohui Yu, Fuhai Li, Robert Jackson, and Stephen T. C. Wong	. It is recognized that the current process is cumbersome, costly, and time consuming and adds no intrinsic value to the research being undertaken. This leads investigators to spend a lot of unproductive time in negotiating and waiting for data instead of conducting the research. Worse, the data ultimately delivered often are incomplete, depending on the understanding and knowledge of the person retrieving the data. In many institutions, a "gray market" for data could develop, as researchers find unofficial workarounds to obtain data they need for their work. This "gray market" approach could lead to compliance and security risks, as isolated silos of patient data evolve in different parts of the healthcare organization without formal oversight for Health Insurance Portability and Accountability Act (HIPAA) and Institutional Review Board (IRB) compliance, and outside of the processes for protecting data from misuse or breach. HMM researchers

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 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 a Data Scientist of Health Man – a not-for-profit organization dedicated to managing the functioning of Hospitals in a professional and optimal manner.

CHAPTER 3 IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas:

3.2 Ideation & Brainstorming:



3.3 Proposed Solution:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	The hospitals need a way to accurately predict the Length of stay for each patient at the time of admission and classify them into various categories so that the patients with high LOS have their treatment plan optimized on minimum LOS and also the hospital resources such as rooms and beds are efficiently utilized.
2.	Idea / Solution description	Our solution is to build an efficient and an intelligent system. In that we will explore large amounts of data and visualize them. We will be using python and other predictive analysis to predict the length of stay of patients in the hospital and categorize them into various categories.
3.	Novelty / Uniqueness	We took the effort to identify the most important variables that affect the length of stay in the hospital. We referred to the previous cases that are similar to the corresponding ones.

		We found a significant variation of LOS across based on various facilities and across disease conditions and specialties even within the same healthcare system
4.	Social Impact / Customer Satisfaction	By using this application in addition to improving patient safety and lowering costs, reducing LOS can release capacity in the system (including beds and staff time) and improve throughput, enabling the hospital to serve more patients.
5.	Business Model (Revenue Model)	By increasing the dataset, the accuracy of the result increases. This increases the trust of the customer and hence automatically increases the revenue.
6.	Scalability of the Solution	This application can be accessed online without paying. It can be accessed via any browser of your choice. The application can be expanded from analyzing the data in a particular district to state to the global level.

3.4 Problem Solution fit:

Project Title: Analytics for Hospitals Health-Care Data			Project Design Phase-I - Solution Fit Template		Team ID: PNT2022TMD27559	
Define CS, fit into CC	1. CUSTOMER SEGMENT(S) <small>Who is your customer? i.e. working parents of 0-5 y.o. kids</small>	CS	6. CUSTOMER CONSTRAINTS <small>What constraints prevent your customers from taking action or limit their choices of solutions? (i.e. spending power, budget, no cash, network connection, available devices)</small>	CC	5. AVAILABLE SOLUTIONS <small>Traditionally, to predict the date of release, hospital administrators rely on the facility's average length of stay (ALOS). For monthly ALOS calculation, add bed days for each discharged patient and divide the sum by the number of discharged patients. The final prediction is made taking into account a several-day margin of error. Yet, such an approach generates rough results that have a lot of room for improvement. More and more hospitals are considering replacing old methods with machine learning tools to achieve better accuracy.</small>	AS
	2. JOBS-TO-BE-DONE / PROBLEMS <small>Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.</small>	J&P	9. PROBLEM ROOT CAUSE <small>What is the real reason that this problem exists? What is the back story behind the need to do this job? i.e. customers have to do it because of the change in regulations.</small>	RC	7. BEHAVIOUR <small>What does your customer do to address the problem and get the job done? (i.e. Directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace))</small>	BE
Identify strong TR & EM	3. TRIGGERS Seeing patients predict their LOS during admission itself and optimizing the treatment accordingly.	TR	10. YOUR SOLUTION <small>Our solution is to build an efficient and an intelligent system. In that we will explore large amounts of data and visualize them. We will be using python and other predictive analysis to predict the length of stay of patients in the hospital and categorize them into various categories.</small>		SL	8. CHANNELS of BEHAVIOUR 8.1 ONLINE <small>What kind of actions do customers take online? Extract online channels from #7</small> 8.2 OFFLINE <small>What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.</small> 8.1 - Go through the website and interact with it to get the predictive LOS 8.2 - Get optimized health plan and reduce the LOS
	4. EMOTIONS: BEFORE / AFTER Before : <ul style="list-style-type: none"> Uncertainty in LOS Inefficient hospital resource plan After: <ul style="list-style-type: none"> Accurate range of LOS Efficient hospital resource planning optimal health care practice 	EM				

Chapter 4 REQUIREMENT ANALYSIS

4.1 Functional requirement:

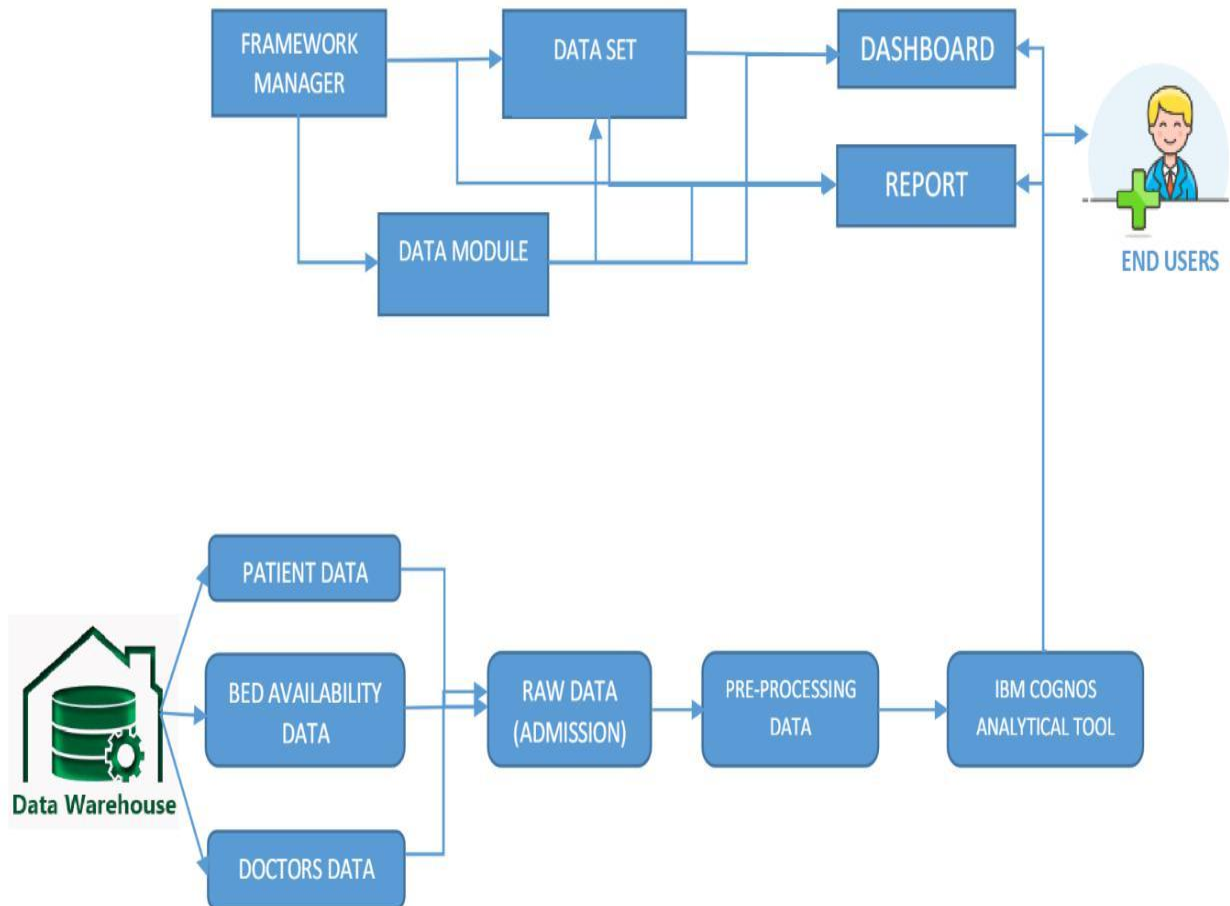
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form
FR-2	User Confirmation	Confirmation via OTP
FR-3	Database	Every patient enters some of their personal details such as name, age, gender, address, and mobile number, etc. along with the disease/injury, its severity, etc. All these details will be stored in the database.
FR-4	Storing disease/injury details	<p>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.</p> <p>The Hospital Management System generates a predictive LOS based on the patient's information and their disease/injury.</p> <p>It also takes reference from previous similar cases and predicts the LOS.</p> <p>The information about the predicted LOS is also stored on the database along with the disease/injury.</p>
FR-5	Availability of beds	Based on the LOS prediction, the Hospital Management System updates the availability of beds.
FR-6	Check Out	<p>The staff in the administration section of the ward can delete the patient ID from the system when the patient checks out from the hospital.</p> <p>The Staff in the administration section of the ward can put the bed empty in the list of beds available.</p>
FR-7	Adding Patients	The Hospital Management enables the staff at the frontend to include new patients in the system.

4.2 Non-Functional requirements:

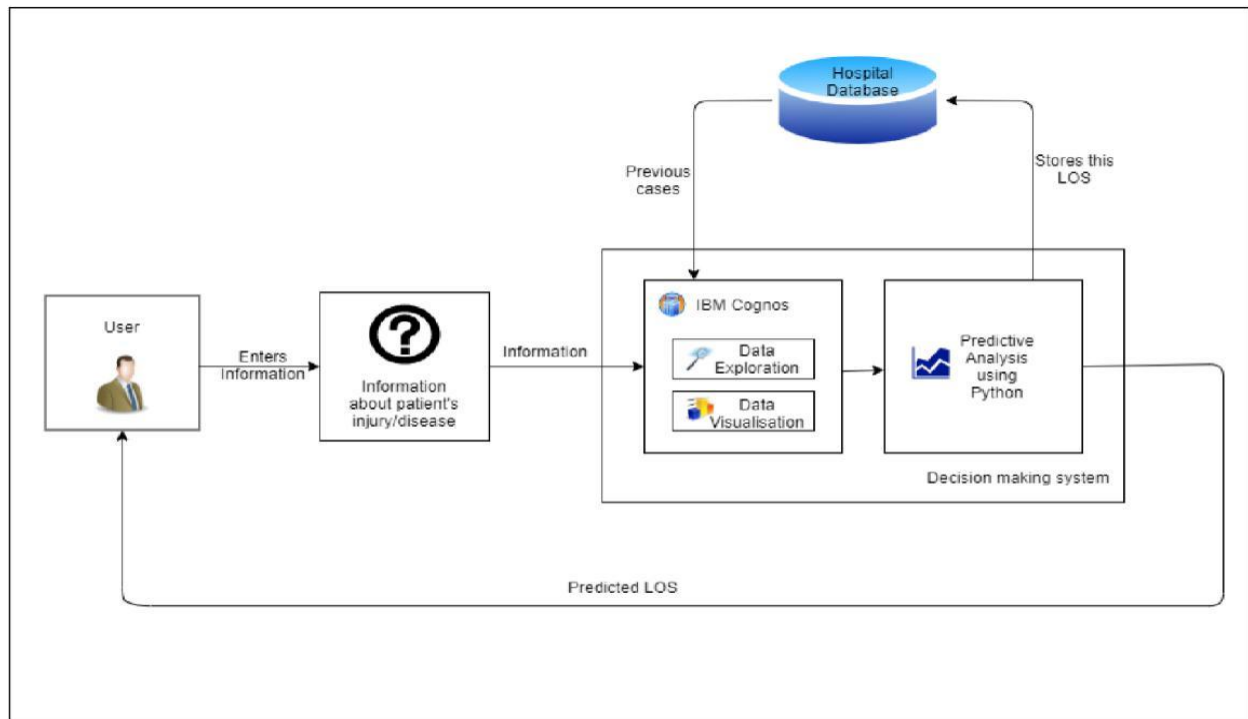
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	The patients will get efficient timely care and diagnosis as this software is used for the prediction of LOS for their health.
NFR-2	Security	Assures all data inside the system or its part will be protected against malware attacks or unauthorized access.
NFR-3	Reliability	A highly reliable system consistently performs the specified functions without failure and has a lower risk of errors
NFR-4	Performance	performance measurements include: <ul style="list-style-type: none"> Quality of patient care Cost of healthcare services Timeliness of care Patient's experience
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

