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1. INTRODUCTION :

1.1 Project Overview :

Recent Covid-19 Pandemic has raised alarms over one of the most overlooked areas to focus: Healthcare Management. While healthcare management has various use cases for using data science, patient length of stay is one critical parameter to observe and predict if one wants to improve the efficiency of the healthcare management in a hospital.

1.2 Purpose:

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.

2. LITERATURE SURVEY:

2.1 Existing problem

CASE STUDY I

TITLE: Big Data Analytics in Healthcare: Data-Driven Methods for Typical Treatment Pattern Mining

AUTHOR- Chonghui guo and Jingfeng Chen : Year 2019

PROJECT DESCRIPTION: A huge volume of digitized clinical data is generated and accumulated rapidly since the widespread adoption of Electronic Medical Records (EMRs). This paper discusses the research background - big data analytics in healthcare, the research framework of big data analytics in healthcare, analysis of medical process, and treatment pattern mining. Then the challenges for data-driven typical treatment pattern mining are highlighted, including similarity measure between treatment records, typical treatment pattern extraction, evaluation and recommendation, when considering medical information in EMRs. Furthermore, three categories of typical treatment patterns are mined from doctor order content, duration, and sequence view respectively, which can provide a data-driven guideline to achieve the “5R” goal for rational drug use and clinical pathways.

CASE STUDY II

TITLE :Big Data in Supply Chain Management and Medicinal Domain

AUTHOR-Aniket Nargundkar and Anand J.Kulkarni : Year 2019

PROJECT DESCRIPTION: This paper presents the fundamental and conceptual overview of big data describing its characteristics. There are Supply Chain (SC) and Medicinal industries. Under SC domain, data generation process is explained. The difference between big data and traditional analytics is significantly noted. Landscape of SC is described with specific case studies in central areas of application. The typical big data platforms used in supply chain are elaborated with comparison. Prominent platform NoSQL is used comprehensively. Contemporary methodologies of big data analytics in supply chain are stated. The overall process of bigdata analytics from data

generation till data results visualization is exemplified. Upcoming trends of big data analytics with wearable or implanted sensors is explicated.

CASE STUDY III

TITLE :Transforming Healthcare with Big Data Analytics and Artificial Intelligence: A Systematic Mapping Study

AUTHOR -Nishita Mehta, Anil pandit and Sharvari Shukla : Year 2019

PROJECT DESCRIPTION: The current study performs a systematic literature review (SLR) to synthesise prior research on the applicability of big data analytics (BDA) in healthcare. The SLR examines the outcomes of 41 studies, and presents them in a comprehensive framework. The findings from this study suggest that applications of BDA in healthcare can be observed from five perspectives, namely, health awareness among the general public, interactions among stakeholders in the healthcare ecosystem, hospital management practices, treatment of specific medical conditions, and technology in healthcare service delivery. This SLR recommends actionable future research agendas for scholars and valuable implications for theory and practice.

CASE STUDY IV

TITLE: Big Data Analytics for Healthcare Industry: Impact, Applications, and Tools.

AUTHOR- Sunil Kumar and Maninder Singh : Year 2019

PROJECT DESCRIPTION :The health industry sector has been confronted by the need to manage the big data being produced by various sources, which are well known for producing high volumes of heterogeneous data. Various big-data analytics tools and techniques have been developed for handling these massive amounts of data, in the healthcare sector. In this paper, we discuss the impact of big data in healthcare, and various tools available in the Hadoop ecosystem for handling it. We also explore the conceptual architecture of big data analytics for healthcare which involves the data gathering history of different branches, the genome database, electronic health records, text/imagery, and clinical decisions support system.

CASE STUDY V

TITLE: Exploring big data analytics in health care.

AUTHOR- T.Ramesh, V.santhi : Year 2020

PROJECT DESCRIPTION :Cost optimization is one of the major issues in health care as it has become very difficult in fetching patient's information across huge data bases. Here, various data mining techniques such as SVM, Decision Trees etc. have been discussed in order to address various healthcare issues. Later on Big Data Analytics tools were addressed on top of data mining techniques in health care sector, as the health care industry is one of the leading sectors where huge revenue will be generated across globe as the numbers of patients are increasing drastically with the population. In future Machine learning with Big Data has lot of scope in healthcare as so many new diseases are coming into lie light across the world.

CASE STUDY VI

TITLE: Data analytics for the sustainable use of resources in hospitals: Predicting the length of stay for patients with chronic diseases

AUTHOR- Harmed M.Zolbanin, Behrooz Davazahelmami, Dursun Delen, Amir Hassan Zadeh :
Year 2022

PROJECT DESCRIPTION: Employs a data analytics approach to develop and test a deep learning neural network to predict LOS for patients with chronic obstructive pulmonary disease (COPD) and pneumonia. The methodological contributions include to augment the data sets, prediction of LOS as a numerical (rather than a binary) variable, temporal evaluation of the training and validation data sets, and a significant improvement in the accuracy of predicting LOS for COPD and pneumonia inpatients. Using the assessment criteria introduced in prior studies (i.e., ± 2 days and ± 3 days tolerance), our models predict the length of hospital stay with 86 % and 91 % accuracy for the COPD data set, and with 74 % and 85 % accuracy for the pneumonia data set. Hence, effort could help hospitals serve a larger number of patients, thereby reducing their environmental footprint while increasing their revenue, as well as their patients' satisfaction.

CASE STUDY VII

TITLE :The use of Big Data Analytics in healthcare.

