Analytics for Hospitals Health-Care Data

PROJECT REPORT

1.INTRODUCTION

1.1 Project Overview

• The COVID-19 pandemic has resulted in uncontrollable havoc. Since this was an unexpected circumstance, many local hospitals were not prepared to handle this crisis.

• The proper allocation of resources has become a tough challenge for hospitals. There is a possibility that many patients may not get proper treatment.

1.2 Purpose

Data Analytics is the process of examining raw datasets to **find trends, draw conclusions and identify the potential for improvement**. Health care analytics uses current and historical data to gain insights, macro and micro, and support decision-making at both the patient and business level.

2. LITERATURE SURVEY

2.1 Existing problem

It created an urgent need for data analytics in the healthcare industry for Analysis of the current situation in terms of patient condition and hospital resources can help in the organized planning of any future waves of the pandemic.

2.2 References

The development of digital technology has the impact on healthcare facilities in Indonesia, one of which is the digitization of medical records. This will generate abundant clinical data from various sources including electronic medical records. Therefore, a large infrastructure is needed to store data from various sources that can facilitate the process of data aggregation to then be processed into information.

2.3 Problem Statement Definition

S.NO	AUTHOR	TITLE	CONTENT	YEAR
4	EUN KYONG SHIN AND ARASH SHABAN-NEJAD	Urban Decay and Pediatric Asthma Prevalence in Memphis, Tennessee: Urban Data Integration for Efficient Population Health Surveillance	Improving public health decision making, the health issue should be approached with a more holistic view with taking into account environmental, residential, and social conditions. Integrating multiple data sources helps us not only discover the hidden links between quality of housing and childhood asthma in an urban community but also provide more efficient health surveillance guidelines to identify the population at risk.	2018
5	FATIMA KHALIQUE	A Framework for Public Health Monitoring, Analytics and Research	The proposed framework in its adoption provides a very effective platform for generating alerts and alarms along with providing statistics for better planning of healthcare-related issues at national, district, or at any level of administrative hierarchy. It is applicable to any country even when there is no standard EHR and has hospitals working in silos with limited digitalization.	2019
6	Lu Yan, Weihong Huang, 2021	Data-Enabled Digestive Medicine: A New Big Data Analytics Platform	A typical use case of integrated analysis based on electronic medical records and colonoscopy data was presented and discussed, the analytic report on risk factors of colorectal diseases shows a reasonable recommendation about the age when people should start to screen the colorectal cancer, which could be very useful to individual and group health management.	2021

S.NO	AUTHOR	TITLE	CONTENT	YEAR
1	NADA Y. PHILIP 1 , (Senior Member, IEEE), MANZOOR	A Data Analytics Suite for Exploratory Predictive, and Visual Analysis of Type 2 Diabetes	The analytics presented explores advanced data analysis techniques, which are potential tools for clinicians in decision-making that can contribute to better management of T2D.	2022
2	HAMZEH KHAZAEI1	Health Informatics for Neonatal Intensive Care Units: An Analytical Modeling Perspective	Using the proposed analytical model, the prediction of amount of storage, memory, and computation power required for the system. Capacity planning and tradeoff analysis would be more accurate and systematic by applying the proposed analytical model .	2015
3	CAIFENG ZHANG1	Optimizing the Electronic Health Records Through Big Data Analytics: A Knowledge-Based View	This study contributes to the existing digital health and big data literature by exploring the proper adaptation of analytical tools to EHRs from the different knowledge mode in order to shape meaningful use of big data analytics with EHRs.	2019

3. IDEATION & PROPOSED SOLUTION
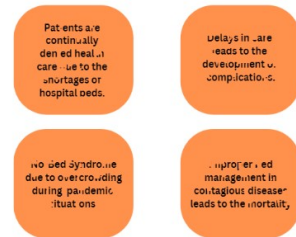
3.1 Empathy Map Canvas
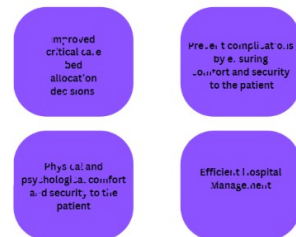
3.2 Ideation & Brainstorming
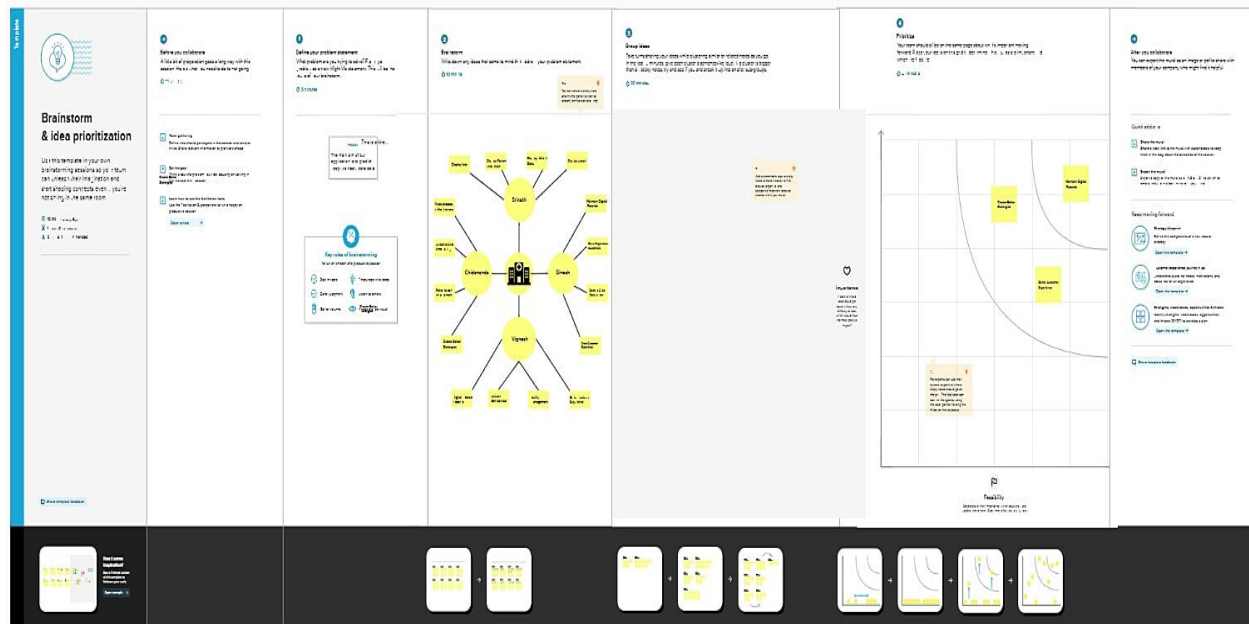
3.3 Proposed Solution

Proposed Solution:

S. No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Three hospital beds are assigned to a certain section of a hospital, for use as an Intensive Care Unit (ICU) for critical care patients. A nurse only is always on duty at the nurse's central area outside the ICU hospital rooms.
2.	Idea / Solution description	Hospital Management System provides the benefits of streamlined operations. HMS is powerful, flexible, and easy to use and is designed and developed to deliver real conceivable benefits to hospitals.
3.	Novelty / Uniqueness	The positive outcomes and high patient satisfaction, they highlighted that the patients are actually staying longer than normal and that employee satisfaction is low, which is potentially leading to high turnover
4.	Social Impact / Customer Satisfaction	Healthcare industry continues to face several challenges from the environment. Among many, one of the critical challenges is to improve the quality and efficiency of patient care.
5.	Business Model (Revenue Model)	The right Length of Stay prediction could help in allocation of only enough beds and resources and not more than enough. This would lessen the money both the hospital and the patient spent.
6.	Scalability of the Solution	This advanced prediction method instead of the traditional methods makes the Hospital function better by more accurate allocation of beds and resources because it uses the historical data to analyse using visualization tools.