CHAPTER 5 PROJECT DESIGN

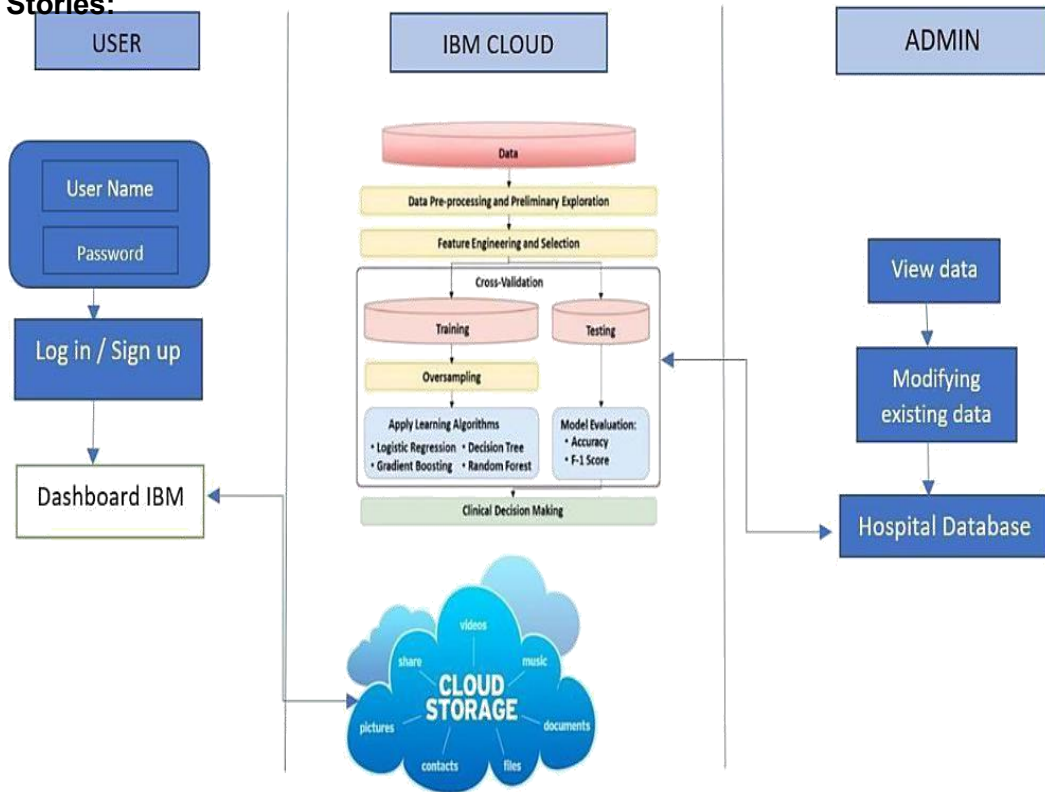
5.1 Data Flow Diagram:



Solution & Technical Architecture:



User Stories:



User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Patients (Users)	Registration	USN-1	Users can register for the admission by entering their details, by referring the bed availabilities and the doctor who they want to consult.	They can access their account / dashboard	High	Sprint-1

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Hospital Staffs	Managing patient details & Ward availability	USN-2	The official website enables the technical staffs in the hospital management to access patient data from anywhere in the world and execute any operation on it.	Data is easily accessible wherever and whenever.	High	Sprint-1
Patients (Web user)	Data Visualization	USN-3	Visualization techniques are used to determine the frequency of occurrence and recovery time of a disease, and they can be used to identify data trends.	Make easy and better understanding while visualizing data.	High	Sprint-1

Patient Care Executive	Dashboard	USN-4	The dashboard provides the information about the severity of the disease, recovery period based on previous data and the current details of the data. This will help to find Length Of Stay.	Give quick access for data in need of patient details.	Medium	Sprint-2
Administrator	Maintain database and records	USN-5	Keeps track of the patient details and updating data.	Provides Better Management	Low	Sprint-3

CHAPTER 6 PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Register	USN-1	As an Admin, I can register users and provide usernames and passwords.	10	Medium	Sneha D
Sprint-1	Login	USN-2	As a user, I can log in to the website/ application using username and password	10	Medium	Anshiya Antrolin E.S
Sprint-2	Data Preparation, Exploration and Visualization	USN-3	As a user, I need a visualized dashboard of the number of beds occupied and the number of free beds in a hospital	20	High	Bavithira R..S
Sprint-2	Dashboard	USN-4	As a user, I can add Patient Details like Patient name, contact number, age,etc.	20	High	Bavithira R.S
Sprint-3	Dashboard	USN-5	As a user, I want the interactive dashboard to analyze the data. Have the data in terms of Graph.	20	High	Shinia D
Sprint-3	Dashboard	USN-6	As a user, I can upload patient medical reports and maintain records.	10	Medium	Shinia D
Sprint-4	Predict LOS	USN-7	As a user, I want a flawless system to predict the patient's length of stay.	20	High	Anshiya Antrolin E.S

6.2 Sprint Delivery Schedule:

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date(Planned)	Story Points Completed (as on Planned End Date)	Sprint Release as Date (Actual)
Sprint-1	20	60 Days	1 Nov 2022	5 Nov 2022	20	5 Nov 2022
Sprint-2	20	60 Days	6 Nov 2022	10 Nov 2022	20	10 Nov 2022
Sprint-3	20	60 Days	11 Nov 2022	15 Nov 2022	20	11 Nov 2022
Sprint-4	20	60 Days	16 Nov 2022	19 Nov 2022	20	16 Nov 2022

CHAPTER 7

CODING & SOLUTIONING

PREPARED DATA SET : https://us3.ca.analytcs.ibm.com/bi/?perspective=ca-modeller&pathRef=.my_folders%2FFINAL%2BDATASET

7.1 FEATURE 1 - DASHBOARD

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

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

```
<h2>Dashboard</h2>
```

```
<p>A dashboard helps you to monitor events or activities at a glance by providing key
```

```
insights and analysis about your data on one or more pages or screens.</p>
```

```
</div>
```

```
<iframe
```

```
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```

```
<iframe
```

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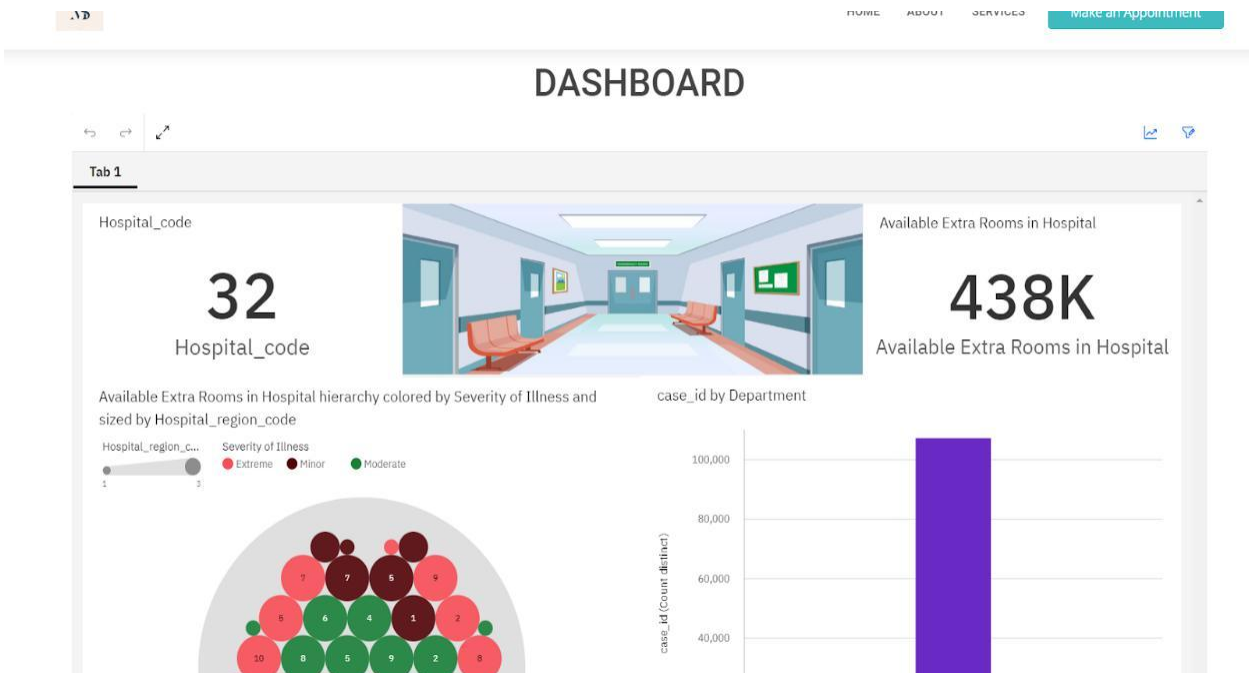
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</div>

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7.2 REPORT

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  <div class="section-ttle">
    <h2>Reports</h2>
    <p>Reportng is a Web-based report authoring tool that professional report authors and developers
use to build sophisticated, multiple-page, multiple-query reports against multiple databases. With
Cognos Analytics - Reportng, you can create any reports that your organizaton requires, such as
invoices, statements, and weekly sales and inventory reports.</p>
  </div>
  <div>
    <iframe
src="https://us3.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2FREPORT%2B2&closeWindowOnLastView
=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&acton=run&prompt
=false" width="1260" height="800" frameborder="0" gesture="media" allow="encrypted-media"
allowfullscreen=""></iframe>
  </div>
  <div>
    <iframe
src="https://us3.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2Freport3&closeWindowOnLastView=true
&ui_appbar=false&ui_navbar=false&shareMode=embedded&acton=run&prompt=fals e"
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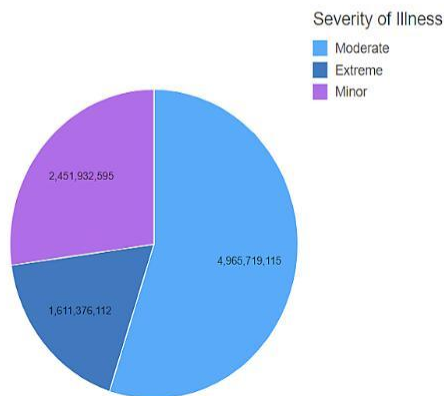
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</div>
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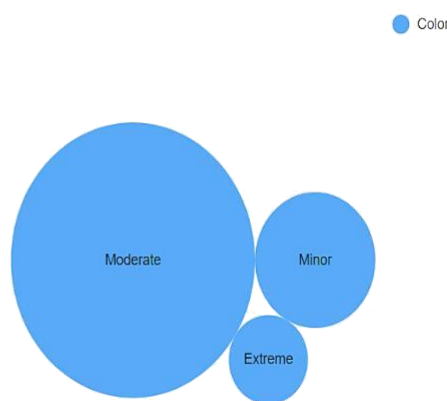
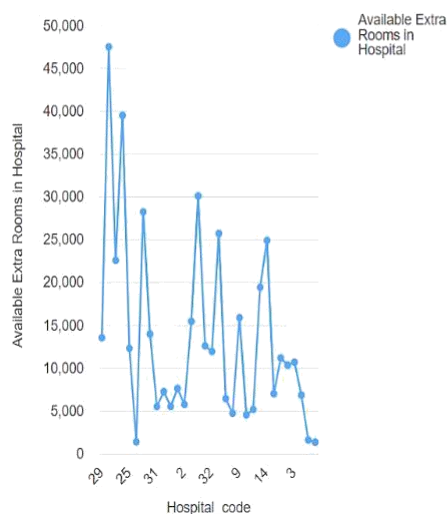
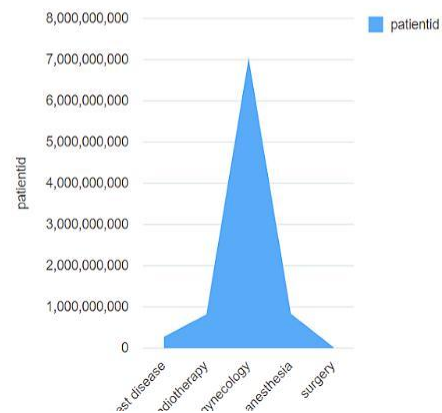
REPORT

HEALTH CARE DATA REPORT

Severity of illness by patient id



Department by patient id



7.3 STORY:

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```

```
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```

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

```
<h2>Stories</h2>
```

```
<p>A story is a type of view that contains a set of scenes that are
```

displayed in sequence over time.