AUTHOR- Kornelia Batko and Andrzej Ślęzak : Year 2022

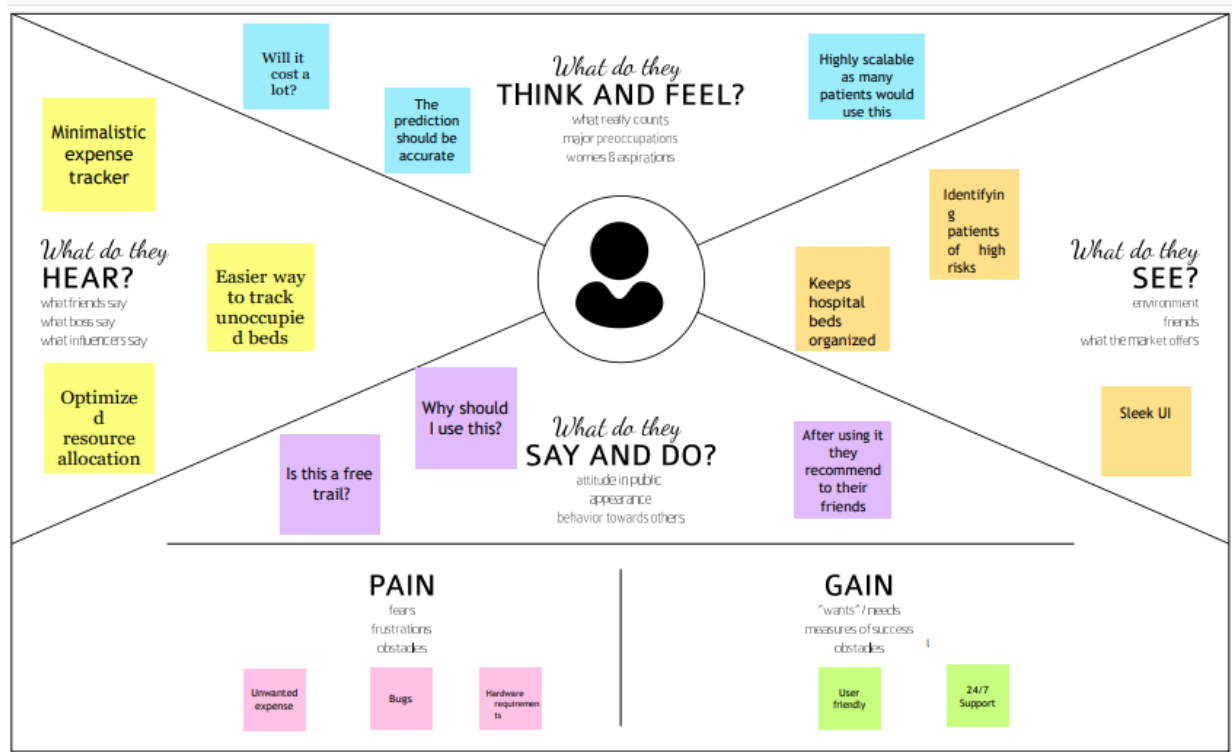
PROJECT DESCRIPTION: The direct research was carried out based on research questionnaire and conducted on a sample of 217 medical facilities in Poland. The research positively confirmed that medical facilities are working on both structural data and unstructured data. The following kinds and sources of data can be distinguished: from databases, transaction data, unstructured content of emails and documents, data from devices and sensors. However, the use of data from social media is lower as in their activity they reach for analytics, not only in the administrative and business but also in the clinical area. It clearly shows that the decisions made in medical facilities are highly data-driven. The results of the study confirm what has been analyzed in the literature that medical facilities are moving towards data-based healthcare, together with its benefits.

2.2 Problem Statement Definition:

Data analytics can provide valuable knowledge to companies that leverage collected data to derive relevant information. However, processed data are often highly sensitive and thus their disclosure may harm individuals' privacy. We are performing a predictive analytics on the health care data by classifying patients of higher risk. Those patients are given higher priority. This will be useful for better resource allocation by the hospital management. Factors causing high severity of illness is analyzed and the admission deposit collected is calculated according to Department and severity of illness.

3.IDEATION & PROPOSED SOLUTION:

3.1 Empathy Map Canvas:



3.2 Ideation & Brainstorming:

Ideation 1:

- Our goal is to create an analysis on hospital health care data with maximum accuracy
- User can easily review the reports daily, weekly, monthly or yearly.
- User can update or delete records.
- User can get notification daily.

Ideation 2: To perform predictive analysis on the given hospital health care dataset and build interactive dashboards using cognos analytics.

Ideation 3: 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.

Ideation 4: Identify trends and patterns in the data through exploratory data analysis.

3.3 Proposed Solution:

Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	To identify each patient's length of stay based on the dataset.
2.	Idea / Solution description	By using the data provided in the hospital, we can track the length of stay of each patient in the hospital.
3.	Novelty / Uniqueness	By tuning some parameters we can boost the accuracy.
4.	Social Impact / Customer Satisfaction	By this, we can allot the rooms accordingly and based on risk levels of patients hospitals can allocate the resources accordingly. Incoming patients can be served better.
5.	Business Model (Revenue Model)	This is a much needed solution in many health care units as managing resources efficiently is essential for minimizing the expenditure of the unit. Considering the need in the market, this is sells good in the market through.
6.	Scalability of the Solution	This is quite a scalable solution as this does not involve much of cost.. A robust hardware and softwareis necessary to manage huge amounts of data.

3.4 Problem Solution fit:

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> HOSPITALS AND HEALTH CARE CENTRES TRYING TO MANAGE THEIR RESOURCES EFFICIENTLY	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> Constraints: <ul style="list-style-type: none"> Budget Power Consumption Meeting hardware and software requirements Maintenance and Backup 	5. AVAILABLE SOLUTIONS <small>Which solutions are available to the customers when they face the problem?</small> <small>or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking</small> Asking the patients to vacate early before getting cured was a solution which brought bad name to the hospital.. Now the information of available beds , length of stay of each patient etc..., can be determined through this solutions.	Explore AS, differential
	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> Classification of patients based on their level of risk. Allocation of beds for new patients Predicting the length of stay for each patient	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> Root cause is that , those careless and time consuming management methods can result in loss of lives of increased of risks among patients. Patients with high risks are to be given higher priority than others.	7. BEHAVIOUR <small>What does your customer data address the problem and 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> Analyse the risk of patients and determine the length of stay.	
Focus on J&P, tap into BE, understand RC	3. TRIGGERS <small>What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news.</small> Getting to know that management of resources can be done efficiently with the use of technologies.	10. YOUR SOLUTION <small>If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour.</small> Perform a predictive analytics with the	8. CHANNELS of BEHAVIOUR 8.1 ONLINE Query the data needed, drawing conclusions from the available data, creating reports and acting accordingly.	Focus on J&P, tap into BE, understand RC
	4. EMOTIONS: BEFORE / AFTER <small>How do customers feel when they face a problem or a job and afterwards? i.e. lost, insecure > confident, in control - use it in your communication strategy & design.</small> Customers feel very sorted.. Man power required is reduced and rooms can be allocated to patients efficiently.	given dataset and determine the length of stay of each patient.	8.2 OFFLINE <small>What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.</small> Immediate action towards allocation of beds .. Extra care towards high risk patients , Appointing doctors according to criticality of patients and other actions can be taken offline which lead to efficient management of clinical resources.	