3.4 Problem Solution fit

1. CUSTOMER SEGMENT(S)
- Person With Identical Needs
- Person With Chronic Condition
- Person With Multiple Illness
- Tertiary Care Patient

2. PROBLEMS
- People for testing and treatment of coronavirus
- Overflowing waiting room
- Beds crowded in intensive care units
- Lack of oxygen cylinders during covid
- Restricted travel for staffs

3.TRIGGER TO ACT
- Care of the dying is urgent care
- Diagnosis of life-limiting conditions

4.EMOTIONS
- Condemning emotions
- Self-conscious emotions
- Suffering emotions

5.AVAILABLE SOLUTION
- Effective Communication to Patients
- Grievance Redressal Mechanism.
- Nurses To focus on Clinical Care

6.CUSTOMER STATE LIMITATION
- Convincing Consumers There's Choice
- Inaccessibility
- Lagging Behind in Consumer Technology

7.BEHAVIOUR
- Arrangements in schools and colleges for the patient who had covid to avoid spreading
- Giving Essential resources for the patients
- Organizing Vaccination camp

9.ROOT/CAUSE
- Government mandates.
- Patient safety and quality care.
- Staffing concerns.
- Patient satisfaction.
- Doctor-related issues.
- Population health management.

10.MY SOLUTION
- Orientation Training
- Camp for vaccination and providing free consultation for awareness
- Developing application for information
- Creating blood bank app for immediate blood requirements

8.CHANNELS OF BEHAVIOUR
- Strategic Decision
- Physical Advocacy
- Paid Advertising
- Customer Services

4. REQUIREMENT ANALYSIS

4.1 Functional requirement

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIN
FR-2	User Login	Login using the given credentials.
FR-3	User Confirmation	Confirmation via Email. Confirmation via OTP.
FR-4	Analysis	Data is pre-processed and cleaned. After cleaning the exploration process is carried out.
FR-5	Dataset	Upload the dataset to the dashboard.
FR-6	Visualization	Visualization of the prediction is shown in the dashboard created using IBM Cognos Analytics.
FR-7	Prediction	Machine learning algorithm is used for prediction.
FR-8	Interoperability	Dashboard helps to share the patient's information interoperable to the hospitals in timely manner.

4.2 Non-Functional requirements

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Dashboards are created in order to display the length of stay prediction in visual manner. So, the prediction can be easily understood.
NFR-2	Availability	Predicted data will be available for some time after the prediction.
NFR-3	Scalability	This system will predict the length of stay of all kind of patients.
NFR-4	Performance	The prediction has more accuracy.
NFR-5	Security	The dataset uploaded to the dashboard cannot be downloaded or accessed by external sources.
NFR-6	Relaiability	Dashboard created after the prediction process will be more reliable and shows the result clearly and effectively.

5. PROJECT DESIGN

5.1 Data Flow Diagrams

```
Emergency
Case
    │
    ▼
Hospitalization
    │
    ▼
Predictive Analysis
    │
    ▼
    ●
 ┌──┼──┐
 ▼  ▼  ▼
Length      Resource      Periodic
of stay     Allocation    Reports
 │    │    │
 └──  ●  ──┘
    │
    ▼
Data Exploration
    │
    ▼
Data Visualization
    │
    ▼
Future
Consultation
```
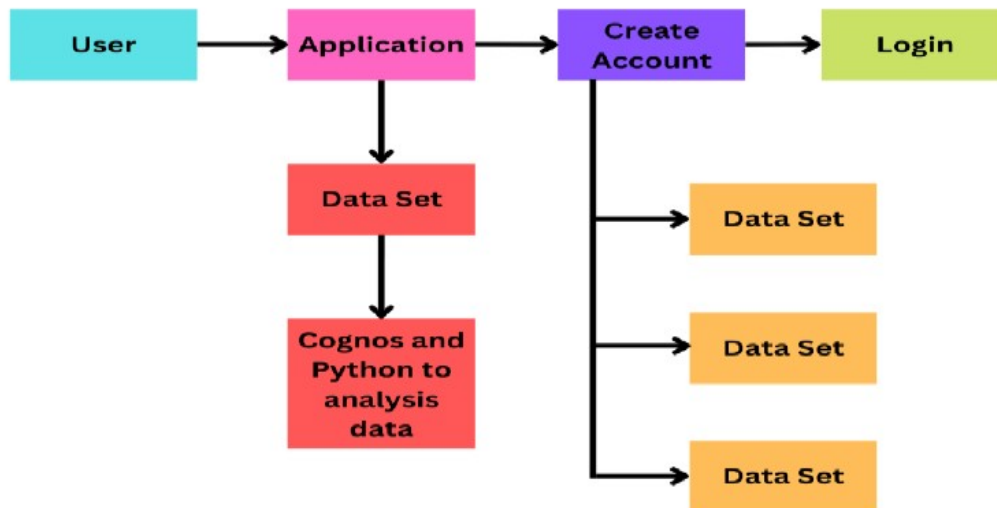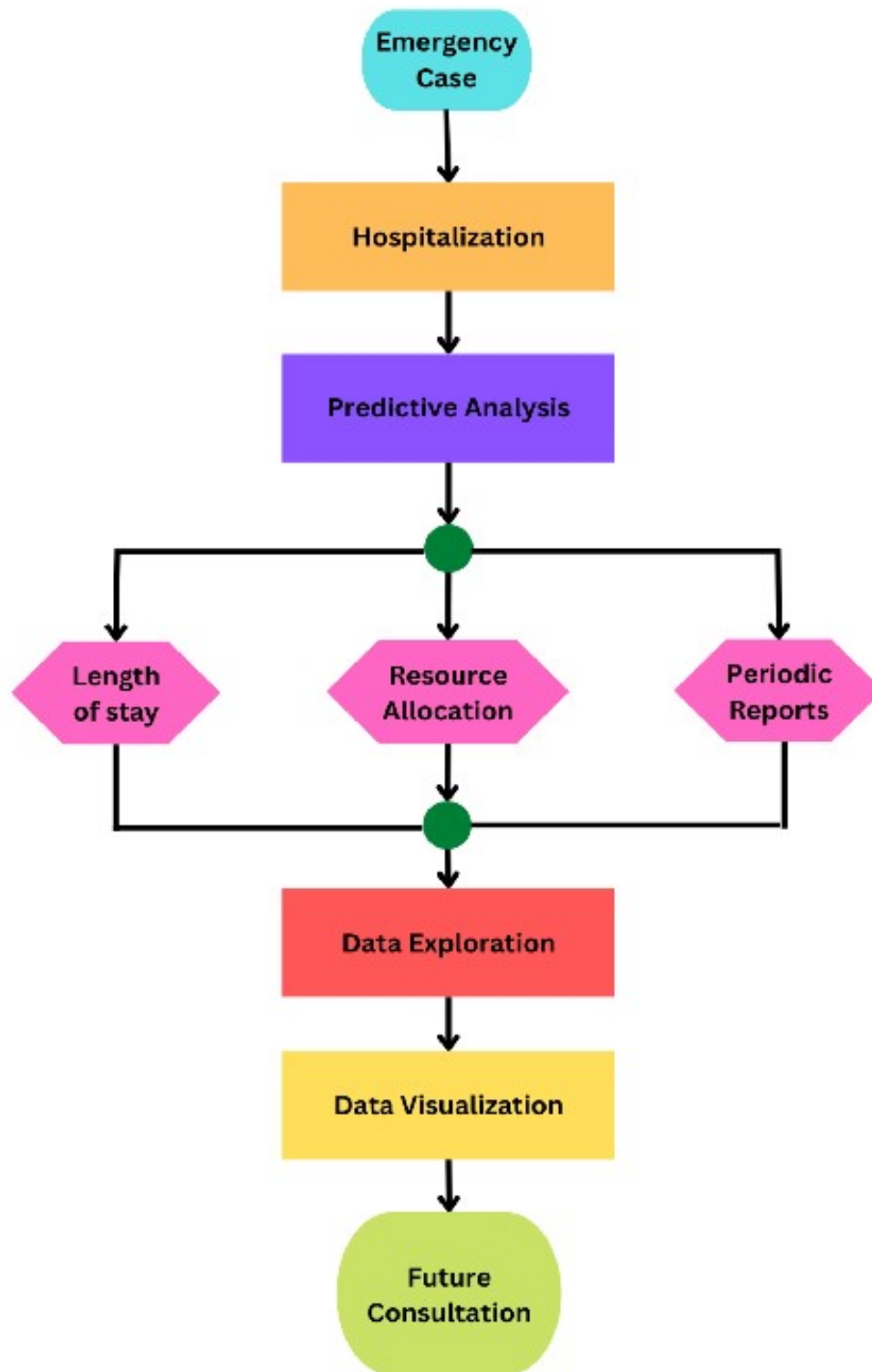
5.2 Solution & Technical Architecture
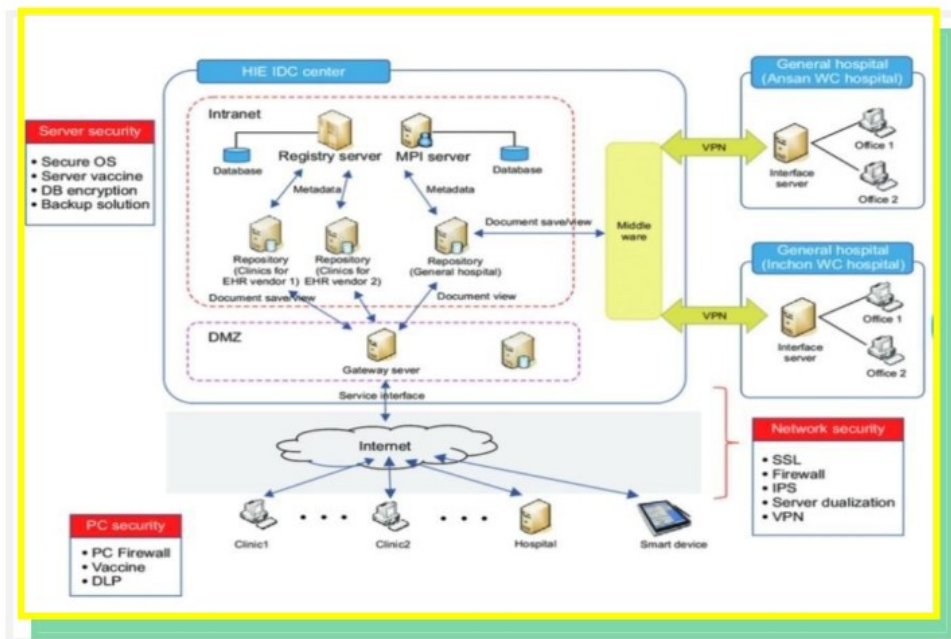
Table-1: Components & Technologies:

S.No	Components	Description	Technology
1.	User Interface	How user interacts with application. Example: Mobile App	HTML, CSS, Java Script, Excel
2.	Application Logic-1	Logic for a process in the application	IBM Watson STT service, Python
3.	Application Logic-2	Logic for a process in the application	IBM Watson Assistant
4.	Database	Data Type, Configurations	MySQL, NSQL
5.	Cloud Database	Database service on cloud	IBM DB2, IBM Cloudant
6.	File Storage	File Storage requirements	IBM Blocks Storage or other storage service or Local File system
7.	External API-1	Purpose of External API used in the application	IBM Weather API
8.	External API-1	Purpose of External API used in the application	Aadhar API
9.	Infrastructure (Server/Cloud)	Application Deployment on Local System/Cloud Local Server Configuration: Cloud Server Configuration	Local, Cloud Foundry

5.3 User Stories

USER STORIES:

User Type	Functional Requirements	User Story No.	User Task	Acceptance Criteria	Priority
Patient	Hospitalization	USN-1	Patients are required to hospitalize if they have COVID +ve	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	Hospital Management should allocate the necessary resource for treating the COVID Patients	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	High
	Resource Availability	USN-5	The Hospital Staff should be aware of available resources in hospital	Visualizing the about the resource availability	High
	Staff Welfare	USN-6	The working staff should be safe and conscious about the COVID		High

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Retrieve Data	USN-1	As a user, I should get clearer clinical context for AIDS patient's unique case	10	Medium	Chidananda M
Sprint-1	Visualize the data	USN- 2	As a user,I need nicely visualized dashboard of number of beds occupied and number of free beds in hospital.	20	High	Dinesh S Srinath S
Sprint-2	Track of patient visit of Hospital	USN-3	Tracking a patient Health care over years of visit and Screening of data they have in hospital.	10	Medium	Vignesh A Dinesh S
Sprint -2	Dashboard	USN - 4	As a user , I want the interactive dashboard to analyze the data. Have the data in terms of Graph.	20	High	Srinath S Chidananda M
Sprint-3	Detailed EHR's of patient	USN-5	Provided greater details in the EHR's of individual patient with clear idea of what to do.	10	Medium	Dinesh S Vignesh A
Sprint- 3	Story Creation	USN-6	As a user , I need the story animation of the data set with insights	20	High	Vignesh A Dinesh S
Sprint-4	Predict LOS	USN-7	As a user, I want the flawless system to predict the length of stay of the patients	20	High	Chidananda M Srinath S

6.2 Sprint Delivery Schedule

Project Tracker, Velocity & Burndown Chart: (4 Marks)