Stories are similar to dashboards because they also use visualizations to share your insights. Stories differ from dashboards because they provide an over-time narrative and can convey a conclusion or recommendation.</p>

```
</div>
```

```
<div>
```

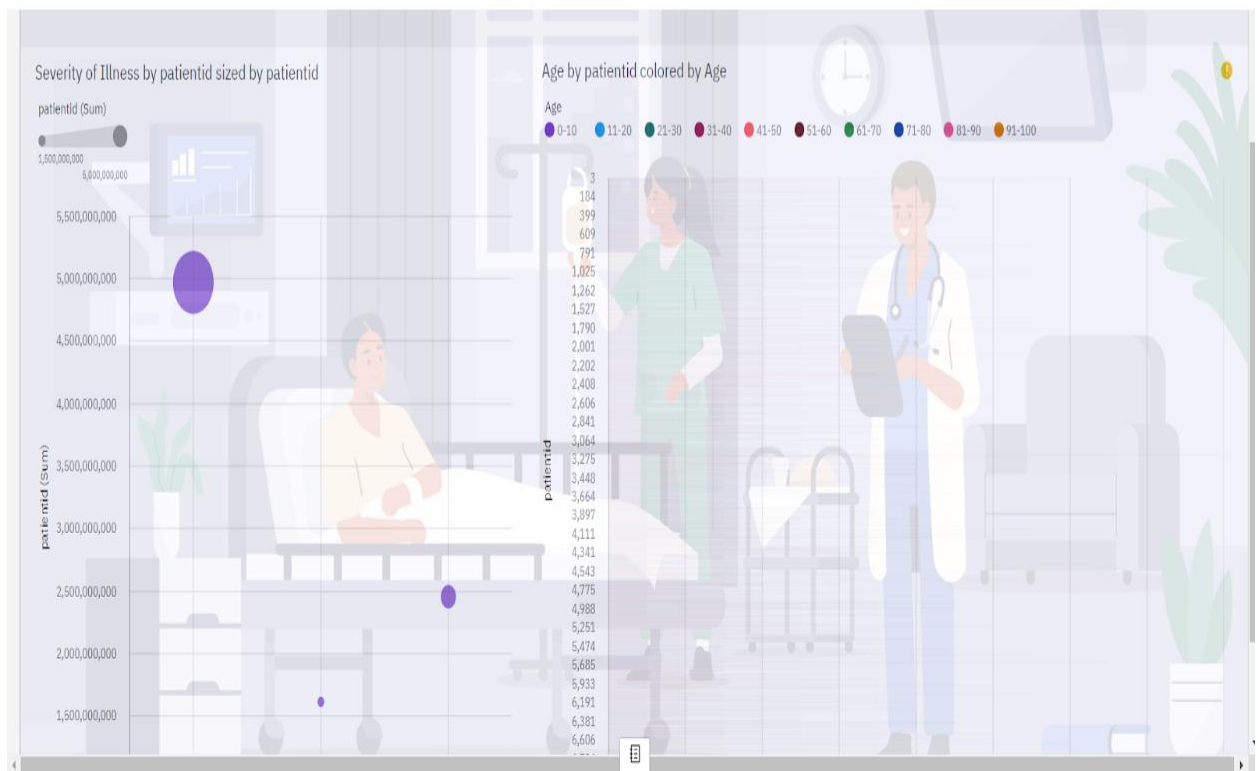
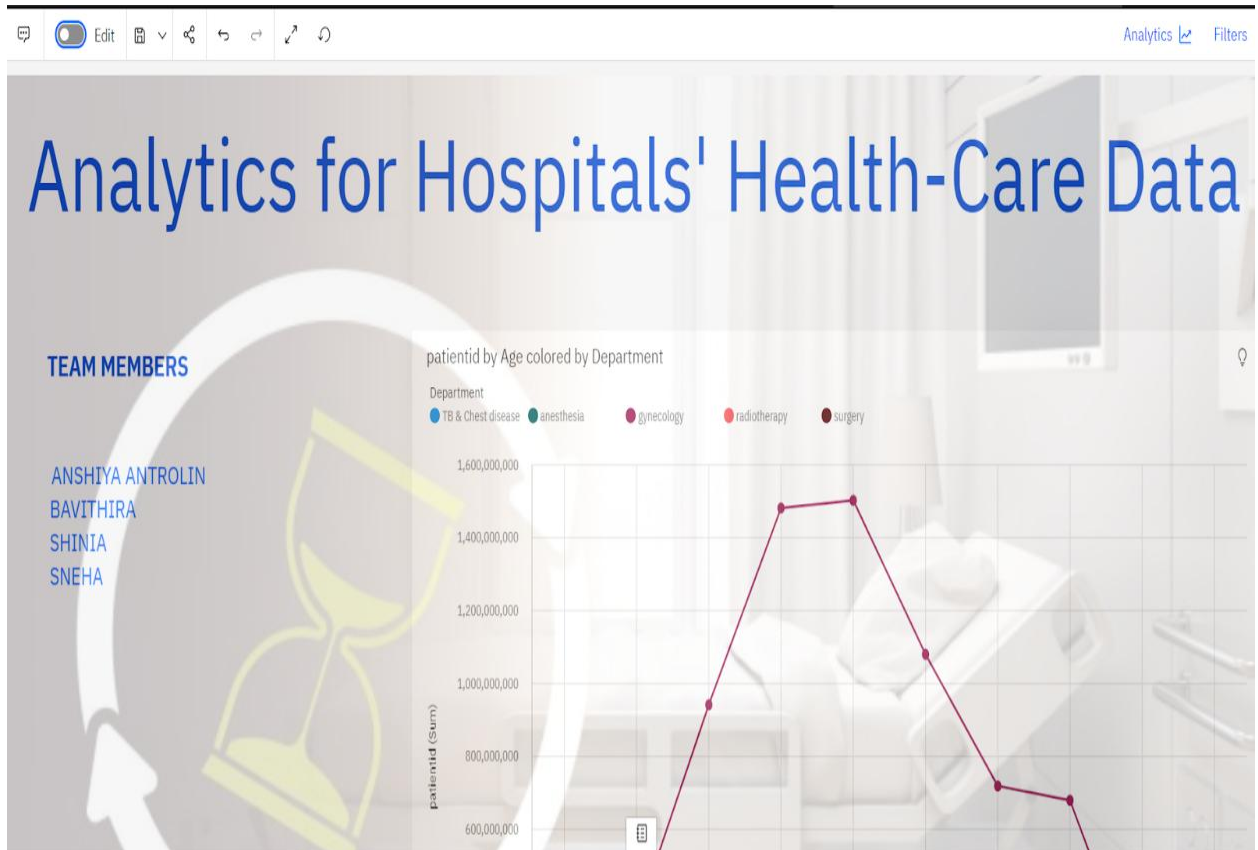
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<iframe
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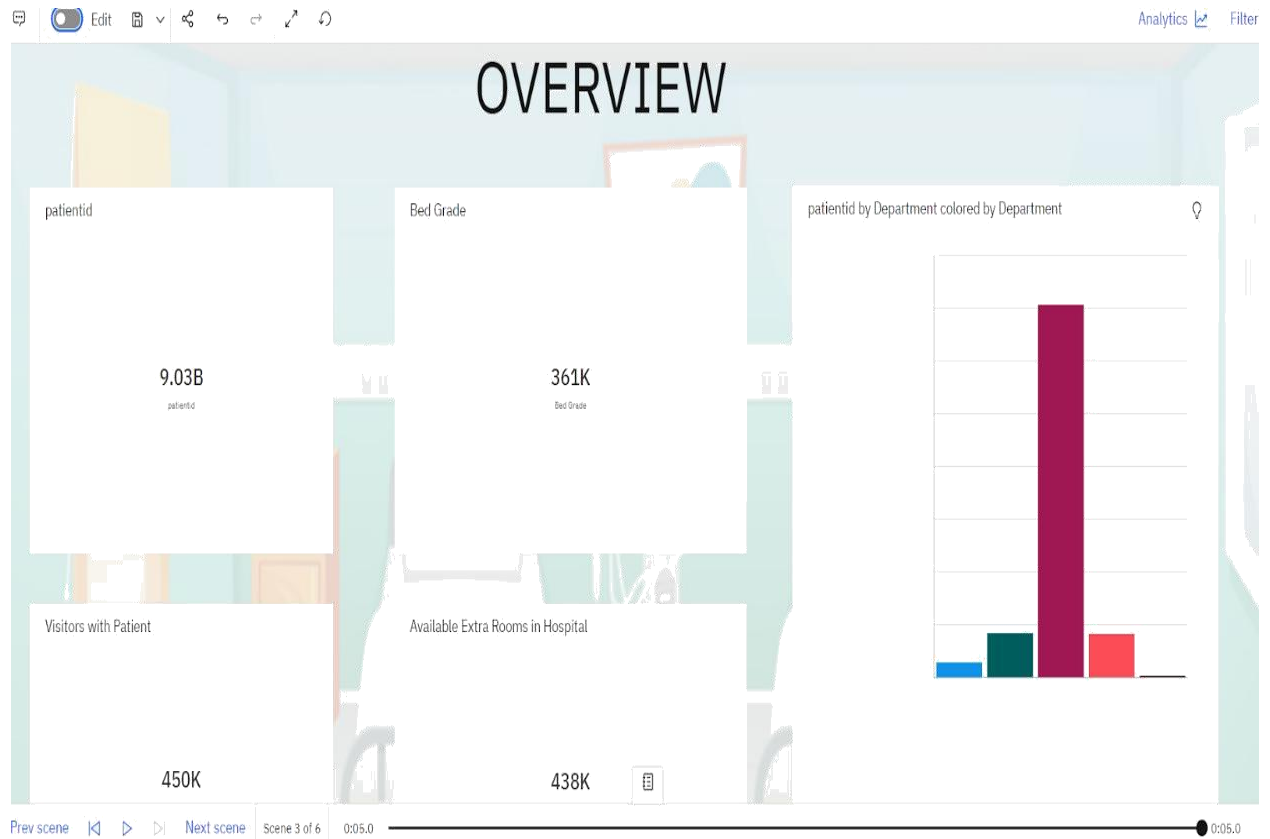
```
src="https://us3.ca.analytics.ibm.com/bi/?perspective=story&pathRef=.my_folders%2FStory%2FStory_card&closeWindowOnLastView=true&p;ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&sceneId=model000001848587107f_000000000&sceneTime=0" width="1260" height="800" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>
```