4 REQUIREMENT ANALYSIS:

4.1 Functional requirement:

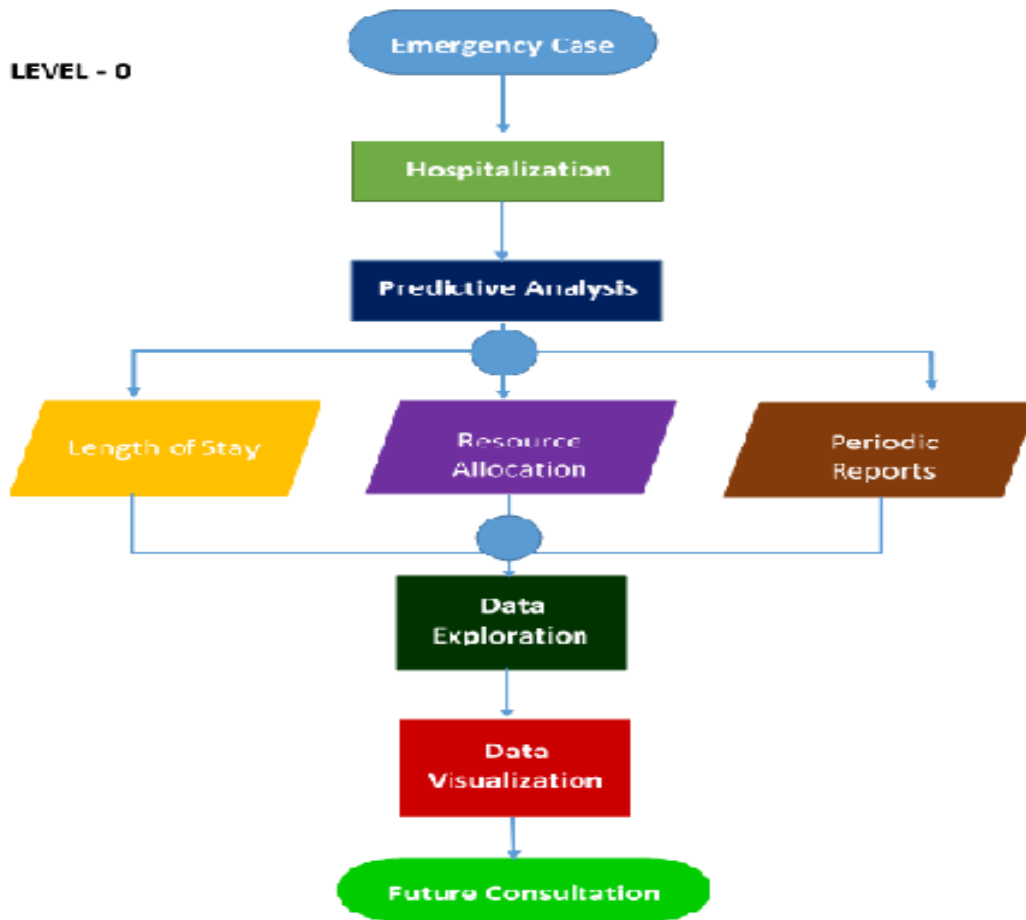
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Access	The User can have access to the website
FR-2	Updated information	User can view the updated information frequently through the website as it is connected to cloud.
FR-3	Dashboard	The collected data are found in visualized format and the prior data are analyzed
FR-4	Dataset	The patients record and staffs record are collected and consolidated as dataset
FR-5	Report Generator	The periodic reports of patients and the <u>LoS</u> are reported
FR-6	Exploration	The data exploration on available dataset

4.2 Non-Functional requirements

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	The user can analyze about the Patients detail and their Length of Stay
NFR-2	Security	The data are confidential so Hospital Staffs conscious about it
NFR-3	Reliability	The Analytics system ensures the reliability
NFR-4	Performance	The accurate result of patients LoS can be identified.
NFR-5	Availability	The availability of dataset must be constrained for accurate data
NFR-6	Scalability	Expandable system

5 PROJECT DESIGN:

5.1 Data Flow Diagrams



5.2 Solution & Technical Architecture

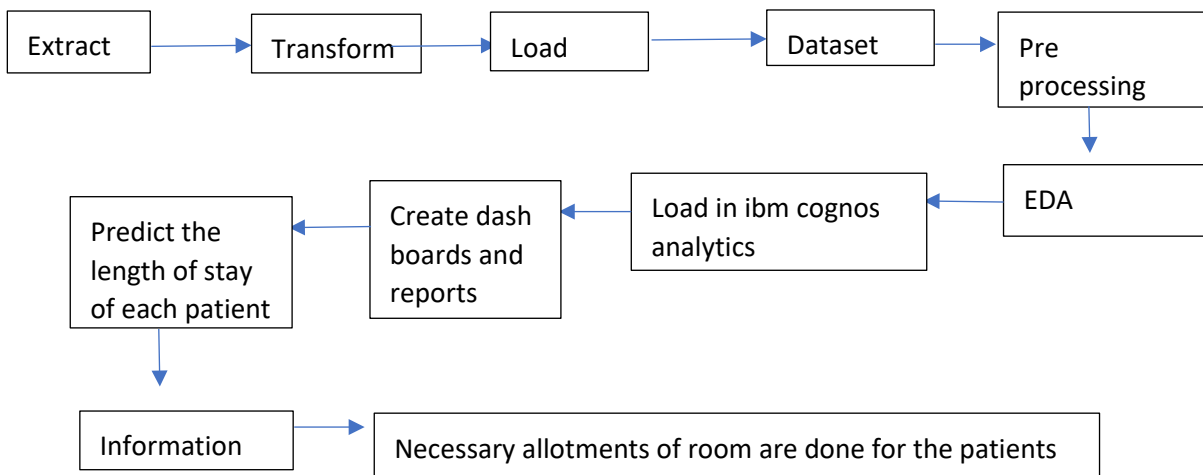
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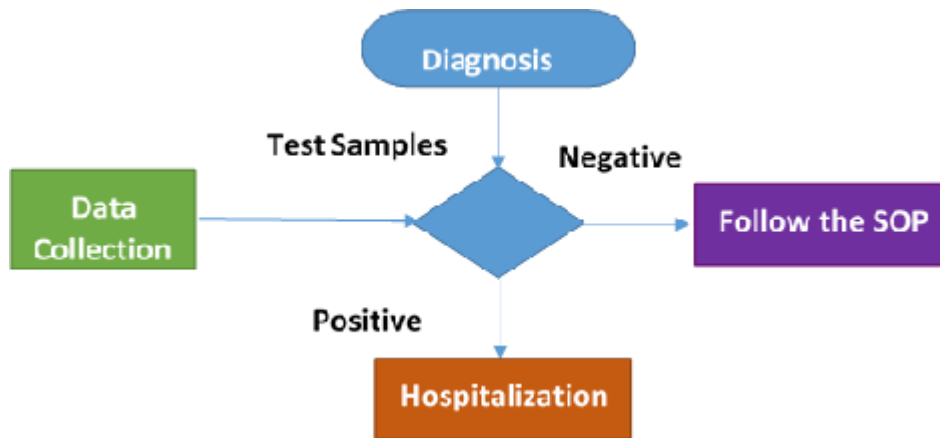
Solution Architecture:

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

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, 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



User Type	Functional Requirements	User Story No.	User Task	Acceptance Criteria	Priority
Patient	Hospitalization	USN-1	Patients are required to hospitalize if needed	Direct Hospitalization	High
	Treatment Report	USN-2	Patients should collect their treatment report and get further doctor consult	They can receive the report from hospital	High
Hospital Management	Resource Allocation	USN-3	allocate the necessary resource for treatment.	Should be ready for any circumstance	High
	Predicting Length of Stay	USN-4	The Doctors should be aware of condition of Patients to predict the LoS	Exploring the data about the patient health condition and predicting LoS using ML	High