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

6.3 Reports from JIRA

7. CODING & SOLUTIONING
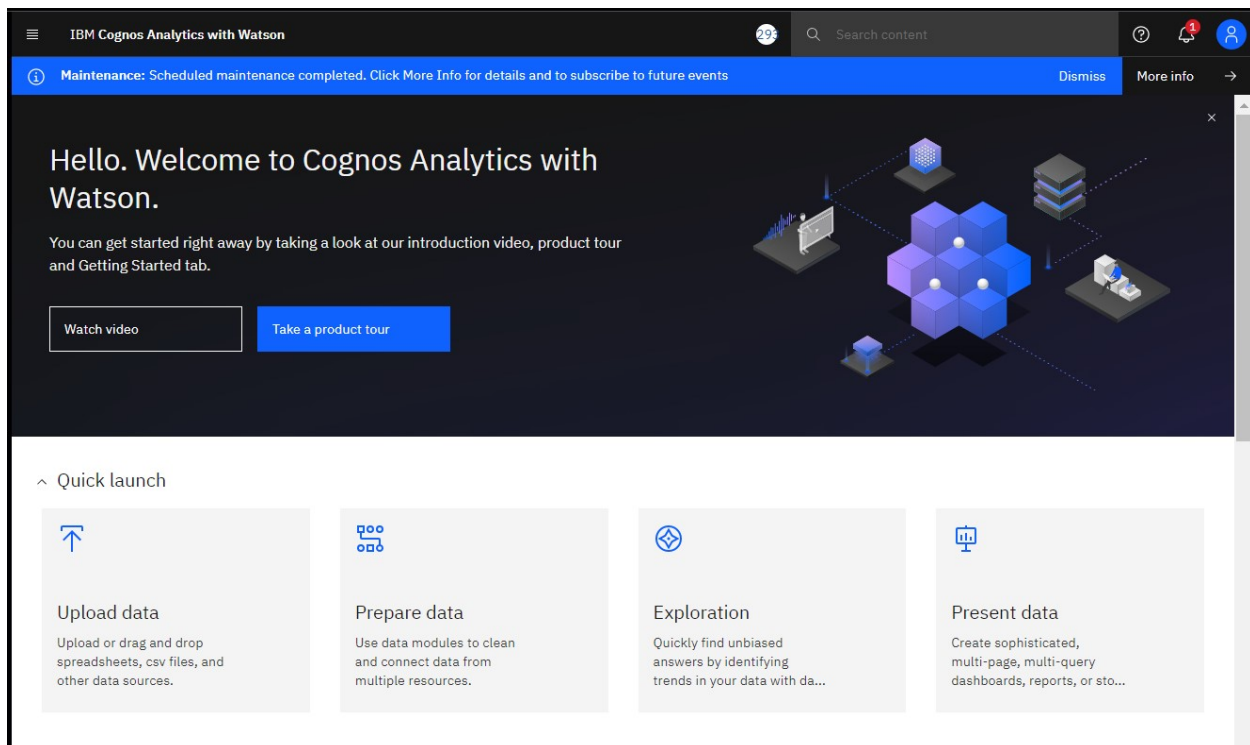
7.1 Feature 1

Get started   Recent

Get up and running in IBM Cognos Analytics

How-to videos

Learn how to use IBM Cognos Analytics and start gaining insights into your data.

Watch videos

Accelerator Catalog

Browse a growing catalog of industry use, best practice guides, custom visualizations, and more.

Browse catalog 🔗

Learning resources

Expand your knowledge and get assistance by connecting with the community, reading documentation, and watching videos.

Launch the learn pane

Samples

Experiment with examples that show off all that Cognos Analytics has to offer.

By feature

Browse samples by feature, such as core functionality, custom controls, extensions, notebooks, an...

By industry

Browse samples by industry, such as automotive, banking and more.

View all samples →

7.2 Feature 2

```
X_train.fillna(0,inplace=True)
Y_train.fillna(0,inplace=True)
X_test.fillna(0,inplace=True)
```

K-Nearest Neighbor Algorithm

```
knn = KNeighborsClassifier(n_neighbors = 3)
knn.fit(X_train, Y_train)
Y_pred = knn.predict(X_test)
acc_knn = round(knn.score(X_train, Y_train) * 100, 2)
acc_knn
```

53.99

Descision Tree Algorithm

```
decision_tree = DecisionTreeClassifier()
decision_tree.fit(X_train, Y_train)
Y_pred = decision_tree.predict(X_test)
acc_decision_tree = round(decision_tree.score(X_train, Y_train) * 100, 2)
acc_decision_tree
```

99.76

Random Forest Algorithm

```
random_forest = RandomForestClassifier(n_estimators=100)
random_forest.fit(X_train, Y_train)
Y_pred = random_forest.predict(X_test)
random_forest.score(X_train, Y_train)
acc_random_forest = round(random_forest.score(X_train, Y_train) * 100, 2)
acc_random_forest
```

99.76

Prediction accuracy comparison

8. TESTING

8.1 Test Cases

Test caseID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Commnets	TC for Automation(Y/N)	BUG ID	Executed By
City_Code	Dashboard / report,report	Cognos Analytics	Verify the dataset for accurate performance	A quality dataset	1.Upload the dataset 2.Explore the data 3.Create dashboard/ Report,Story	https://github.com/IBM-EPBL/IBM-Project-21966-1659799833 Deliverables/ Dataset/test.csv	Accurate Prediction	Working as expected	Pass	Cognos analytics to accurate predict of patients City_Code	yes	high	Dinesh S
Avslisble Extra Roomin Hospital	Dashboard / report,report	Cognos Analytics	Verify the dataset for accurate performance	A quality dataset	1.Upload the dataset 2.Explore the data 3.Create dashboard/ Report,Story	https://github.com/IBM-EPBL/IBM-Project-21966-1659799833 Deliverables/ Dataset/test.csv	Accurate Prediction	Working as expected	fail	Cognos analytics to accurate predict of patients Avslisble Extra Roomin Hospital	no	low	Chidananda M
Department	Dashboard / report,report	Cognos Analytics	Verify the dataset for accurate performance	A quality dataset	1.Upload the dataset 2.Explore the data 3.Create dashboard/ Report,Story	https://github.com/IBM-EPBL/IBM-Project-21966-1659799833 Deliverables/ Dataset/test.csv	Accurate Prediction	Working as expected	Pass	some datanot accuracy	yes	high	Vignesh A
Ward_Type	Dashboard / report,report	Cognos Analytics	Verify the dataset for accurate performance	A quality dataset	1.Upload the dataset 2.Explore the data 3.Create dashboard/ Report,Story	https://github.com/IBM-EPBL/IBM-Project-21966-1659799833 Deliverables/ Dataset/test.csv	Accurate Prediction	Working as expected	Pass	Cognos analytics to accurate predict of patients Ward_Type	yes	high	Dinesh S Srinath S
Bed Grade	Dashboard / report,report	Cognos Analytics	Verify the dataset for accurate performance	A quality dataset	1.Upload the dataset 2.Explore the data 3.Create dashboard/ Report,Story	https://github.com/IBM-EPBL/IBM-Project-21966-1659799833 Deliverables/ Dataset/test.csv	Accurate Prediction	Working as expected	fail	Cognos analytics to accurate predict of patients Bed Grade	no	low	Chidananda M Vignesh A
Type of Admission	Dashboard / report,report	Cognos Analytics	Verify the dataset for accurate performance	A quality dataset	1.Upload the dataset 2.Explore the data 3.Create dashboard/ Report,Story	https://github.com/IBM-EPBL/IBM-Project-21966-1659799833 Deliverables/ Dataset/test.csv	Accurate Prediction	Working as expected	Pass	Cognos analytics to accurate predict of Type of Admission	yes	high	Srinath S

8.2 User Acceptance Testing

Acceptance Testing
UAT Execution & Report Submission

Date	03 November 2022
Team ID	PNT2022TMIDxxxxxx
Project Name	Project - xxx
Maximum Marks	4 Marks

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [ProductName] project at the time of the release to User Acceptance Testing (UAT).