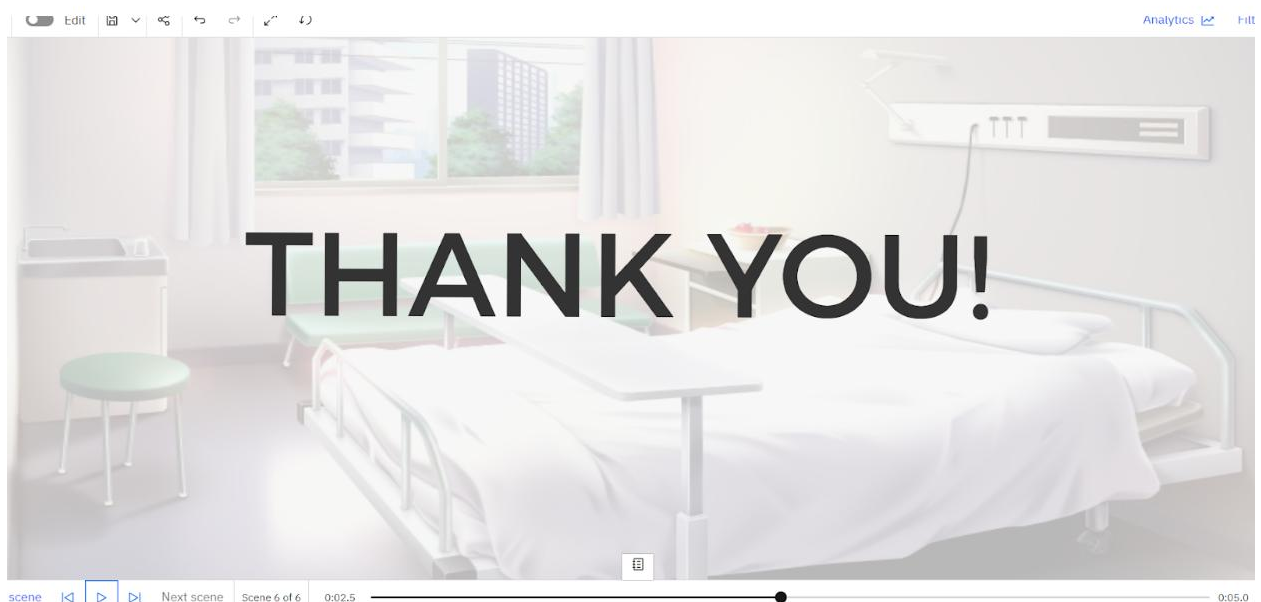
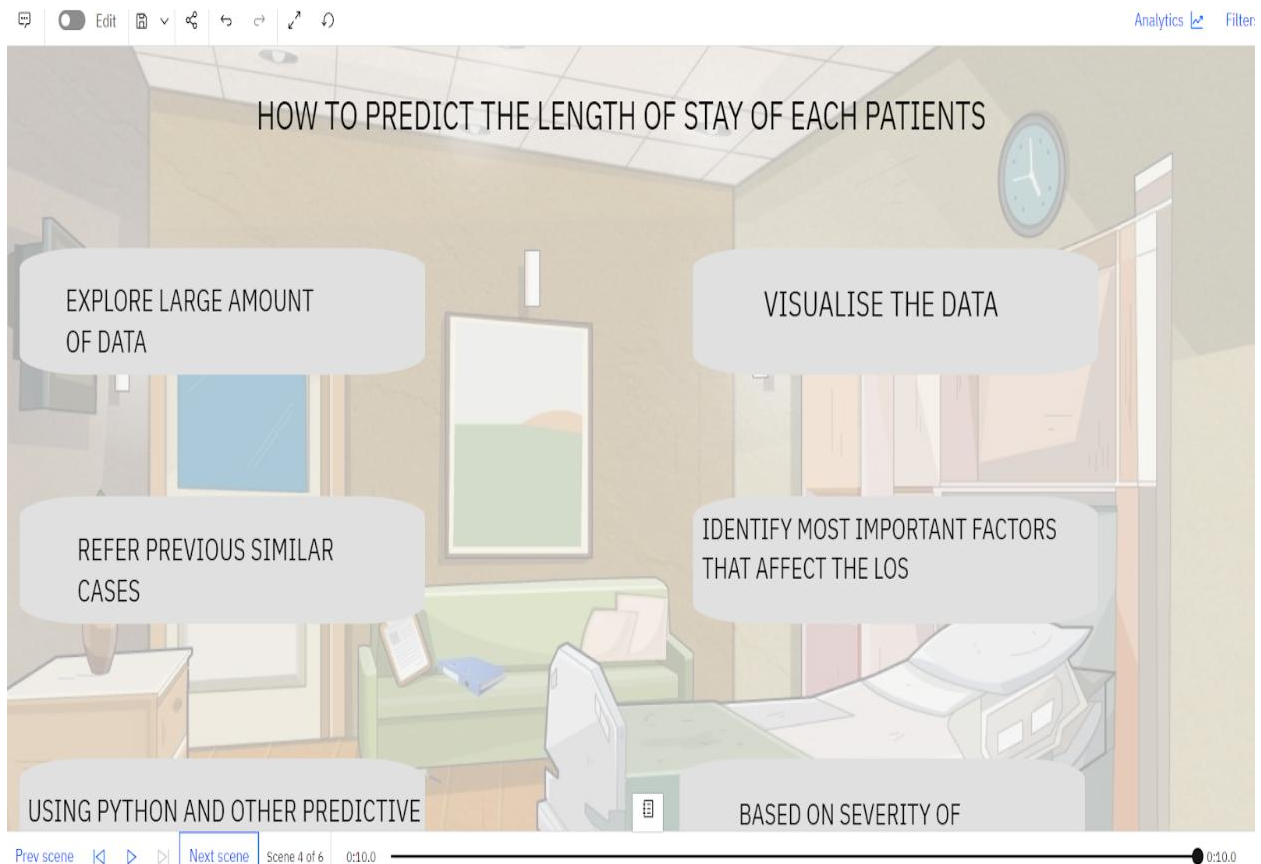
```
</div>
```

```
</div>
```

```
</div>
```







CHAPTER 8

TESTING

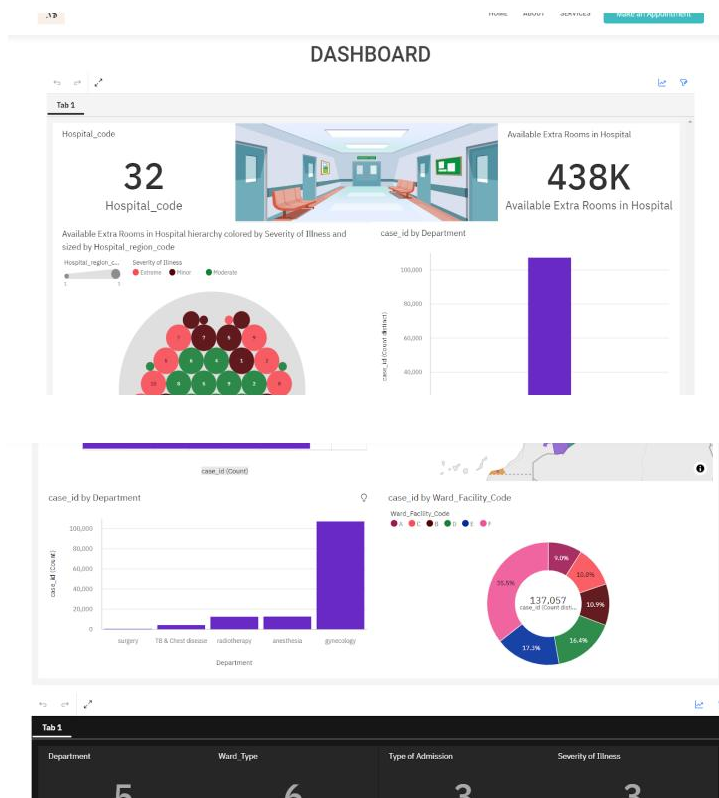
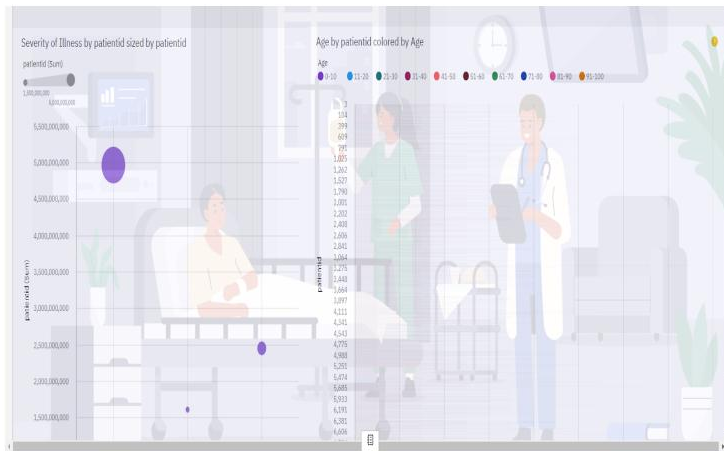
8.1 PERFORMANCE TESTING

8.1.1 Model Performance Testng:

Project team shall fill the following informaton in the model performance testng template.

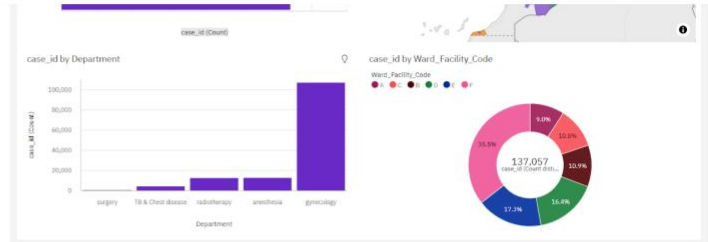
S.No.	Parameter	Screenshot / Values
er	No of Visulizatons / Graphs - 35	1. Dashboard design

Data Responsiveness

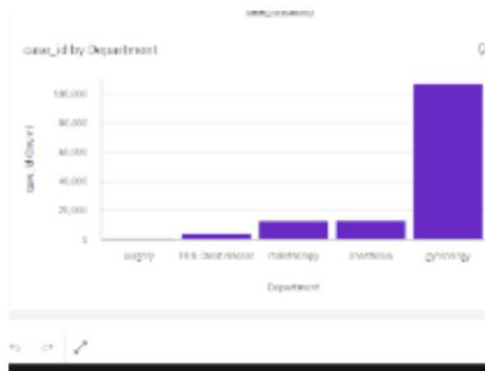


3
.

Amount Data to
Rendered (DB2
Metrics)



Tab 1			
Department	Ward_Type	Type of Admission	Severity of Illness
5	6	3	3



4

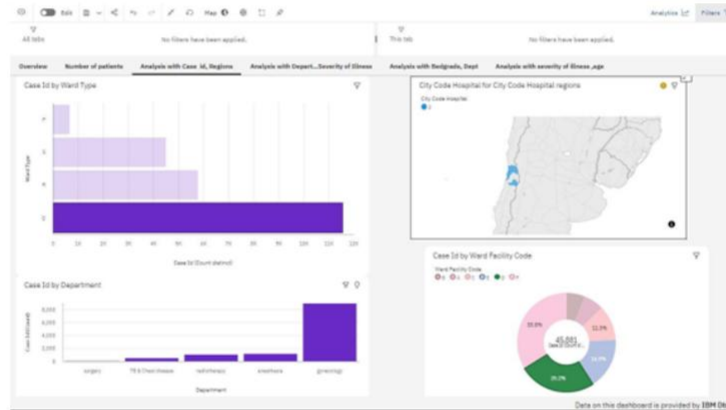
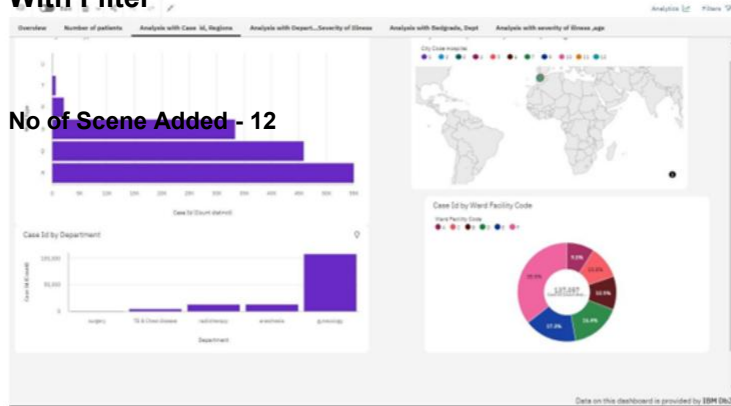
Utilization of Data Filters