	Resource Availability	USN-5	The Hospital Staff should be aware of available resources in hospital	Visualizing the resource availability	High
	Staff Welfare	USN-6	The working staff should be safe and conscious about t	PPE Kits to be worn by staffs	High

6.PROJECT PLANNING & SCHEDULING

6.1Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Extract Data	USN-1	I should extract the right kind of data that helps me in the analysis process.	2	High	Dineshkumar S Madhavan V
Sprint-1		USN- 2	I need nicely visualized dashboard representing LOS of patients	1	Medium	Megha V Jothilakshmi S
Sprint-2	Track of patient visit of Hospital	USN-3	Tracking a patient Health care over years of visit	1	Medium	Dineshkumar S
Sprint -2	Dashboard Analysis	USN - 4	Build interactive dashboard to analyze the data in terms of Graph,plots etc..	2	High	Jothilakshmi S
Sprint- 3	Report Creation	USN-5	I need the report animation of the data set .	1	Medium	Madhavan V Megha V

Analytics for hospitals health care data- TEAM ID : PNT2022TMID02666

Sprint-4	LOS prediction	USN-6	To predict the admission deposit of the hospital as accurate as possible	1	High	Dineshkumar S Madhavan V Megha V Jothilakshmi S
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Project Tracker, Velocity & Burndown Chart:

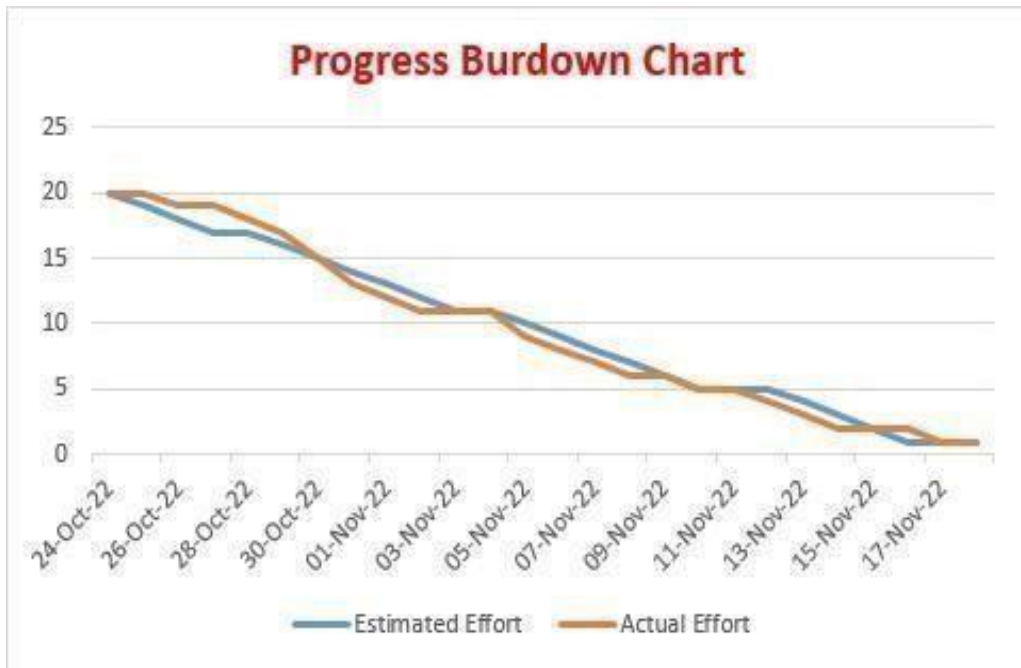
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit

(story points per day)

$$AV = \frac{\text{sprint duration}}{\text{velocity}} = \frac{20}{10} = 2$$



6.2 Sprint Delivery Schedule

MILESTONES	ACTIVITY LIST
MILESTONE - 1	EXTRACTION OF DATA
MILESTONE – 2	TRANSFORMATION AND LOADING DATA INTO IBM COGNOS
MILESTONE – 3	EXPLORATORY DATA ANALYSIS
MILESTONE – 4	CREATING THE INTERACTIVE DASHBOARD.
MILESTONE – 5	DRAW INSIGHTS FROM THE DASHBOARD
MILESTONE – 6	CLEAN THE DATA SET AND USE THE DATA REQUIRED WITH THE HELP OF A PYTHON PROGRAM TO PERFORM PRE PROCESSING
MILESTONE - 7	USAGE OF VARIOUS MACHINE LEARNING ALGORITHMS TO OBTAIN THE RESULT WITH BEST ACCURACY
MILESTONE – 8	DATA VISUALIZATION
MILESTONE - 9	DEPLOY IN THE GITHUB

6.3 Reports from JIRA

Analytics for Hospitals' Healthcare Data

The screenshot displays the Jira Software interface for the 'Sprintdeliveryplan' project. The 'SPRIN board' is visible, showing a Kanban-style workflow with three columns: 'TO DO', 'IN PROGRESS', and 'DONE 7 ISSUES'. The 'DONE' column contains three items:

- Sprint 2- Dashboard Analysis: Build interactive dashboard to analyze the data in terms of Graph, plots etc. (Status: SPRIN-4)
- Sprint 3-Story Creation: I need the story animation of the data set with insights. (Status: SPRIN-5)
- Sprint 4- Prediction of severity: To predict the length of stay of the patients as accurate as possible (Status: SPRIN-6)

The bottom screenshot shows the same board with different items in the 'DONE' column:

- Sprint 4- Prediction of severity: To predict the length of stay of the patients as accurate as possible (Status: SPRIN-6)
- Sprint 4 - As a user.I need prior knowledge of LOS can aid in logistics such as room and bed allocation planning. (Status: SPRIN-7)

7. CODING & SOLUTIONING

7.1 PREDICTION MODEL

A prediction model was built using linear regression technique with Admission deposit as the dependent variable and severity of illness as independent variable

CODE:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt

df = pd.read_csv("test_data.csv")

df.head()
df.info()
df = df.dropna()
df.describe()

df[['Bed Grade']].value_counts()
df.replace({'Type of Admission':{'Emergency':3,'Trauma':1,'Urgent':2}}, inplace = True)
df.replace({'Department':{'gynecology':3,'anesthesia':1,'radiotherapy':2,'TB' & 'Chest
disease':4,'surgery':5}}, inplace = True)
df.replace({'Severity of Illness':{'Minor':1,'Moderate':2,'Extreme':3}}, inplace = True)
y = df['Admission_Deposit']
x = df[['Severity of Illness']]

from sklearn.model_selection import train_test_split
xtrain , xtest , ytrain , ytest = train_test_split(x,y,test_size = 0.3 )
from sklearn.linear_model import LinearRegression

lr = LinearRegression()
lr.fit(xtrain , ytrain)
ypred = lr.predict(xtest)
plt.scatter(xtest,ypred)