2. Defect Analysis

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

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	10	4	2	3	20
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	20	37
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	24	14	13	26	77

3. Test Case Analysis

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

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	7	0	0	7
Client Application	51	0	0	51
Security	2	0	0	2
Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

9. RESULTS

9.1 Performance Metrics


```
[ ]  sns.barplot(x= ['K-Nearest Neighbor','Decision tree','Random Forest'],y= [acc_knn, acc_decision_tree,acc_random_forest])
```
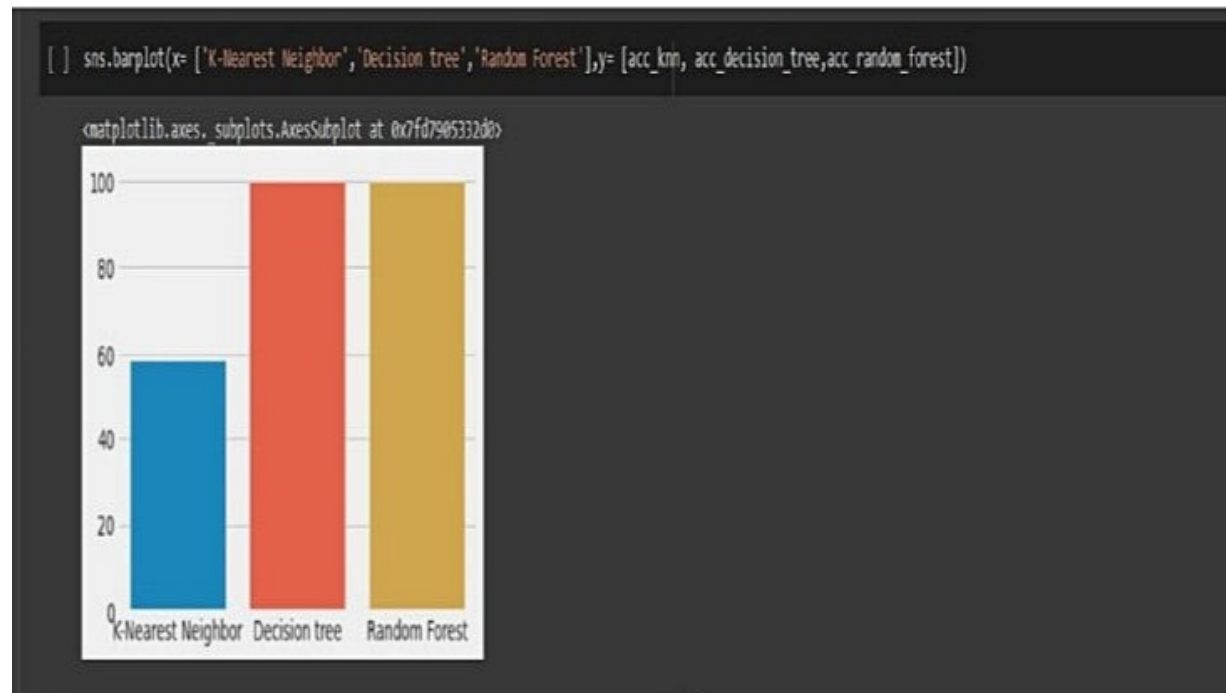
10. ADVANTAGES & DISADVANTAGES

Advantages:

- Analysing clinical data to improve medical research ☐ Using patient data to improve health outcomes.
- Gaining operational insights from healthcare provider data ☐ Improved staffing through health business management analytics.
- Research and prediction of disease.
- Automation of hospital administrative processes.
- Early detection of disease.
- Prevention of unnecessary doctor's visits.
- Discovery of new drugs.
- More accurate calculation of health insurance rates.
- More effective sharing of patient data.

Disadvantages:

Replacing Medical Personnel

- Application of technology in every sphere of human life is improving the way things are done. These technologies are also posing some threat to world of works. Robotics are replacing human labour.

Data Safety

- Data security is another challenge in applying big data in healthcare. Big data storage is usually targets of hackers. This endangers the safety of medical data. Healthcare organisations are very much concerned about the safety of patients' sensitive personal data. For this, all healthcare applications must meet the requirement for data security and be HIPAA compliant before they can be deployed for healthcare services.

Privacy

- One of the major drawbacks in the application of big data in healthcare industry is the issue of lack of privacy. Application of big data technologies involves monitoring of patient's data, tracking of medical inventory and assets, organizing collected data, and visualization of data on the dashboard and the reports. So visualization of sensitive medical data especially that of the patients creates negative impression of big data as it violets privacy.

Man Power

- Applying big data solutions in healthcare requires special skills, and such kills are scarce. Handling of big data requires the combination of medical, technological and statistical knowledge.

11. CONCLUSION

- Data analytics is the science of analysing raw datasets in order to derive a conclusion regarding the information they hold. It enables us to discover patterns in the raw data and draw valuable information from them. To some, the domain of healthcare data analytics may look new, but it has a lot of potential, especially if you wish to engage in challenging job roles and build a strong data analytics profile in the upcoming years. In this blog, we have covered some of the major topics such as what is healthcare data analytics, its applications, scope, and benefits, etc. We hope it helps you in your decision-making as a healthcare data analytics professional.

12. FUTURE SCOPE

- The Future of Healthcare, Intel provides a foundation for big data platforms and AI to advance health analytics. Predictive data analytics is helping health organizations enhance patient care, improve outcomes, and reduce costs by anticipating when, where, and how care should be provided. The future of big data in healthcare will be determined by technological breakthroughs from 2022 to 2030. Complete patient care and cost-effective prescription procedures are required for population health management. To assess clinical and claims data, they must be combined on the same platform.

- Countries around the world have started to invest more capital in medical infrastructure, pharmaceuticals, and healthcare smart analytics solutions. The market is growing and will continue to expand. It has also risen as a good career option for fresh data science and data analytics graduates or professionals who build their career in the healthcare sector. Due to the sensitivity of the profession, the salary offers for healthcare data analysts are lucrative around the world. Apart from the remuneration, the opportunities to work with some of the biggest names in the healthcare sector is also worth mentioning. Hence, healthcare data analytics is growing to be one of the most rewarding branches of data analytics in the coming future.

13. APPENDIX

Source Code

Index.html

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Analytics for Hospitals' Health-Care Data</title>
    <!-- font awesome cdn link  -->
    <link rel="stylesheet"
href="https://cdnjs.cloudflare.com/ajax/libs/font-
awesome/5.15.4/css/all.min.css">
    <!-- custom css file link  -->
    <link rel="stylesheet" href="css/style.css">
    <link rel="stylesheet" href="Styles.css">
</head>
<body>
<!-- header section starts  -->
<header class="header">
    <a href="#" class="logo">
        <img src="images\logo.png" alt="">
    </a>
    <nav class="navbar">
        <a href="index.html">home</a>
        <a href="About.html">about</a>
        <a href="SPRINT-3.pdf">Dashboard</a>
        <a href="SPRINT-4(REPORT).pdf">Report</a>
        <a href="SPRINT-4(STORY).pdf">Story</a>
    </nav>
    <!-- <div class="icons">
```