5

Effective User Story

Without applying any filter
With Filter

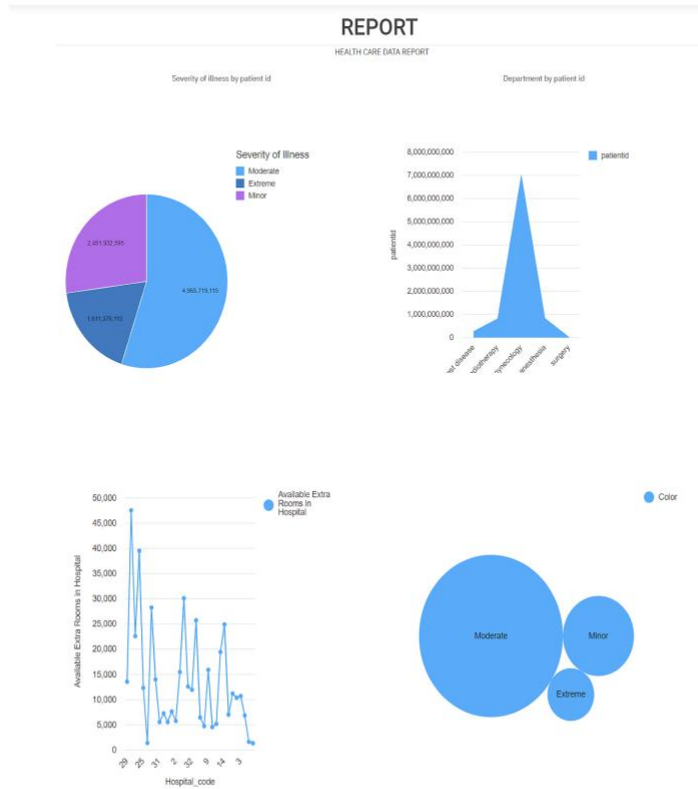
No of Scene Added - 12



6

Descriptive Reports

No of Visualizatons / Graphs - 6 Pages - 3



8.1.2 Performance Testng

8.1 Test Cases:

Test case ID	Feature Type	Component	Test Scenario	Steps To Execute	Test Data	Expected Result	Actual Result	Status
HomePage_TC_001	Functional	Home Page	Verify user is able to see the Home page	1.Enter URL and click Home page		Home page should be displayed.	Working as expected	Pass
DashboardPage_TC_002	Functional	Dashboard Page	Verify user is able to see the Dashboard page	1.Enter URL and click Dashboard page		Dashboard page will be shown	Working as expected	Pass
ReportPage_TC_003	Functional	Report page	Verify user is able to see the Report page	1. Enter the URL and click Report Page.		User should navigate to Report page.	Working as expected	Pass
StoryPage_TC_004	Functional	Story page	Verify user is able to see the Story page	1.Enter URL and click go Story page.		Story Page will be shown	Working as expected	Pass
Filter_TC_005	Functional	Filter	Verify the filter working or not	1.Click the filter, choose data		Filters are properly working	Working as expected	Pass

8.2 USER ACCEPTANCE TESTING

1. Defect Analysis:

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

Resolution	Severity1	Severity2	Severity3	Severity4	Subtotal
By Design	4	3	5	0	12
Duplicate	0	0	0	0	0
External	8	3	2	1	14
Fixed	11	8	7	5	31
Not Reproduced	1	0	0	0	1
Skipped	0	0	0	0	0
Won't Fix	0	0	0	0	0
Totals	24	14	14	6	57

2. Test Case Analysis

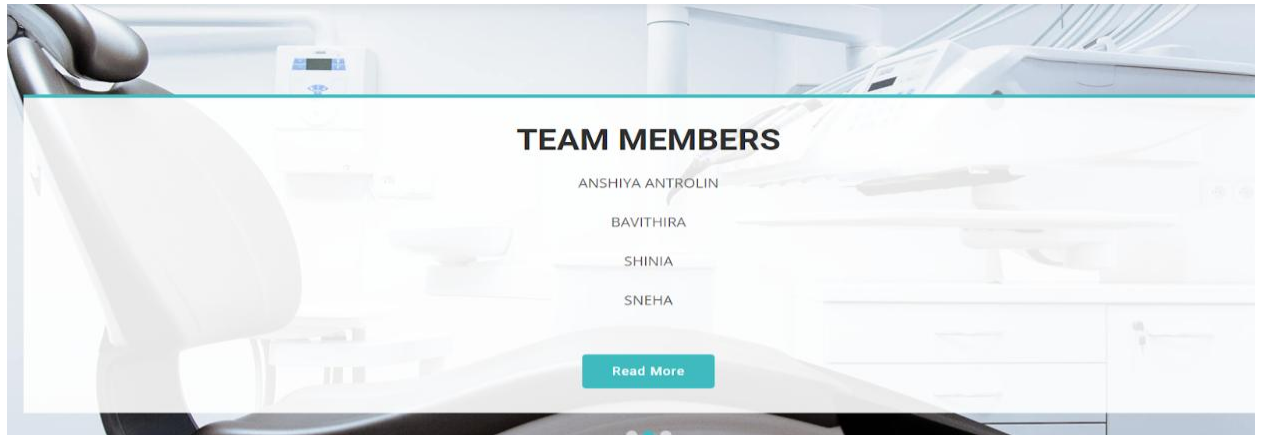
This report shows the number of test cases that have passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	10	0	0	10

Client Applicaton	15	0	0	15
Security	3	0	1	2
Outsource Shipping	1	0	0	1
Excepton Reportng	9	0	0	9
Final Report Output	10	0	0	10
Version Control	1	0	0	1

CHAPTER 9

RESULT:



DASHBOARD

A dashboard helps you to monitor events or activities at a glance by providing key insights and analysis about your data on one or more pages or screens.



VISUALIZATION

Reporting provides you with a preview of your visualization, using simulated data. This allows you to view your style changes without running your report.



REPORT

Reports are usually created by professional report authors who have a good knowledge of the data and tools



STORY

A story is a type of view. A story is composed of a set of scenes that are displayed in sequence over time. Stories can be used to provide your data with a visual narrative.

ABOUT US

Our Medstay Healthcare aspires to deliver outstanding patient experiences with world class expertise backed by next generation medical and digital technologies because you deserve the best of care and are at the core of everything we do



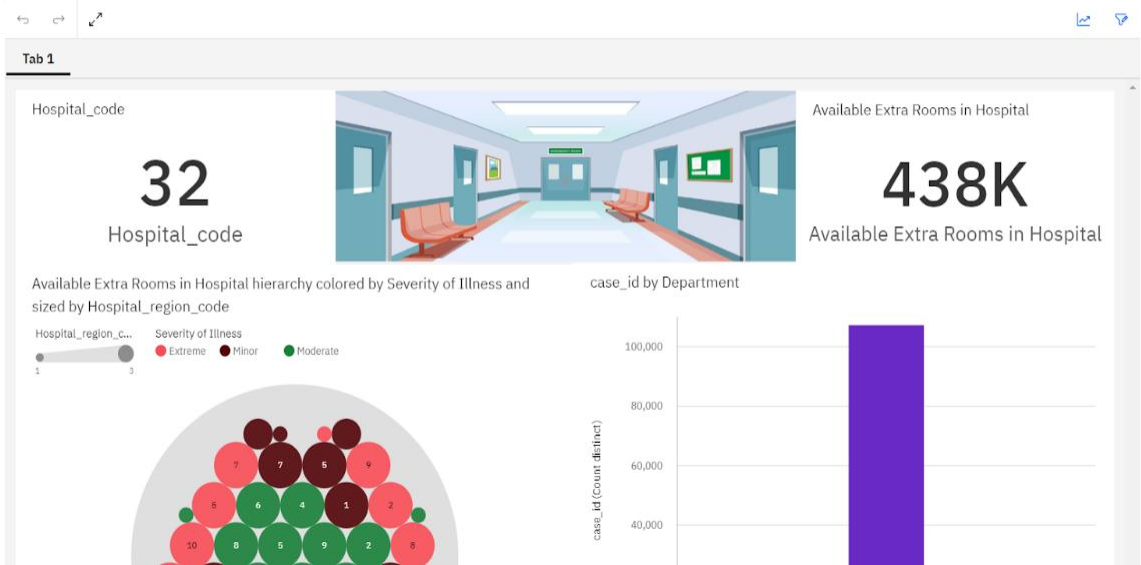
Predictive analytics is an increasingly important tool in the healthcare field since modern machine learning (ML) methods can use large amounts of available data to predict individual outcomes for patients. For example, ML predictions can help healthcare providers determine the likelihoods of disease, aid in the diagnosis, recommend treatment, and predict future wellness. For this project, I chose to focus on a more logistical metric of healthcare, hospital length-of-stay (LOS). LOS is defined as the time between hospital admission and discharge measured in days. The expected outcome of this project is to develop a model that will be better at predicting hospital LOS than the industry standards of median and average LOS. The median LOS is simply the median LOS of past admissions to a hospital. Similarly, a second commonly used metric in healthcare is the average, or mean LOS. For example, a perfect prediction model would have an RMSE of 0. The RMSE equation for this work is given as follows, where (n) is the number of hospital admission records, (y-hat) the prediction LOS, and (y) is the actual LOS. To measure performance, I'll compare the prediction model against the median and average LOS using the root-mean-square error (RMSE). The RMSE is a commonly used measure of the differences between values predicted by a model and the values observed, where a lower score implies better accuracy.