<matplotlib.collections.PathCollection at 0x23e55ac45e0>

from sklearn.metrics import mean_squared_error , mean_absolute_error , r2_score
mean_squared_error(ytest, ypred)
1172686.68387676

mean_absolute_error(ytest, ypred)
807.5791736905824
r2_score(ytest, ypred)
0.00429621248868306
```


7.2 WEBSITE EMBEDDED WITH COGNOS ANALYTICS

CODE:

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

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

  <title>Analytics for Hospitals Healthcare data</title>
  <meta content="" name="description">
  <meta content="" name="keywords">

  <!-- Favicons -->

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

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

  <!-- =====
  * Template Name: iPortfolio - v3.9.1
  * Template URL: https://bootstrapmade.com/iportfolio-bootstrap-portfolio-websites-template/
  * Author: BootstrapMade.com
  * License: https://bootstrapmade.com/license/
  ===== -->
</head>

<body>

  <!-- ===== Mobile nav toggle button ===== -->
```

```
<i class="bi bi-list mobile-nav-toggle d-xl-none"></i>

<!-- ===== Header ===== -->
<header id="header">
  <div class="d-flex flex-column">

    </nav><!-- .nav-menu -->
  </div>
</header><!-- End Header -->

<!-- ===== Hero Section ===== -->
<section id="hero" class="d-flex flex-column justify-content-center align-items-center">
  <div class="hero-container" data-aos="fade-in">
    <h1>Healthcare Analysis</h1>
    <h2>Project Members</h2>
    <p> <span class="typed" data-typed-items="Madhavan V, Dineshkumar S, Megha V, Jothilakshmi S"></span></p>
  </div>
</section><!-- End Hero -->

<main id="main">

  <!-- ===== About Section ===== -->
  <section id="about" class="about">
    <div class="container">

      <div class="section-title">
        <h2>About</h2>
        <p>Team ID:PNT2022TMID02666</p>
        <p>Dineshkumar S - 2116191001501 </p>
        <p>Madhavan V - 2116191001042</p>
        <p>Megha V - 2116191001047 </p>
        <p>Jothilakshmi S - 2116191001027</p>

      </div>

      <div class="row">
        <div class="col-lg-4" data-aos="fade-right">
          
        </div>
      </div>
    </div>
  </section>
</main>
```

```
<div class="col-lg-8 pt-4 pt-lg-0 content" data-aos="fade-left">

</div>
</div>

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

<h1> Dashboard </h1>

<!-- ===== Skills Section ===== -->

<iframe
src="https://us3.ca.analytics.ibm.com/bi/?perspective=dashboard&amp;pathRef=.my_folders%2Fdashboard&a
mp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedde
d&amp;action=view&amp;mode=dashboard&amp;subView=model00000184743a8874_00000003"
width="1200"      height="1000"      frameborder="0"      gesture="media"      allow="encrypted-media"
allowfullscreen=""></iframe><!-- End Skills Section -->


<!-- ===== Portfolio Section ===== -->

<img
src
=
"data:image/jpeg;base64,/9j/4AAQSkZJRgABAQAAAQABAAD/2wCEAAkGBxATEhMSEhAVFhUVFhgT
FRUvFxUVFRgXFxMYFhcXGBUYHigiGBolGxgXITEhJSkrLi4uFx8zODMtNygtLisBCgoKDg0OGxAQG
yOIICUvLy0tLS0tLS0tLS0tLS0uLS0tLS0tLS0tLS0tLS0tLS8tLS0tLS0tLS0tLf/AABEIALoBDwMB
IgACEQEDEQH/xAAcAAEAAgMBAQEAAAAAAAAAABQYDBAcCAQj/xABIEAACAIQICBAoh
BAkDAgcAAAABAgADEQQSBQYhMSJBUBWfxgZGhscEHMyUnLRFDNisiRCgpKis8Lh8DRjc0TxJV
NkdKPS0//EABoBAQADAQEBAIAAAAAAAAAAABAwQCBQb/xAA1EQACAQIEaggGAQMFAA
AAAAAAAAAQIDEQSITFBURMiMnGBscHwBTNhkaHR4SNC8RQkQ1Ky/9oADAMBAAIRAxEAPwC6x
ETYEStIiAiIgClAiIiAiIgClAiIiAiIgClAiIiAiIgClAiIiAiIgClAiIiAiIgClAiIiAiIeHrovvOo6SB4xSrKwurB
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<!-- End Contact Section -->

```
<!-- ===== Footer ===== -->
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  <div class="container">
    <div class="copyright">
      &copy; Copyright <strong><span>iPortfolio</span></strong>
    </div>
    <div class="credits">
      <!-- All the links in the footer should remain intact. -->
      <!-- You can delete the links only if you purchased the pro version. -->
      <!-- Licensing information: https://bootstrapmade.com/license/ -->
      <!-- Purchase the pro version with working PHP/AJAX contact form: https://bootstrapmade.com/iportfolio-bootstrap-portfolio-websites-template/ -->
      Designed by <a href="https://bootstrapmade.com/">BootstrapMade</a>
    </div>
  </div>
</footer><!-- End Footer -->