```html
        <div class="fas fa-search" id="search-btn"></div>
        <div class="fas fa-shopping-cart" id="cart-btn"></div>
        <div class="fas fa-bars" id="menu-btn"></div>
    </div> -->
    <div class="search-form">
        <input type="search" id="search-box" placeholder="search here...">
        <label for="search-box" class="fas fa-search"></label>
    </div>
    <div class="cart-items-container">
        <div class="cart-item">
            <span class="fas fa-times"></span>
            <img src="images/cart-item-1.png" alt="">
            <div class="content">
                <h3>cart item 01</h3>
                <div class="price">$15.99/-</div>
            </div>
        </div>
        <div class="cart-item">
            <span class="fas fa-times"></span>
            <img src="images/cart-item-2.png" alt="">
            <div class="content">
                <h3>cart item 02</h3>
                <div class="price">$15.99/-</div>
            </div>
        </div>
        <div class="cart-item">
            <span class="fas fa-times"></span>
            <img src="images/cart-item-3.png" alt="">
            <div class="content">
                <h3>cart item 03</h3>
                <div class="price">$15.99/-</div>
            </div>
        </div>
        <div class="cart-item">
            <span class="fas fa-times"></span>
            <img src="images/cart-item-4.png" alt="">
```

```html
            <div class="content">
                <h3>cart item 04</h3>
                <div class="price">$15.99/-</div>
            </div>
        </div>
        <a href="#" class="btn">checkout now</a>
    </div>
</header>
<!-- header section ends -->
<!-- home section starts  --><section class="home" id="home">
    <div class="content">
        <h3>Analytics for Hospitals' Health-Care Data </h3>
        <p><b> This webpage allows the user to view the responsive data
info via Dashboard</b></p>
        <table class="table table-bordered">
            <tbody>
                <tr>
                    <td><h4><i><b>Team ID : PNT2022TMID29950
</b></i></h4></td>
                </tr>
                <tr>
                    <td>Team Leader</td>
                    <td>Chidananda M</td>
                </tr>
                <tr>
                    <td>Team member</td>
                    <td>Vignesh A</td>

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

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

```html
                <td>Srinath S</td>

            </tr>
        </tbody>
    </table>
    <a href="#" class="btn">Get Started</a>
  </div>
</section>
<!-- home section ends -->
<!-- about section starts  -->
<section class="about" id="about">
    <h1 class="heading"> <span>about</span> Project </h1>
    <div class="row">
        <div class="image">
            <img src="images\front.jpg" alt="">
        </div>
        <div class="content">
            <h3>what makes us special?</h3>
            <p>• The COVID-19 pandemic has resulted in uncontrollable
havoc. Since this
                was an unexpected circumstance, many local hospitals were
not prepared
                to handle this crisis.
            </p>
            <br>
            <p>• The proper allocation of resources has become a tough
challenge for
                hospitals. There is a possibility that many patients
may not get proper
                treatment.
            </p>
            <br>
            <p>• It created an urgent need for data analytics in
the healthcare industry for
                Analysis of the current situation in terms of
patient condition and hospital
```

```html
                              resources can help in the organized planning of
any future waves of the
                              pandemic.
                              </p>
               <a
href="https://www.yourarticlelibrary.com/retailing/inventory-management-
in-retail-store/48143"class="btn">learn more</a>
           </div>
       </div>
</section>
<!-- about section ends -->
<!-- review section starts  -->
<section class="review" id="review">
     <h1 class="heading"> Client's <span>review</span> </h1>
     <div class="box-container">
         <div class="box">
             <img src="images/quote-img.png" alt="" class="quote">
             <p>Chidhu were all very friendly and helpful. I especially
loved how Dr.Vignesh really took his time to explain my conditions with me
as well as my treatment options. I had a great visit and the doctor's
demeanor has really put me at ease so I highly recommend this clinic.</p>
             <img src="images/pic-1.png" class="user" alt="">
             <h3>john deo</h3>
             <div class="stars">
                 <i class="fas fa-star"></i>
                 <i class="fas fa-star"></i>
                 <i class="fas fa-star"></i>
                 <i class="fas fa-star"></i>
                 <i class="fas fa-star-half-alt"></i>
             </div>
         </div>
         <div class="box">
             <img src="images/quote-img.png" alt="" class="quote">
             <p>Srinath were all very friendly and helpful. I especially
loved how Dr. Dinesh really took his time to explain my conditions with me
as well as my treatment options. I had a great visit and the doctor's
```

```html
demeanor has really put me at ease so I highly recommend this clinic.</p>
                <img src="images/pic-2.png" class="user" alt="">
                <h3>Riya</h3>
                <div class="stars">
                    <i class="fas fa-star"></i>
                    <i class="fas fa-star"></i>
                    <i class="fas fa-star"></i>
                    <i class="fas fa-star"></i>
                    <i class="fas fa-star-half-alt"></i>
                </div>
            </div>
            <div class="box">
                <img src="images/quote-img.png" alt="" class="quote">
                <p> Dinesh were all very friendly and helpful. I especially
loved how Dr. Srinath really took his time to explain my conditions with
me as well as my treatment options. I had a great visit and the doctor's
demeanor has really put me at ease so I highly recommend this clinic.</p>
                <img src="images/pic-3.png" class="user" alt="">
                <h3>Mark</h3>
                <div class="stars">
                    <i class="fas fa-star"></i>
                    <i class="fas fa-star"></i>
                    <i class="fas fa-star"></i>
                    <i class="fas fa-star"></i>
                    <i class="fas fa-star-half-alt"></i>
                </div>
            </div>
        </div>
</section>
<!-- review section ends -->
<!-- contact section starts  -->
<section class="contact" id="contact">
    <h1 class="heading"> <span>contact</span> us </h1>
    <div class="row">
        <iframe class="map"
src="https://www.google.com/maps/embed?pb=!1m18!1m12!1m3!1d30153.788252261
```

```
566!2d72.82321484621745!3d19.141690214227783!2m3!1f0!2f0!3f0!3m2!1i1024!2i
768!4f13.1!3m3!1m2!1s0x3be7b63aceef0c69%3A0x2aa80cf2287dfa3b!2sJogeshwari%
20West%2C%20Mumbai%2C%20Maharashtra%20400047!5e0!3m2!1sen!2sin!4v162945207
7891!5m2!1sen!2sin" allowfullscreen="" loading="lazy"></iframe>
        <form action="">
            <h3>get in touch</h3>
            <div class="inputBox">
                <span class="fas fa-user"></span>
                <input type="text" placeholder="name">
            </div>
            <div class="inputBox">
                <span class="fas fa-envelope"></span>
                <input type="email" placeholder="email">
            </div>
            <div class="inputBox">
                <span class="fas fa-phone"></span>
                <input type="number" placeholder="number">
            </div>
            <input type="submit" value="contact now" class="btn">
        </form>
    </div>
</section>
<!-- contact section ends -->
<!-- footer section starts  -->
<section class="footer">
    <div class="share">
        <a href="#" class="fab fa-facebook-f"></a>
        <a href="#" class="fab fa-twitter"></a>
        <a href="#" class="fab fa-instagram"></a>
        <a href="#" class="fab fa-linkedin"></a>
        <a href="#" class="fab fa-pinterest"></a>
    </div>
    <div class="links">
        <a href="index.html">home</a>
        <a href="About.html">about</a>
        <a href="Dashboard.html">Dashboard</a>
```

```html
        <a href="Report.html">Report</a>
        <a href="Story.html">Story</a>
    </div>
    <div class="credit">created by <span>TEAM:PNT2022TMID29950</span> |
all rights reserved</div>
</section>
<!-- footer section ends -->
<!-- custom js file link  -->
<script src="js/script.js"></script>
</body>
</html>
```