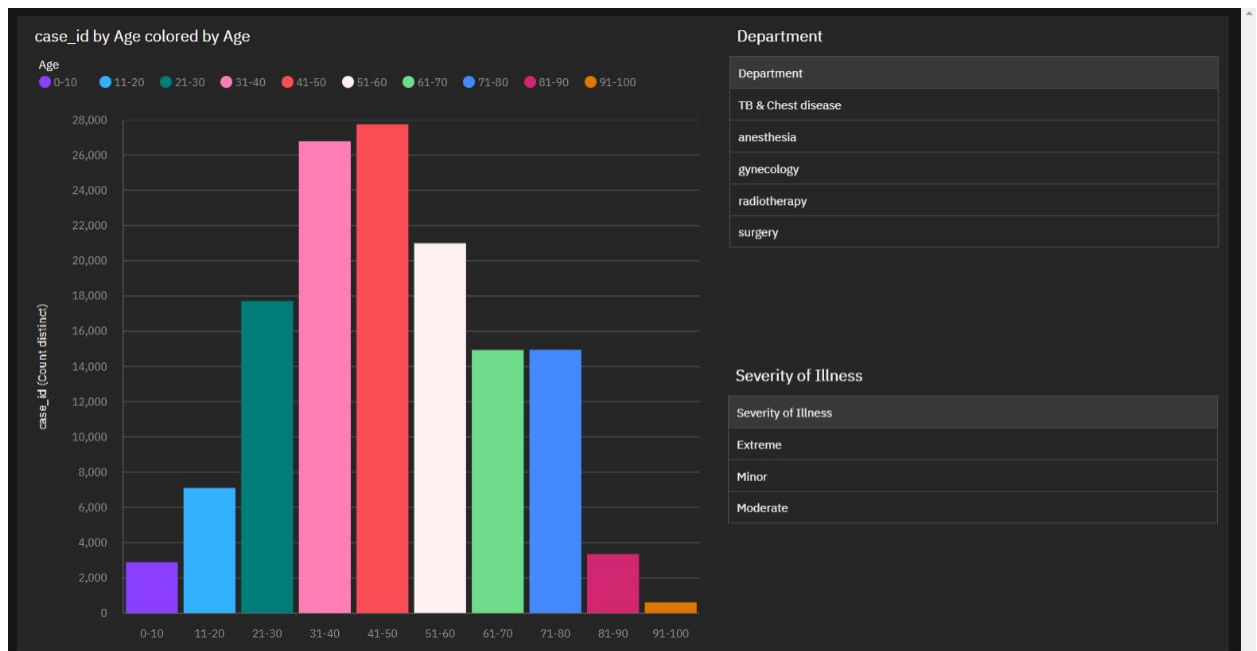
Medstay

HOME ABOUT SERVICES

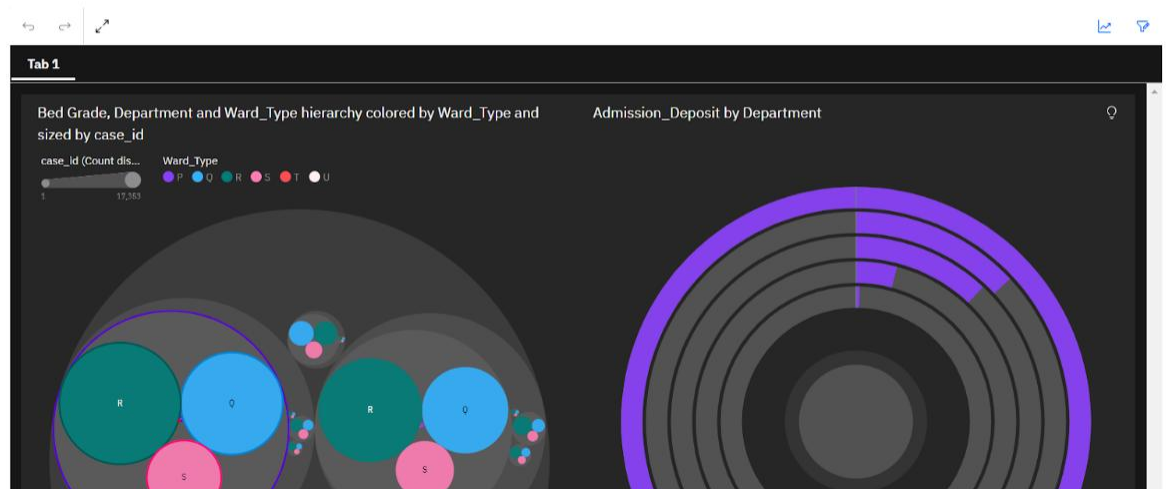
Make an Appointment

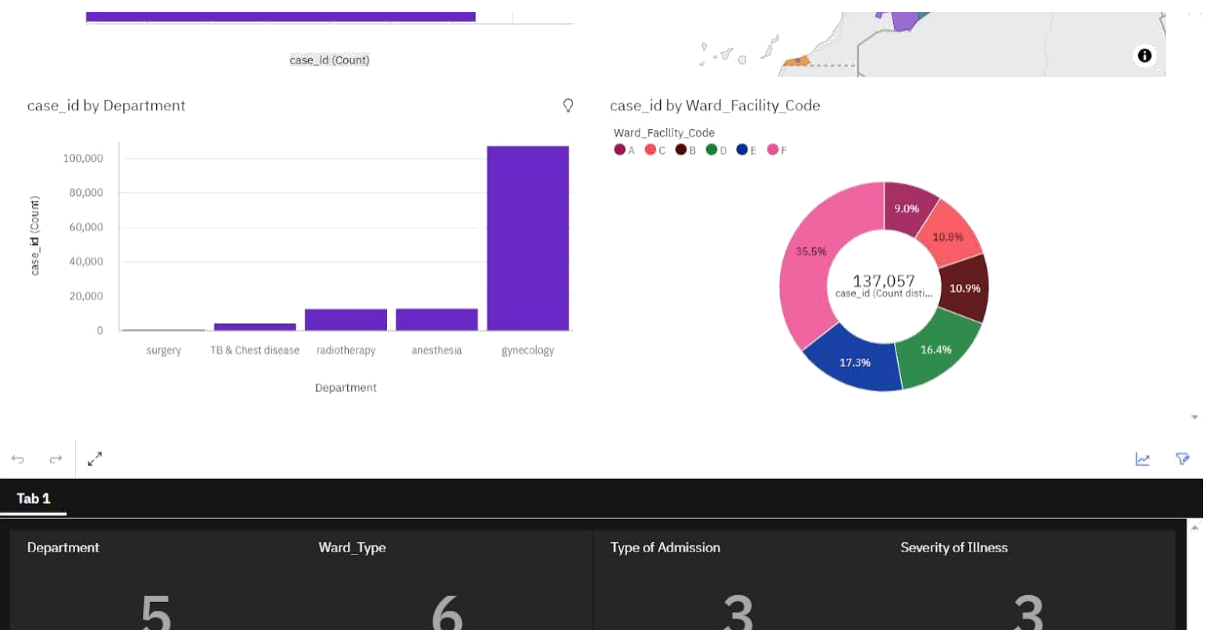
DASHBOARD





VISUALISATION

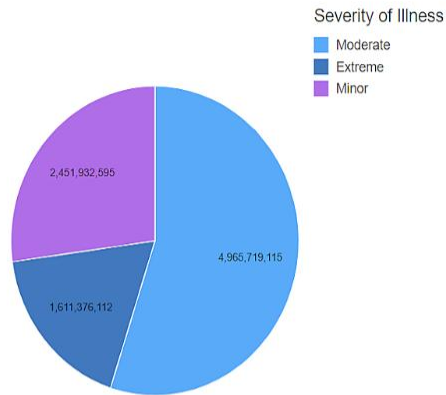




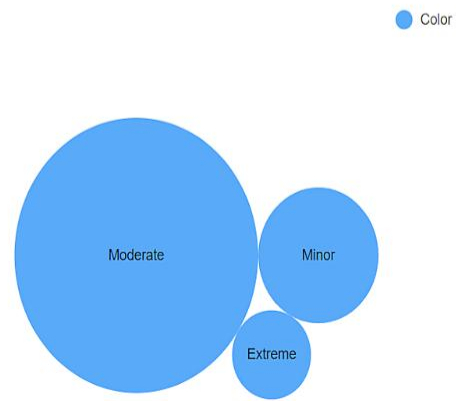
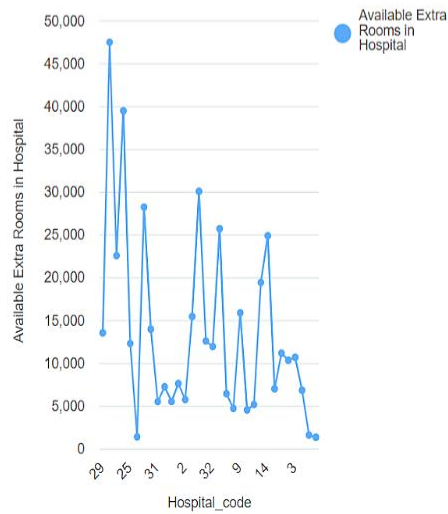
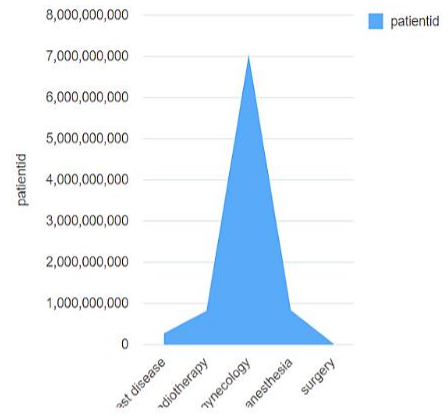
REPORT

HEALTH CARE DATA REPORT

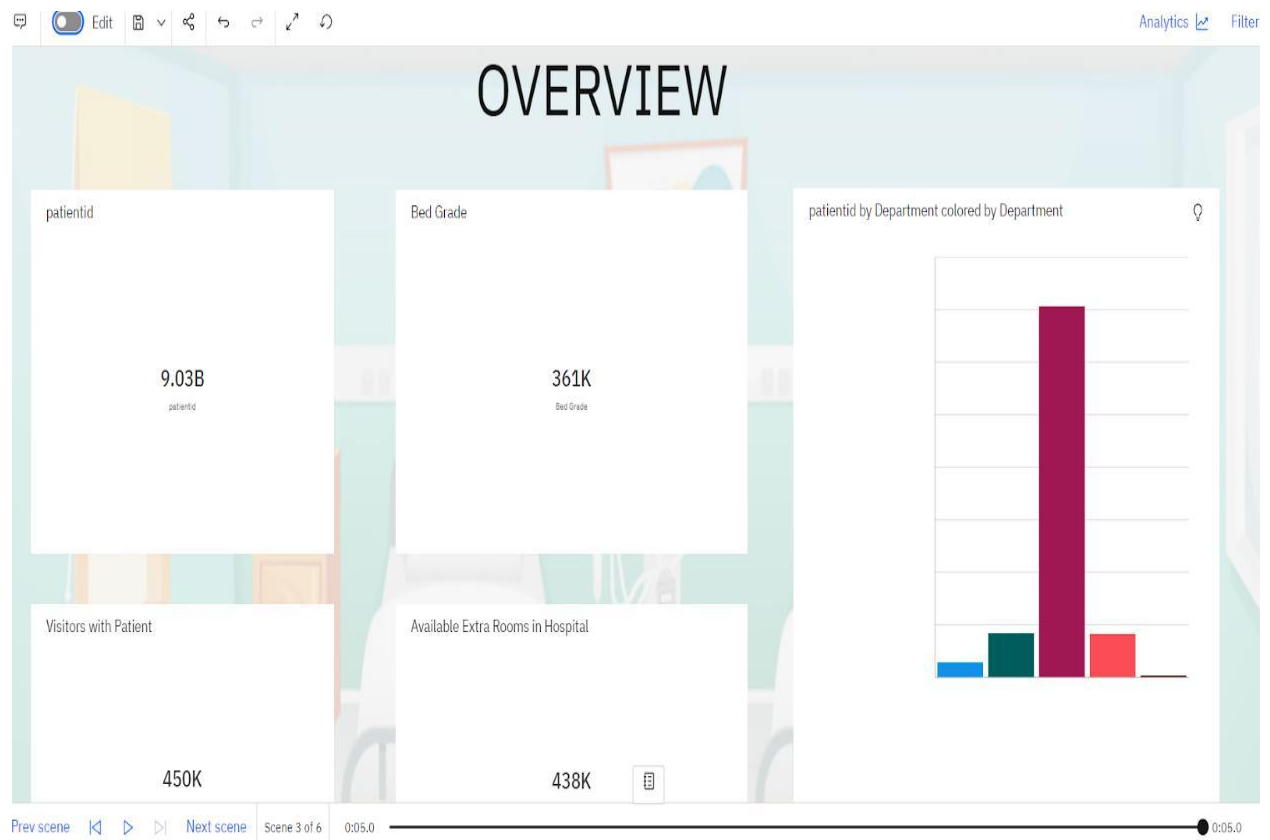
Severity of illness by patient id



Department by patient id



STORY:



CHAPTER 10

ADVANTAGES:

1. Optimal resource allocation and better functioning.
2. Accurately predict the length of stay of each patient.

DISADVANTAGES:

1. Capturing data is one of the biggest obstacles.
2. More time consuming.

EXPLORE LARGE AMOUNT
OF DATA

VISUALISE THE DATA

REFER PREVIOUS SIMILAR
CASES

IDENTIFY MOST IMPORTANT FACTORS
THAT AFFECT THE LOS

USING PYTHON AND OTHER PREDICTIVE

BASED ON SEVERITY OF

CHAPTER 11

CONCLUSION:

This project shows that unstructured data can be used to predict LOS with acceptable predictive performance. The performance was similar to the performance of the model using structured data. Structured data, however, may have the drawback of being more time-consuming to extract. In many applications, unstructured text data contains valuable insights that are yet to be explored. As the methods to automatically extract knowledge evolve, they will undoubtedly give more accurate predictions. Modules to extract specific information like the primary complaint or presence of pain are currently being developed and could be combined or added to already existing software

CHAPTER 12

FUTURE SCOPE:

Further research is required to explore novel methods such as fuzzy systems which could build upon the success of current models as well as further exploration of black-box approaches and model interpretability. This is important, as in general, healthcare workers are overwhelmed by the sheer number of patients that they are required to care for, the associated tasks required of them and the amount of data generated by the patients. Machine learning implementations and their explanations, if not sufficiently interpretable, could further hamper the day-to-day effort, of a healthcare worker. Balancing the interpretability of such models with the overall prediction performance that they provide will be a key challenge in the future of LoS prediction.