<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 -->
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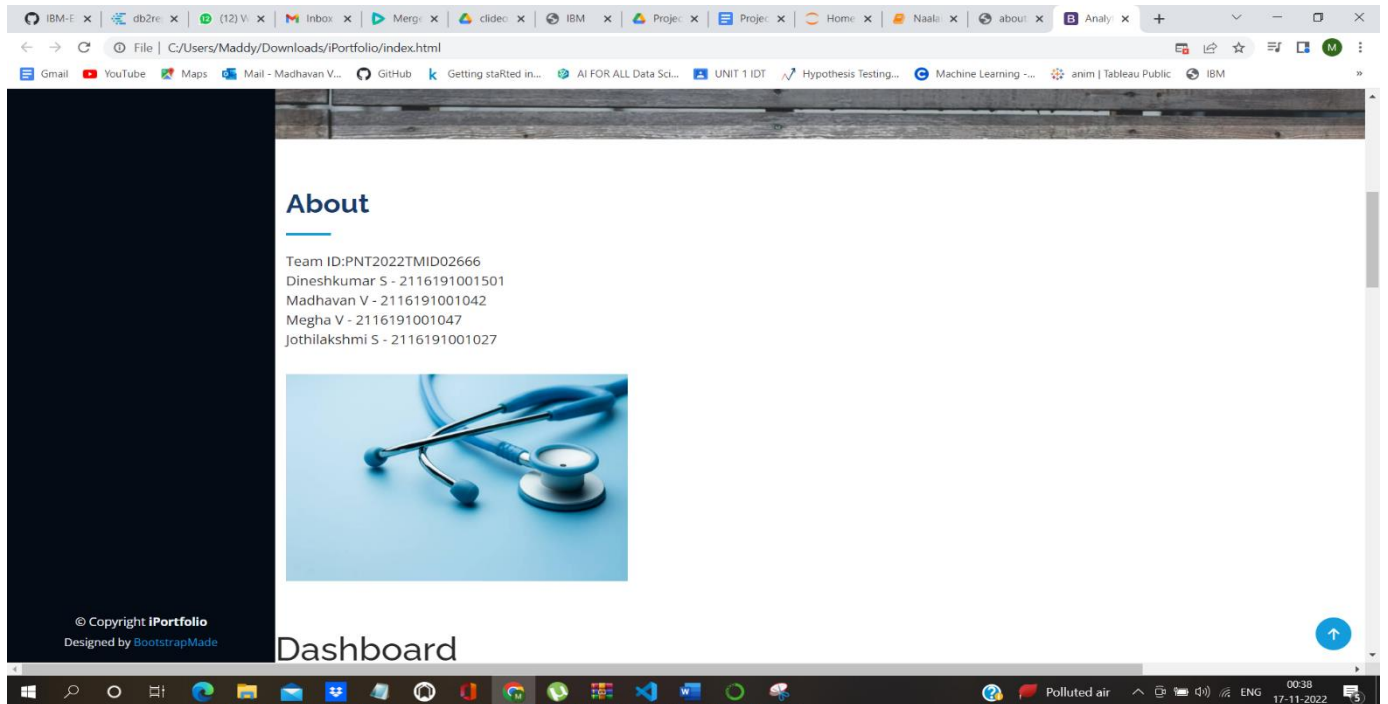
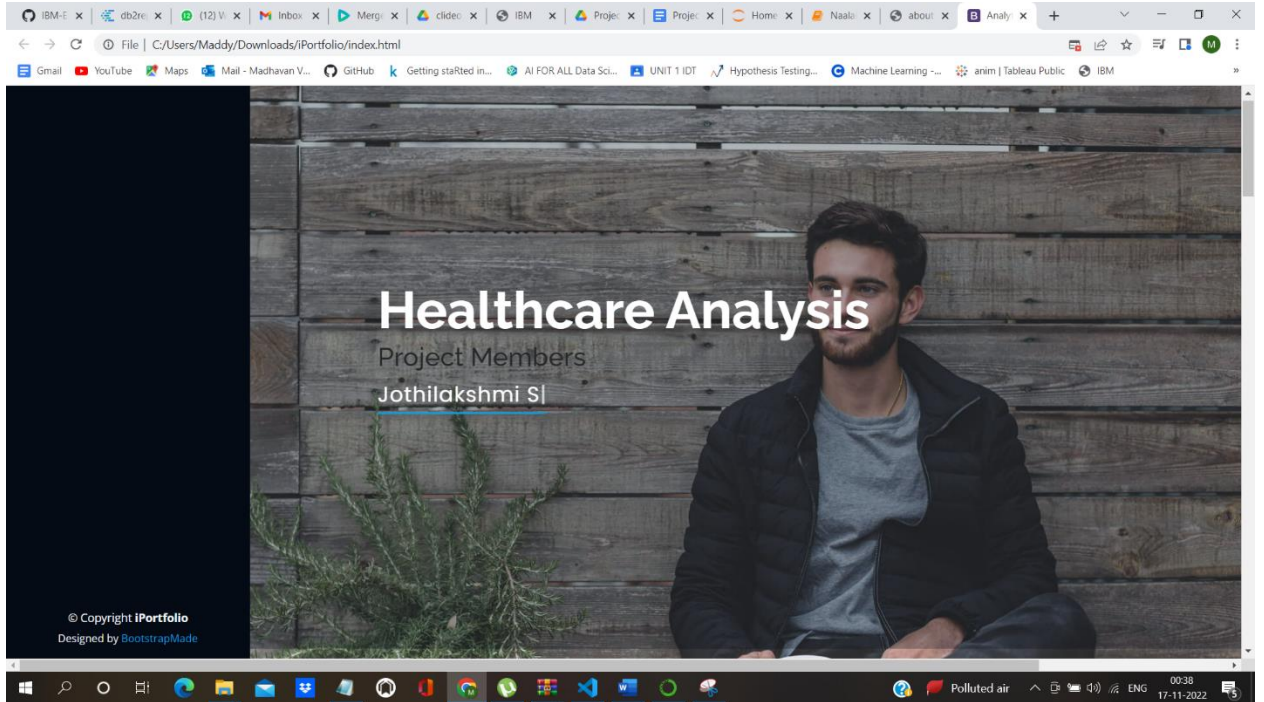
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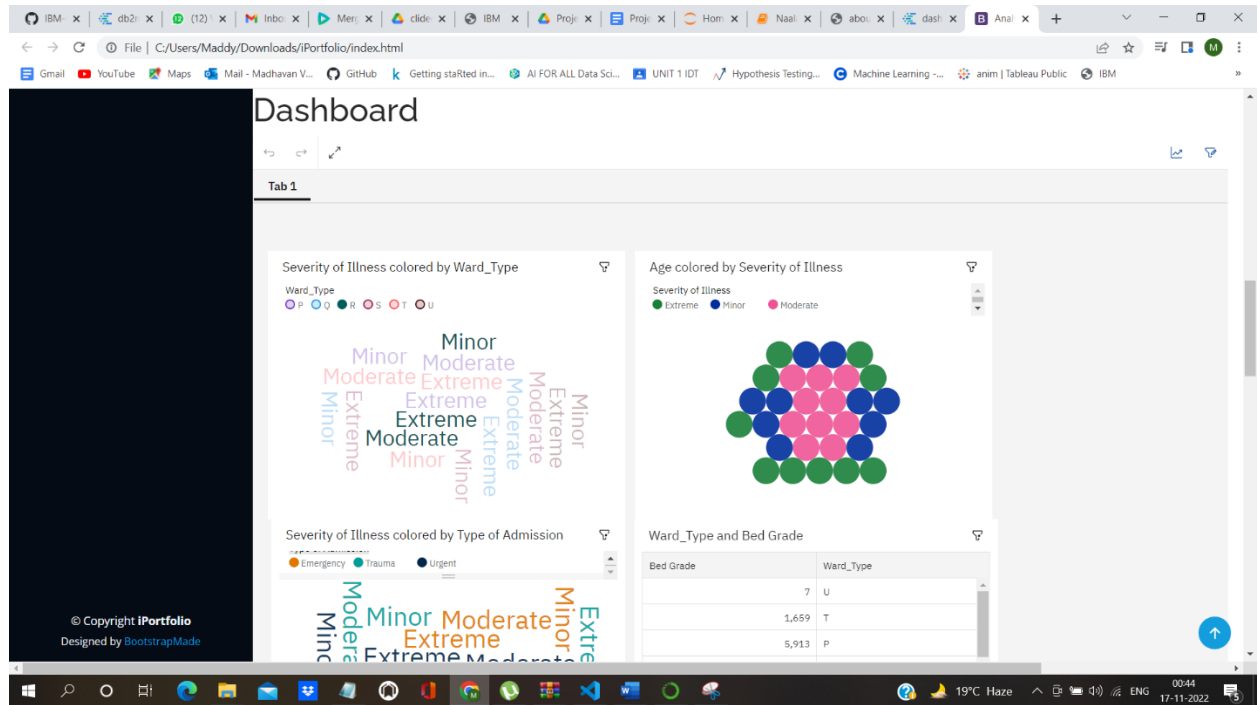
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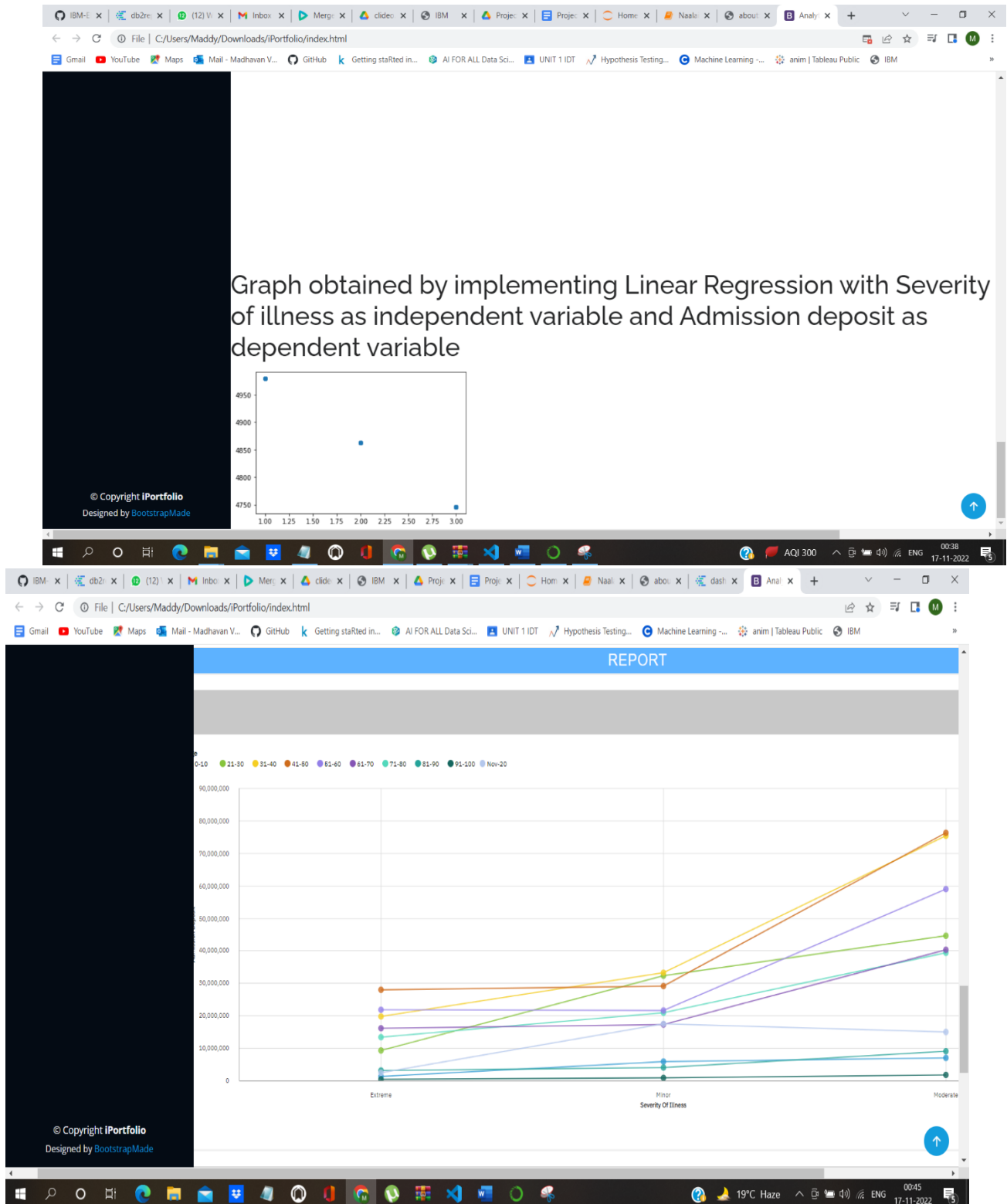
OUTPUT:

Analytics for hospitals health care data- TEAM ID : PNT2022TMID02666



Analytics for hospitals health care data- TEAM ID : PNT2022TMID02666





7.3 Database Schema

Analytics for hospitals health care data- TEAM ID : PNT2022TMID02666

QKY36376.HEALTH

Back

Export to CSV

CASE_ID	HOSPITAL_CODE	HOSPITAL_TYPE_CODE	CITY_CODE_HOSPITAL	HOSPITAL_REGION_CODE	AVAILABLE_EXTRA_ROOMS_IN_HOSPITAL	DEPARTMENT	WAF
318439	21	c	3	Z	3	gynecology	S
318440	29	a	4	X	2	gynecology	S
318441	26	b	2	Y	3	gynecology	Q
318442	6	a	6	X	3	gynecology	Q
318443	28	b	11	X	2	gynecology	R
318444	23	a	6	X	3	gynecology	Q
318445	26	b	2	Y	2	gynecology	Q

Items per page: 50 1-50 items

1 page 1

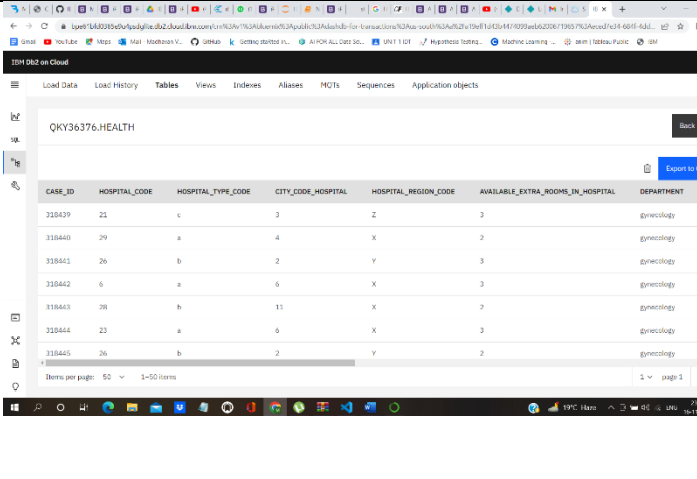
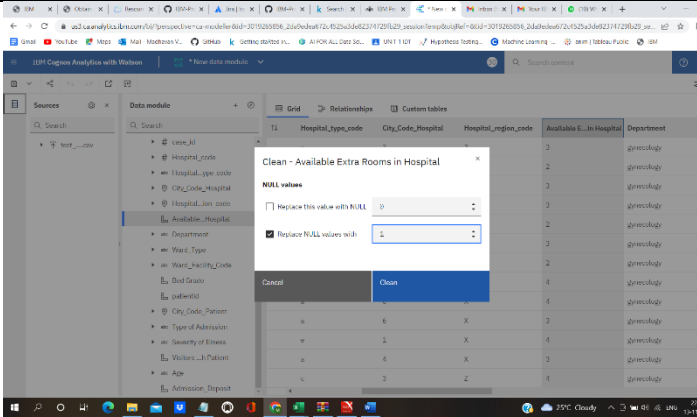
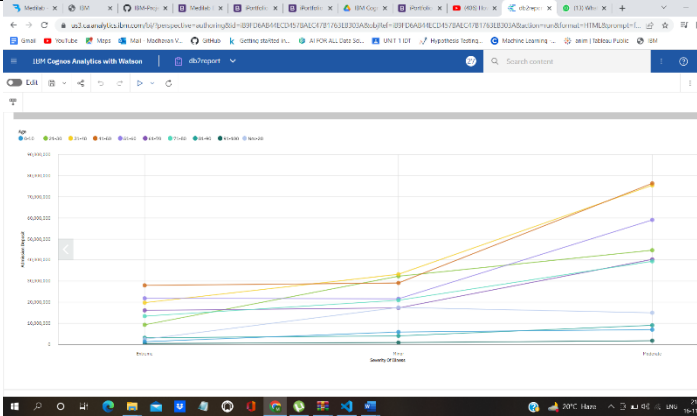
8. RESULTS:

Model Performance Testing:

Project team shall fill the following information in model performance testing template.

S.No.	Parameter	Screenshot / Values
1.	Dashboard design	No of Visualizations / Graphs - 4
2.	Data Responsiveness	Data is quite responsive

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3.	Amount Data to Rendered (DB2 Metrics)	
4.	Utilization of Data Filters	
5.	Descriptive Reports	

9. ADVANTAGES AND DISADVANTAGES

ADVANTAGES:

- When the database gets updated in the cloud , accordingly the dashboards,reports and stories in the website will also get updated.

- By analysing these visualizations useful insights can be retrieved.
- Hospital Administration can live track all the reports easily.

DISADVANTAGES

- Less security
 - Confidentiality breach
- Individual users and admin can be given separate login credentials and can allow only certain information to be viewed by respective users

10. CONCLUSION

In the healthcare industry, every decisions made and the steps taken can have a huge impact over the course of action, therefore affecting human life and health. By quickly gathering and analysing the available data accurately, decision-makers can make the right choices.

The data obtained from the predictive analysis can be used to answer questions about what might happen next. So, when done correctly, predictive analysis can help you gain insights into the future and prepare for it accordingly.

11. FUTURE SCOPE

- More suitable ML algorithms can be used for prediction so that the accuracy can be improved.
- More user stories can be identified.
- Individual users and admin can be given separate login credentials and can allow only certain information to be viewed by respective users.

12. APPENDIX

SOURCE CODE

PREDICTION MODEL
CODE:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt

df = pd.read_csv("test_data.csv")

df.head()
df.info()
df = df.dropna()
df.describe()

df[['Bed Grade']].value_counts()
```

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```
df.replace({'Type of Admission':{'Emergency':3,'Trauma':1,'Urgent':2}}, inplace = True)
df.replace({'Department':{'gynecology':3,'anesthesia':1,'radiotherapy':2,'TB' & 'Chest
disease':4,'surgery':5}}, inplace = True)
df.replace({'Severity of Illness':{'Minor':1,'Moderate':2,'Extreme':3}}, inplace = True)
y = df['Admission_Deposit']
x = df[['Severity of Illness']]
```

```
from sklearn.model_selection import train_test_split
xtrain , xtest , ytrain , ytest = train_test_split(x,y,test_size = 0.3 )
from sklearn.linear_model import LinearRegression
```

```
lr = LinearRegression()
lr.fit(xtrain , ytrain)
ypred = lr.predict(xtest)
plt.scatter(xtest,ypred)
```

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```
from sklearn.metrics import mean_squared_error , mean_absolute_error , r2_score
mean_squared_error(ytest, ypred)
1172686.68387676
```

```
mean_absolute_error(ytest, ypred)
807.5791736905824
r2_score(ytest, ypred)
0.00429621248868306
```

Website embedded with cognos analytics

CODE:

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

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

  <title>Analytics for Hospitals Healthcare data</title>
  <meta content="" name="description">
  <meta content="" name="keywords">

  <!-- Favicons -->

  <!-- Google Fonts -->
```

```
<link
href="https://fonts.googleapis.com/css?family=Open+Sans:300,300i,400,400i,600,600
i,700,700i|Raleway: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/swiper/swiper-bundle.min.css" rel="stylesheet">

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

<!-- =====
* Template Name: iPortfolio - v3.9.1
* Template URL: https://bootstrapmade.com/iportfolio-bootstrap-portfolio-
websites-template/
* Author: BootstrapMade.com
* License: https://bootstrapmade.com/license/
===== -->
</head>

<body>

<!-- ===== Mobile nav toggle button ===== -->
<i class="bi bi-list mobile-nav-toggle d-xl-none"></i>

<!-- ===== Header ===== -->
<header id="header">
  <div class="d-flex flex-column">

    </nav><!-- .nav-menu -->
  </div>
</header><!-- End Header -->

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



```
<div class="hero-container" data-aos="fade-in">
  <h1>Healthcare Analysis</h1>
  <h2>Project Members</h2>
  <p> <span class="typed" data-typed-items="Madhavan V, Dineshkumar S, Megha
V, Jothilakshmi S"></span></p>
</div>
</section><!-- End Hero -->

<main id="main">

  <!-- ===== About Section ===== -->
  <section id="about" class="about">
    <div class="container">

      <div class="section-title">
        <h2>About</h2>
        <p>Team ID:PNT2022TMID02666</p>
        <p>Dineshkumar S - 2116191001501 </p>
        <p>Madhavan V - 2116191001042</p>
        <p>Megha V - 2116191001047 </p>
        <p>Jothilakshmi S - 2116191001027</p>

      </div>

      <div class="row">
        <div class="col-lg-4" data-aos="fade-right">
          
          </div>
          <div class="col-lg-8 pt-4 pt-lg-0 content" data-aos="fade-left">

            </div>
          </div>

        </div>
        <!-- End About Section -->

        <h1> Dashboard </h1>

        <!-- ===== Skills Section ===== -->
```

```
<iframe
src="https://us3.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2Fdashboard&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&mode=dashboard&subView=model00000184743a8874_00000003" width="1200" height="1000" frameborder="0"
gesture="media" allow="encrypted-media" allowfullscreen=""></iframe><!-- End
Skills Section -->
```

```
<!-- ===== Portfolio Section ===== -->
<img src =
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[illegible]

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

<!-- End Contact Section -->

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

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

<footer id="footer">

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        </div>
    </div>
</footer><!-- End Footer -->

    <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/purecounter/purecounter_vanilla.js"></script>
    <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/typed.js/typed.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>
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GITHUB LINK: <https://github.com/IBM-EPBL/IBM-Project-17893-1659676971>

PROJECT DEMO LINK: https://drive.google.com/file/d/148buGT22Uc6E47K7WKz-I5jAcyZB8quj/view?usp=share_link