About.html

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Analytics for Hospitals' Health-Care Data</title>
    <!-- font awesome cdn link  -->
    <link rel="stylesheet"
href="https://cdnjs.cloudflare.com/ajax/libs/font-
awesome/5.15.4/css/all.min.css">
    <!-- custom css file link  -->
    <link rel="stylesheet" href="css/style.css">
        <link rel="stylesheet" href="Styles.css">
</head>
<body>

<!-- header section starts  -->
<header class="header">
    <a href="#" class="logo">
        <img src="images/logo.png" alt="">
```

```html
        </a>
    <nav class="navbar">
        <a href="index.html">home</a>
        <a href="#">about</a>
        <a href="SPRINT-3.pdf">Dashboard</a>
        <a href="SPRINT-4(REPORT).pdf">Report</a>
        <a href="SPRINT-4(STORY).pdf">Story</a>
    </nav>
    <div class="search-form">
        <input type="search" id="search-box" placeholder="search here...">
        <label for="search-box" class="fas fa-search"></label>
    </div>
    <div class="cart-items-container">
        <div class="cart-item">
            <span class="fas fa-times"></span>
            <img src="images/cart-item-1.png" alt="">
            <div class="content">
                <h3>cart item 01</h3>
                <div class="price">$15.99/-</div>
            </div>
        </div>
        <div class="cart-item">
            <span class="fas fa-times"></span>
            <img src="images/cart-item-2.png" alt="">
            <div class="content">
                <h3>cart item 02</h3>
                <div class="price">$15.99/-</div>
            </div>
        </div>
        <div class="cart-item">
            <span class="fas fa-times"></span>
            <img src="images/cart-item-3.png" alt="">
            <div class="content">
                <h3>cart item 03</h3>
                <div class="price">$15.99/-</div>
            </div>
```

```html
        </div>
        <div class="cart-item">
            <span class="fas fa-times"></span>
            <img src="images/cart-item-4.png" alt="">
            <div class="content">
                <h3>cart item 04</h3>
                <div class="price">$15.99/-</div>
            </div>
        </div>
        <a href="#" class="btn">checkout now</a>
    </div>
</header>
<section class="home1" id="home"></section>
<!-- home section ends -->
<!-- about section starts  -->
<section class="about" id="about">
    <h1 class="heading"> <span>about</span> Project </h1>
    <div class="row1">
        <div class="image">
            <img src="images\business-presentation.jpg" alt="">
        </div>
        <div class="content1">
            <h3>what makes us special?</h3>
            <p>● The COVID-19 pandemic has resulted in uncontrollable
havoc. Since this
                was an unexpected circumstance, many local hospitals were
not prepared
                to handle this crisis.</p>
                <br>
                <p> ● The proper allocation of resources has become a
tough challenge for
                hospitals. There is a possibility that many patients
may not get proper
                treatment.
                </p>
                <br>
```

```html
                    <p>• It created an urgent need for data analytics in
the healthcare industry for
                        Analysis of the current situation in terms of
patient condition and hospital
                        resources can help in the organized planning of
any future waves of the
                        pandemic.
                    </p>
        <a
href="https://pubmed.ncbi.nlm.nih.gov/22658468/"class="btn">learn more</a>
        </div>
    </div>
</section>
<!-- about end -->
<!-- about2 Starts-->
<section class="about" id="about">
    <div class="row1">
        <div class="image">
            <img src="images\client.jpg" alt="">
        </div>
        <div class="content1">
            <h2>Social Impact</h2>
            <p>• Access to primary healthcare, Less Casualty.</p>
                <br>
                <h2>Business Model/Impact</h2>
                <p> • Pharmacy companies will sell their medical products
to generate more
                    revenue.
                    • Insurance companies will sell their health policies
to needed people.
                </p>
                <br>
                <p>• Retailers are able to understand the deepest
customer needs and
                    adjust their offering to meet shoppers' demands.
                </p>
```

```html
                        <br>
                        <h3> Existing Solutions</h3>
                        <p> <a href="https://www.boldbi.com/dashboard-
examples/healthcare"> 1.https://www.boldbi.com/dashboard-
examples/healthcare</a></p>
                        <br> <p> <a
href="https://www.orangemantra.com/industries/healthcare/">2.https://www.o
rangemantra.com/industries/healthcare/</a>
                        </p><br>
                        <h3>Recommended Technology Stack</h3>
                        <li>Cognos Analytics</li>
                        <li>Data Analysis with Python</li>
                   <li>Power-BI, etc..</li>
                        </li>
                        <h3>References</h3>
                        <p> <a
href="https://www.researchgate.net/publication/348834045_Development_of_th
e_Health_Information_Analytics_Dashboard_Using_Big_Data_Analytics">3.https
://www.researchgate.net/publication/348834045_Development_of_the_Health_In
formation_Analytics_Dashboard
    </a></p>


            <!-- <a
href="https://www.yourarticlelibrary.com/retailing/inventory-management-
in-retail-store/48143"class="btn">learn more</a> -->
        </div>
    </div>
</section>
<!-- footer section starts  -->
<section class="footer">
    <div class="share">
        <a href="#" class="fab fa-facebook-f"></a>
        <a href="#" class="fab fa-twitter"></a>
        <a href="#" class="fab fa-instagram"></a>
        <a href="#" class="fab fa-linkedin"></a>
        <a href="#" class="fab fa-pinterest"></a>
```

```
        </div>
        <div class="links">
            <a href="index.html">home</a>
            <a href="About.html">about</a>
            <a href="Dashboard.html">Dashboard</a>
            <a href="Report.html">Report</a>
            <a href="Story.html">Story</a>
        </div>
        <div class="credit">created by <span>TEAM:PNT2022TMID29950</span> |
all rights reserved</div>
</section>
<!-- footer section ends -->
<!-- custom js file link  -->
<script src="js/script.js"></script>
</body>
</html>
```

Dashboard.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Analytics for Hospitals' Health-Care Data</title>
    <!-- font awesome cdn link  -->
    <link rel="stylesheet"
href="https://cdnjs.cloudflare.com/ajax/libs/font-
awesome/5.15.4/css/all.min.css">
    <!-- custom css file link  -->
    <link rel="stylesheet" href="css/style.css">
    <link rel="stylesheet" href="Styles.css">
</head>
<body>
```

```html
<!-- header section starts  -->
<header class="header">
    <a href="#" class="logo">
        <img src="images\logo.jpg" alt="">
    </a>
    <nav class="navbar">
        <a href="index.html">home</a>
        <a href="About.html">about</a>
        <a href="Dashboard.html">Dashboard</a>
        <a href="Report.html">Report</a>
        <a href="Story.html">Story</a>
    </nav>
    <div class="search-form">
        <input type="search" id="search-box" placeholder="search here...">
        <label for="search-box" class="fas fa-search"></label>
    </div>
    <div class="cart-items-container">
        <div class="cart-item">
            <span class="fas fa-times"></span>
            <img src="images/cart-item-1.png" alt="">
            <div class="content">
                <h3>cart item 01</h3>
                <div class="price">$15.99/-</div>
            </div>
        </div>
        <div class="cart-item">
            <span class="fas fa-times"></span>
            <img src="images/cart-item-2.png" alt="">
            <div class="content">
                <h3>cart item 02</h3>
                <div class="price">$15.99/-</div>
            </div>
        </div>
        <div class="cart-item">
            <span class="fas fa-times"></span>
            <img src="images/cart-item-3.png" alt="">
```

```html
            <div class="content">
                <h3>cart item 03</h3>
                <div class="price">$15.99/-</div>
            </div>
        </div>
        <div class="cart-item">
            <span class="fas fa-times"></span>
            <img src="images/cart-item-4.png" alt="">
            <div class="content">
                <h3>cart item 04</h3>
                <div class="price">$15.99/-</div>
            </div>
        </div>
        <a href="#" class="btn">checkout now</a>
    </div>
</header>
<!-- home section starts  -->
<section class="Dashboard" id="Dashboard">
    <div class="content">
        <iframe
src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.p
ublic_folders%2Fsprint1%2FDashboard&action=view&mode=dashboard&subView=mod
el000001848403120a_00000000" width="1320" height="840" frameborder="0"
gesture="media" allow="encrypted-media" allowfullscreen=""
scrolling="no"></iframe>
    </div>
</section>
<section class="footer">
    <div class="share">
        <a href="#" class="fab fa-facebook-f"></a>
        <a href="#" class="fab fa-twitter"></a>
        <a href="#" class="fab fa-instagram"></a>
        <a href="#" class="fab fa-linkedin"></a>
        <a href="#" class="fab fa-pinterest"></a>
    </div>
    <div class="links">
```

```html
        <a href="index.html">home</a>
        <a href="About.html">about</a>
        <a href="SPRINT-3.pdf">Dashboard</a>
        <a href="SPRINT-4(REPORT).pdf">Report</a>
        <a href="SPRINT-4(STORY).pdf">Story</a>
    </div>
    <div class="credit">created by <span>TEAM:PNT2022TMID29950</span> |
all rights reserved</div>
</section>
<!-- footer section ends -->
<!-- custom js file link  -->
<script src="js/script.js"></script>
</body>
</html>
```