CHAPTER 13

APPENDIX

Source Code:

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="utf-8">
  <meta content="width=device-width, initial-scale=1.0" name="viewport">
  <title>Medicio Bootstrap Template - Index</title>
  <meta content="" name="description">
  <meta content="" name="keywords">
  <!-- Favicons -->
  <link href="assets/img/favicon.png" rel="icon">
  <link href="assets/img/apple-touch-icon.png" rel="apple-touch-icon">
  <!-- Google Fonts -->
  <link
    href="https://fonts.googleapis.com/css?family=Open+Sans:300,300i,400,400i,600,600i,700,700i|
    Roboto: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/fontawesome-free/css/all.min.css" rel="stylesheet">

  <link href="assets/vendor/animate.css/animate.min.css" rel="stylesheet">
```

```

<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/swiper/swiper-bundle.min.css" rel="stylesheet">

<!-- Template Main CSS File -->
<link href="assets/css/style.css" rel="stylesheet">
<!-- =====
* Template Name: Medicio - v4.9.1
* Template URL: https://bootstrapmade.com/medicio-free-bootstrap-theme/
* Author: BootstrapMade.com
* License: https://bootstrapmade.com/license/
===== -->
</head>
<body>
<!-- ===== Top Bar ===== -->
<div id="topbar" class="d-flex align-items-center fixed-top">
    <div class="container d-flex align-items-center justify-content-center justify-content-

md-between">

    <div class="align-items-center d-none d-md-flex">
        <i class="bi bi-clock"></i> Monday - Sunday, 8AM to

10PM </div>

```

```

<div class="d-flex align-items-center">
  <i class="bi bi-phone"></i> Call us now

  9341376454 </div>

</div>
</div>
<!-- ===== Header ===== -->
<header id="header" class="fixed-top">
  <div class="container d-flex align-items-center">
    <a href="index.html" class="logo me-auto"></a>

    <!-- Uncomment below if you prefer to use an image logo -->
    <!-- <h1 class="logo me-auto"><a href="index.html">Medicio</a></h1> -->
    <nav id="navbar" class="navbar order-last order-
      lg-0"> <ul>

      <li><a class="nav-link scrollto " href="#hero">Home</a></li>

      <li><a class="nav-link scrollto" href="#about">About</a></li>

      <li><a class="nav-link scrollto"
        href="#services">Services</a></li> </ul>

      <i class="bi bi-list mobile-nav-toggle"></i>
    </nav><!-- .navbar -->
    <a href="#appointment" class="appointment-btn scrollto"><span class="d-none d-
      md-inline">Make an</span> Appointment</a>

```

```

</div>
</header><!-- End Header -->
<!-- ===== Hero Section ===== -->
<section id="hero">
  <div id="heroCarousel" data-bs-interval="5000" class="carousel slide carousel-fade"

data-bs-ride="carousel">

<ol class="carousel-indicators" id="hero-carousel-indicators"></ol>
<div class="carousel-inner" role="listbox">
  <!-- Slide 1 -->
  <div class="carousel-item active" style="background-image: url(assets/img/slide/slide-
1.jpg)"> <div class="container">

    <h2>Welcome to <span>Analytics for Hospitals Health-Care Data</span></h2>
    <p>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</p>

    <a href="#about" class="btn-get-started scrollto">Read
    More</a> </div>

  </div>
  <!-- Slide 2 -->
  <div class="carousel-item" style="background-image: url(assets/img/slide/slide-
2.jpg)"> <div class="container">

    <h2>TEAM MEMBERS</h2>
    <p>ANSHIYA ANTROLIN<br></br>

```

```

        BAVITHIRA <br></br>
        SHINIA<br></br>
        SNEHA<br></br>
    </p>
    <a href="#about" class="btn-get-started scrollto">Read
    More</a> </div>

</div>
<!-- Slide 3 -->
<div class="carousel-item" style="background-image: url(assets/img/slide/slide-
3.jpg)"> <div class="container">

    <h2>Mission of our Project</h2>
    <p>We help 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.

    </p>
    <a href="#about" class="btn-get-started scrollto">Read
    More</a> </div>

</div>
</div>
<a class="carousel-control-prev" href="#heroCarousel" role="button" data-bs-
slide="prev"> <span class="carousel-control-prev-icon bi bi-chevron-left" aria-
hidden="true"></span> </a>

```

```

<a class="carousel-control-next" href="#heroCarousel" role="button" data-bs-
slide="next"> <span class="carousel-control-next-icon bi bi-chevron-right" aria-
hidden="true"></span> </a>

</div>
</section><!-- End Hero -->
<main id="main">
<!-- ===== Featured Services Section ===== -->

<section id="featured-services" class="featured-
services"> <div class="container" data-aos="fade-up">

<div class="row">
<div class="col-md-6 col-lg-3 d-flex align-items-stretch mb-5 mb-lg-0">

<div class="icon-box" data-aos="fade-up" data-aos-delay="100"> <div
class="icon"><i class="fas fa-heartbeat"></i></div>

<h4 class="title"><a href="">DASHBOARD</a></h4>
<p class="description">A dashboard helps you to monitor events or activities at a glance by
providing key insights and analysis about your data on one or more pages or screens.</p>

</div>
</div>
<div class="col-md-6 col-lg-3 d-flex align-items-stretch mb-5 mb-
lg-0"> <div class="icon-box" data-aos="fade-up" data-aos-
delay="200"> <div class="icon"><i class="fas fa-pills"></i></div>

<h4 class="title"><a href="">VISUALIZATION</a></h4>

```

`<p class="description">Reporting provides you with a preview of your visualization, using simulated data. This allows you to view your style changes without running your report.</p>`

`</div>`

`</div>`

`<div class="col-md-6 col-lg-3 d-flex align-items-stretch mb-5 mb-lg-0">`

`<div class="icon-box" data-aos="fade-up" data-aos-delay="300"> <div`

`class="icon"><i class="fas fa-thermometer"></i></div>`

`<h4 class="title">REPORT</h4>`

`<p class="description">Reports are usually created by professional report authors`

`who have a good knowledge of the data and tools</p>`

`</div>`

`</div>`

`<div class="col-md-6 col-lg-3 d-flex align-items-stretch mb-5 mb-`

`lg-0"> <div class="icon-box" data-aos="fade-up" data-aos-`

`delay="400"> <div class="icon"><i class="fas fa-dna"></i></div>`

`<h4 class="title">STORY</h4>`

`<p class="description">A story is a type of view. A story is composed of a set of scenes that are displayed in sequence over time. Stories can be used to provide your data with a visual narrative.</p>`

`</div>`

`</div>`

`</div>`

`</div>`


```

</section><!-- End Featured Services Section -->
<!-- ===== About Us Section ===== -->
<section id="about" class="about">
  <div class="container" data-aos="fade-up">
    <div class="section-title">
      <h2>About Us</h2>
      <p>Our Medstay Healthcare aspires to deliver outstanding patient experiences
with world class expertise backed by next generation medical and digital technologies
because you deserve the best of care and are at the core of everything we do</p>

    </div>
    <div class="row">
      <div class="col-lg-6" data-aos="fade-right">
         </div>

      <div class="col-lg-6 pt-4 pt-lg-0 content" data-aos="fade-
left"> <p class="fst-italic">

        Predictive analytics is an increasingly important tool in the healthcare field since modern
machine learning (ML) methods can use large amounts of available data to predict individual
outcomes for patients. For example, ML predictions can help healthcare providers determine the
likelihoods of disease, aid in the diagnosis, recommend treatment, and predict future wellness.
For this project, I chose to focus on a more logistical metric of healthcare, hospital length-of-stay
(LOS). LOS is defined as the time between hospital admission and discharge measured in

```

days. The expected outcome of this project is to develop a model that will be better at predicting hospital LOS than the industry standards of median and average LOS. The median LOS is simply the median LOS of past admissions to a hospital. Similarly, a second commonly used metric in healthcare is the average, or mean LOS. For example, a perfect prediction model would have an RMSE of 0. The RMSE equation for this work is given as follows, where (n) is the number of hospital admission records, (y-hat) the prediction LOS, and (y) is the actual LOS. To measure performance, I'll compare the prediction model against the median and average LOS using the root-mean-square error (RMSE). The RMSE is a commonly used measure of the differences between values predicted by a model and the values observed, where a lower score implies better accuracy.

```

    </p>
  </div>
</div>
</div>
</section><!-- End About Us Section -->
<section id="about" class="about">
  <div class="container" data-aos="fade-up">
    <div class="section-title">
<h1>DASHBOARD</h1>
<iframe
src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2
FDashboard%2B1&closeWindowOnLastView=true&ui_appbar=false&ui_navbar
=false&shareMode=embedded&action=view&mode=dashboard&subView=
model00000184867da35e_000000003" width="1260" height="800" frameborder="0"

```

gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

<iframe
src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2Fdashboard%2B5&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&mode=dashboard&subView=model000001848a6f20ea_00000002" width="1260" height="800" frameborder="0"

gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

<section id="about" class="about">

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

<div class="section-title">

<h1>VISUALISATION</h1>

<iframe
src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2Fbubbles%2Band%2Bradial%2Bdashboard&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&mode=dashboard&subView=model0000018485805219_00000002" width="1260" height="800" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

<iframe
src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2FAge%2Bwise%2Bpatient%2Bvisualisation&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&mode=dashboard" width="1260" height="800" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

<iframe
src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2

Fdashboard%2Blist%2Bof%2Bpatients&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&mode=dashboard&subView=model00000184857057a4_00000002" width="1260" height="800" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

<iframe src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2FNumber%2Bof%2Bpatients%2Bby%2Bward%2Btype&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&mode=dashboard&subView=model000001848565ef33_00000002" width="1260" height="800" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

<iframe src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2Fdashboard%2Bshowing%2Bwaterfall%252Cpie%252Cbar&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&mode=dashboard&subView=model000001848589b078_00000000" width="1260" height="800" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

<section id="about" class="about">
<div class="container" data-aos="fade-up">
<div class="section-title">
<h1>REPORT</h1>

<iframe src="https://us1.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2Freport%2B1&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded

```

&amp;action=run&amp;prompt=false" width="1260" height="800" frameborder="0"
gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

<iframe
src="https://us1.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2Freport%2B2&amp;closeWind
owOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedded
&amp;action=run&amp;prompt=false" width="1260" height="800" frameborder="0"
gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>
<iframe
src="https://us1.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2Freport%2B3&amp;closeWind
owOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedded
&amp;action=run&amp;prompt=false" width="1260" height="800" frameborder="0"
gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>
<!-- ===== Appointment Section ===== -->
<section id="appointment" class="appointment section-
bg"> <div class="container" data-aos="fade-up">

<div class="section-title">
  <h2>Make an Appointment</h2>
  <p></p>
</div>
  <form action="forms/appointment.php" method="post" role="form" class="php-email-
form" data-aos="fade-up" data-aos-delay="100">

  <div class="row">
    <div class="col-md-4 form-group">

```

```

        <input type="text" name="name" class="form-control" id="name"
placeholder="Your Name" required>

    </div>
    <div class="col-md-4 form-group mt-3 mt-md-0">
        <input type="email" class="form-control" name="email" id="email"
placeholder="Your Email" required>

    </div>
    <div class="col-md-4 form-group mt-3 mt-md-0">
        <input type="tel" class="form-control" name="phone" id="phone"
placeholder="Your Phone" required>

    </div>
</div>
<div class="row">
    <div class="col-md-4 form-group mt-3">
        <input type="datetime" name="date" class="form-control datepicker"
id="date" placeholder="Appointment Date" required>

    </div>
    <div class="col-md-4 form-group mt-3">
        <select name="department" id="department" class="form-
        select"> <option value="">Select Department</option>

        <option value="Department 1">Department 1</option>

        <option value="Department 2">Department 2</option>

        <option value="Department 3">Department 3</option>

        </select>

    </div>
</div>
<div class="col-md-4 form-group mt-3">

```

```

<select name="doctor" id="doctor" class="form-
select"> <option value="">Select Doctor</option>

<option value="Doctor 1">Doctor 1</option>
<option value="Doctor 2">Doctor 2</option>
<option value="Doctor 3">Doctor 3</option>
</select>
</div>
</div>
<div class="form-group mt-3">
    <textarea class="form-control" name="message" rows="5"
placeholder="Message (Optional)"></textarea>

</div>
<div class="my-3">
    <div class="loading">Loading</div>
    <div class="error-message"></div>
    <div class="sent-message">Your appointment request has been sent
successfully. Thank you!</div>

</div>
<div class="text-center"><button type="submit">Make an
Appointment</button></div> </form>

</div>
</section><!-- End Appointment Section -->
</main><!-- End #main -->

```



```

<!-- ===== Footer ===== -->
<footer id="footer">
  <div
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="utf-8">
  <meta content="width=device-width, initial-scale=1.0" name="viewport">
  <title>Medicio Bootstrap Template - Index</title>
  <meta content="" name="description">
  <meta content="" name="keywords">
  <!-- Favicons -->
  <link href="assets/img/favicon.png" rel="icon">
  <link href="assets/img/apple-touch-icon.png" rel="apple-touch-icon">
  <!-- Google Fonts -->
                                                                    <link
    href="https://fonts.googleapis.com/css?family=Open+Sans:300,300i,400,400i,600,600i,700,700i|
    Roboto: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/fontawesome-free/css/all.min.css" rel="stylesheet">

  <link href="assets/vendor/animate.css/animate.min.css" rel="stylesheet">

```

```

<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/swiper/swiper-bundle.min.css" rel="stylesheet">

<!-- Template Main CSS File -->
<link href="assets/css/style.css" rel="stylesheet">
<!-- =====
* Template Name: Medicio - v4.9.1
* Template URL: https://bootstrapmade.com/medicio-free-bootstrap-theme/
* Author: BootstrapMade.com
* License: https://bootstrapmade.com/license/
===== -->
</head>
<body>
<!-- ===== Top Bar ===== -->
<div id="topbar" class="d-flex align-items-center fixed-top">
    <div class="container d-flex align-items-center justify-content-center justify-content-

md-between">

    <div class="align-items-center d-none d-md-flex">
        <i class="bi bi-clock"></i> Monday - Sunday, 8AM to

10PM </div>

```

```

<div class="d-flex align-items-center">
  <i class="bi bi-phone"></i> Call us now

  9341376454 </div>

</div>
</div>
<!-- ===== Header ===== -->
<header id="header" class="fixed-top">
  <div class="container d-flex align-items-center">
    <a href="index.html" class="logo me-auto"></a>

    <!-- Uncomment below if you prefer to use an image logo -->
    <!-- <h1 class="logo me-auto"><a href="index.html">Medicio</a></h1> -->
    <nav id="navbar" class="navbar order-last order-
      lg-0"> <ul>

      <li><a class="nav-link scrollto " href="#hero">Home</a></li>

      <li><a class="nav-link scrollto" href="#about">About</a></li>

      <li><a class="nav-link scrollto"
        href="#services">Services</a></li> </ul>

      <i class="bi bi-list mobile-nav-toggle"></i>
    </nav><!-- .navbar -->
    <a href="#appointment" class="appointment-btn scrollto"><span class="d-none d-
      md-inline">Make an</span> Appointment</a>

```

```

</div>
</header><!-- End Header -->
<!-- ===== Hero Section ===== -->
<section id="hero">
  <div id="heroCarousel" data-bs-interval="5000" class="carousel slide carousel-fade"

data-bs-ride="carousel">

<ol class="carousel-indicators" id="hero-carousel-indicators"></ol>
<div class="carousel-inner" role="listbox">
  <!-- Slide 1 -->
  <div class="carousel-item active" style="background-image: url(assets/img/slide/slide-
1.jpg)"> <div class="container">

    <h2>Welcome to <span>Analytics for Hospitals Health-Care Data</span></h2>
    <p>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</p>

    <a href="#about" class="btn-get-started scrollto">Read
    More</a> </div>

  </div>
  <!-- Slide 2 -->
  <div class="carousel-item" style="background-image: url(assets/img/slide/slide-
2.jpg)"> <div class="container">

    <h2>TEAM MEMBERS</h2>
    <p>ANSHIYA ANTROLIN<br></br>

```

```

        BAVITHIRA <br></br>
        SHINIA<br></br>
        SNEHA<br></br>
    </p>
    <a href="#about" class="btn-get-started scrollto">Read
    More</a> </div>

</div>
<!-- Slide 3 -->
<div class="carousel-item" style="background-image: url(assets/img/slide/slide-
3.jpg)"> <div class="container">

    <h2>Mission of our Project</h2>
    <p>We help 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.

    </p>
    <a href="#about" class="btn-get-started scrollto">Read
    More</a> </div>

</div>
</div>
<a class="carousel-control-prev" href="#heroCarousel" role="button" data-bs-
slide="prev"> <span class="carousel-control-prev-icon bi bi-chevron-left" aria-
hidden="true"></span> </a>

```

```

<a class="carousel-control-next" href="#heroCarousel" role="button" data-bs-
slide="next"> <span class="carousel-control-next-icon bi bi-chevron-right" aria-
hidden="true"></span> </a>

</div>
</section><!-- End Hero -->
<main id="main">
<!-- ===== Featured Services Section ===== -->

<section id="featured-services" class="featured-
services"> <div class="container" data-aos="fade-up">

<div class="row">
<div class="col-md-6 col-lg-3 d-flex align-items-stretch mb-5 mb-lg-0">

<div class="icon-box" data-aos="fade-up" data-aos-delay="100"> <div
class="icon"><i class="fas fa-heartbeat"></i></div>

<h4 class="title"><a href="">DASHBOARD</a></h4>
<p class="description">A dashboard helps you to monitor events or activities at a glance by
providing key insights and analysis about your data on one or more pages or screens.</p>

</div>
</div>
<div class="col-md-6 col-lg-3 d-flex align-items-stretch mb-5 mb-
lg-0"> <div class="icon-box" data-aos="fade-up" data-aos-
delay="200"> <div class="icon"><i class="fas fa-pills"></i></div>

<h4 class="title"><a href="">VISUALIZATION</a></h4>

```

`<p class="description">Reporting provides you with a preview of your visualization, using simulated data. This allows you to view your style changes without running your report.</p>`

`</div>`

`</div>`

`<div class="col-md-6 col-lg-3 d-flex align-items-stretch mb-5 mb-lg-0">`

`<div class="icon-box" data-aos="fade-up" data-aos-delay="300"> <div`

`class="icon"><i class="fas fa-thermometer"></i></div>`

`<h4 class="title">REPORT</h4>`

`<p class="description">Reports are usually created by professional report authors`

`who have a good knowledge of the data and tools</p>`

`</div>`

`</div>`

`<div class="col-md-6 col-lg-3 d-flex align-items-stretch mb-5 mb-`

`lg-0"> <div class="icon-box" data-aos="fade-up" data-aos-`

`delay="400"> <div class="icon"><i class="fas fa-dna"></i></div>`

`<h4 class="title">STORY</h4>`

`<p class="description">A story is a type of view. A story is composed of a set of scenes that are displayed in sequence over time. Stories can be used to provide your data with a visual narrative.</p>`

`</div>`

`</div>`

`</div>`

`</div>`

```

</section><!-- End Featured Services Section -->
<!-- ===== About Us Section ===== -->
<section id="about" class="about">
  <div class="container" data-aos="fade-up">
    <div class="section-title">
      <h2>About Us</h2>
      <p>Our Medstay Healthcare aspires to deliver outstanding patient experiences
with world class expertise backed by next generation medical and digital technologies
because you deserve the best of care and are at the core of everything we do</p>

    </div>
    <div class="row">
      <div class="col-lg-6" data-aos="fade-right">
         </div>

      <div class="col-lg-6 pt-4 pt-lg-0 content" data-aos="fade-
left"> <p class="fst-italic">

        Predictive analytics is an increasingly important tool in the healthcare field since modern
machine learning (ML) methods can use large amounts of available data to predict individual
outcomes for patients. For example, ML predictions can help healthcare providers determine the
likelihoods of disease, aid in the diagnosis, recommend treatment, and predict future wellness.
For this project, I chose to focus on a more logistical metric of healthcare, hospital length-of-stay
(LOS). LOS is defined as the time between hospital admission and discharge measured in

```


days. The expected outcome of this project is to develop a model that will be better at predicting hospital LOS than the industry standards of median and average LOS. The median LOS is simply the median LOS of past admissions to a hospital. Similarly, a second commonly used metric in healthcare is the average, or mean LOS. For example, a perfect prediction model would have an RMSE of 0. The RMSE equation for this work is given as follows, where (n) is the number of hospital admission records, (y-hat) the prediction LOS, and (y) is the actual LOS. To measure performance, I'll compare the prediction model against the median and average LOS using the root-mean-square error (RMSE). The RMSE is a commonly used measure of the differences between values predicted by a model and the values observed, where a lower score implies better accuracy.

```

    </p>
  </div>
</div>
</div>
</section><!-- End About Us Section -->
<section id="about" class="about">
  <div class="container" data-aos="fade-up">
    <div class="section-title">
<h1>DASHBOARD</h1>
<iframe
src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2
FDashboard%2B1&closeWindowOnLastView=true&ui_appbar=false&ui_navbar
=false&shareMode=embedded&action=view&mode=dashboard&subView=
model00000184867da35e_000000003" width="1260" height="800" frameborder="0"

```

gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

<iframe

src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2Fdashboard%2B5&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&mode=dashboard&subView=model000001848a6f20ea_00000002" width="1260" height="800" frameborder="0"

gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

<section id="about" class="about">

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

<div class="section-title">

<h1>VISUALISATION</h1>

<iframe

src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2

Fbubbles%2Band%2Bradial%2Bdashboard&closeWindowOnLastView=true&ui_appb

ar=false&ui_navbar=false&shareMode=embedded&action=view&mode=das

hboard&subView=model0000018485805219_00000002" width="1260" height="800"

frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

<iframe

src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2

FAge%2Bwise%2Bpatient%2Bvisualisation&closeWindowOnLastView=true&ui_app

bar=false&ui_navbar=false&shareMode=embedded&action=view&mode=da

shboard" width="1260" height="800" frameborder="0" gesture="media" allow="encrypted-media"

allowfullscreen=""></iframe>

<iframe

src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2

Fdashboard%2Blist%2Bof%2Bpatients&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&mode=dashboard&subView=model00000184857057a4_00000002" width="1260" height="800" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

<iframe src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2FNumber%2Bof%2Bpatients%2Bby%2Bward%2Btype&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&mode=dashboard&subView=model000001848565ef33_00000002" width="1260" height="800" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

<iframe src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2Fdashboard%2Bshowing%2Bwaterfall%252Cpie%252Cbar&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&mode=dashboard&subView=model000001848589b078_00000000" width="1260" height="800" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

<section id="about" class="about">
<div class="container" data-aos="fade-up">
<div class="section-title">
<h1>REPORT</h1>

<iframe src="https://us1.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2Freport%2B1&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded

```

&amp;action=run&amp;prompt=false" width="1260" height="800" frameborder="0"
gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

<iframe
src="https://us1.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2Freport%2B2&amp;closeWind
owOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedded
&amp;action=run&amp;prompt=false" width="1260" height="800" frameborder="0"
gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>
<iframe
src="https://us1.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2Freport%2B3&amp;closeWind
owOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedded
&amp;action=run&amp;prompt=false" width="1260" height="800" frameborder="0"
gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>
<!-- ===== Appointment Section ===== -->
<section id="appointment" class="appointment section-
bg"> <div class="container" data-aos="fade-up">

<div class="section-title">
  <h2>Make an Appointment</h2>
  <p></p>
</div>
  <form action="forms/appointment.php" method="post" role="form" class="php-email-
form" data-aos="fade-up" data-aos-delay="100">

  <div class="row">
    <div class="col-md-4 form-group">

```

```

        <input type="text" name="name" class="form-control" id="name"
placeholder="Your Name" required>

    </div>
    <div class="col-md-4 form-group mt-3 mt-md-0">
        <input type="email" class="form-control" name="email" id="email"
placeholder="Your Email" required>

    </div>
    <div class="col-md-4 form-group mt-3 mt-md-0">
        <input type="tel" class="form-control" name="phone" id="phone"
placeholder="Your Phone" required>

    </div>
</div>
<div class="row">
    <div class="col-md-4 form-group mt-3">
        <input type="datetime" name="date" class="form-control datepicker"
id="date" placeholder="Appointment Date" required>

    </div>
    <div class="col-md-4 form-group mt-3">
        <select name="department" id="department" class="form-
        select"> <option value="">Select Department</option>

        <option value="Department 1">Department 1</option>

        <option value="Department 2">Department 2</option>

        <option value="Department 3">Department 3</option>

        </select>

    </div>
</div>
<div class="col-md-4 form-group mt-3">

```

```

<select name="doctor" id="doctor" class="form-
select"> <option value="">Select Doctor</option>

<option value="Doctor 1">Doctor 1</option>
<option value="Doctor 2">Doctor 2</option>
<option value="Doctor 3">Doctor 3</option>
</select>
</div>
</div>
<div class="form-group mt-3">
    <textarea class="form-control" name="message" rows="5"
placeholder="Message (Optional)"></textarea>

</div>
<div class="my-3">
    <div class="loading">Loading</div>
    <div class="error-message"></div>
    <div class="sent-message">Your appointment request has been sent
successfully. Thank you!</div>

</div>
<div class="text-center"><button type="submit">Make an
Appointment</button></div> </form>

</div>
</section><!-- End Appointment Section -->
</main><!-- End #main -->

```

```
<!-- ===== Footer ===== -->
```

```
<footer id="footer">
```

```
<div
```

GitHub Link:

<https://github.com/IBM-EPBL/IBM-Project-14851-1659590960>