Report.html

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Analytics for Hospitals' Health-Care Data</title>
    <!-- font awesome cdn link  -->
    <link rel="stylesheet"
href="https://cdnjs.cloudflare.com/ajax/libs/font-
awesome/5.15.4/css/all.min.css">
    <!-- custom css file link  -->
    <link rel="stylesheet" href="css/style.css">
    <link rel="stylesheet" href="Styles.css">
</head>
<body>
<!-- header section starts  -->
<header class="header">
    <a href="#" class="logo">
```

```html
        <img src="images\logo.jpg" alt="">
    </a>
    <div class="icons">
        <div class="fas fa-search" id="search-btn"></div>
        <div class="fas fa-shopping-cart" id="cart-btn"></div>
        <div class="fas fa-bars" id="menu-btn"></div>
    </div>
    <div class="search-form">
        <input type="search" id="search-box" placeholder="search here...">
        <label for="search-box" class="fas fa-search"></label>
    </div>
    <div class="cart-items-container">
        <div class="cart-item">
            <span class="fas fa-times"></span>
            <img src="images/cart-item-1.png" alt="">
            <div class="content">
                <h3>cart item 01</h3>
                <div class="price">$15.99/-</div>
            </div>
        </div>
        <div class="cart-item">
            <span class="fas fa-times"></span>
            <img src="images/cart-item-2.png" alt="">
            <div class="content">
                <h3>cart item 02</h3>
                <div class="price">$15.99/-</div>
            </div>
        </div>
        <div class="cart-item">
            <span class="fas fa-times"></span>
            <img src="images/cart-item-3.png" alt="">
            <div class="content">
                <h3>cart item 03</h3>
                <div class="price">$15.99/-</div>
            </div>
        </div>
```

```html
        <div class="cart-item">
            <span class="fas fa-times"></span>
            <img src="images/cart-item-4.png" alt="">
            <div class="content">
                <h3>cart item 04</h3>
                <div class="price">$15.99/-</div>
            </div>
        </div>
        <a href="#" class="btn">checkout now</a>
    </div>
</header>
<!-- home section starts  --><section class="Report" id="Report">
    <div class="content">
    <div><iframe
src="https://us1.ca.analytics.ibm.com/bi/?pathRef=.public_folders%2Fsprint
1%2FNew%2Breport&action=run&format=HTML&prompt=false" width="1320"
height="840" frameborder="0" gesture="media" allow="encrypted-media"
allowfullscreen=""></iframe></div>
    <div></div>
    <div></div>
</section>
<section class="footer">
    <div class="share">
        <a href="#" class="fab fa-facebook-f"></a>
        <a href="#" class="fab fa-twitter"></a>
        <a href="#" class="fab fa-instagram"></a>
        <a href="#" class="fab fa-linkedin"></a>
        <a href="#" class="fab fa-pinterest"></a>
    </div>
    <div class="links">
        <a href="index.html">home</a>
        <a href="About.html">about</a>
        <a href="SPRINT-3.pdf">Dashboard</a>
        <a href="SPRINT-4(REPORT).pdf">Report</a>
        <a href="SPRINT-4(STORY).pdf">Story</a>
    </div>
```

```html
        <div class="credit">created by <span>TEAM:PNT2022TMID29950</span> |
all rights reserved</div>
</section>
<!-- footer section ends -->
<!-- custom js file link  -->
<script src="js/script.js"></script>
</body>
</html>
```

Story.html

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Analytics for Hospitals' Health-Care Data</title>
    <!-- font awesome cdn link  -->
    <link rel="stylesheet"
href="https://cdnjs.cloudflare.com/ajax/libs/font-
awesome/5.15.4/css/all.min.css">
    <!-- custom css file link  -->
    <link rel="stylesheet" href="css/style.css">
    <link rel="stylesheet" href="Styles.css">
</head>
<body>

<!-- header section starts  -->
<header class="header">
    <a href="#" class="logo">
        <img src="images\logo.jpg" alt="">
    </a>
    <div class="icons">
```

```html
        <div class="fas fa-search" id="search-btn"></div>
        <div class="fas fa-shopping-cart" id="cart-btn"></div>
        <div class="fas fa-bars" id="menu-btn"></div>
    </div>
    <div class="search-form">
        <input type="search" id="search-box" placeholder="search here...">
        <label for="search-box" class="fas fa-search"></label>
    </div>
    <div class="cart-items-container">
        <div class="cart-item">
            <span class="fas fa-times"></span>
            <img src="images/cart-item-1.png" alt="">
            <div class="content">
                <h3>cart item 01</h3>
                <div class="price">$15.99/-</div>
            </div>
        </div>
        <div class="cart-item">
            <span class="fas fa-times"></span>
            <img src="images/cart-item-2.png" alt="">
            <div class="content">
                <h3>cart item 02</h3>
                <div class="price">$15.99/-</div>
            </div>
        </div>
        <div class="cart-item">
            <span class="fas fa-times"></span>
            <img src="images/cart-item-3.png" alt="">
            <div class="content">
                <h3>cart item 03</h3>
                <div class="price">$15.99/-</div>
            </div>
        </div>
        <div class="cart-item">
            <span class="fas fa-times"></span>
            <img src="images/cart-item-4.png" alt="">
```

```html
            <div class="content">
                <h3>cart item 04</h3>
                <div class="price">$15.99/-</div>
            </div>
        </div>
        <a href="#" class="btn">checkout now</a>
    </div>
</header>
<!-- home section starts  --><section class="Report" id="Report">
    <div class="content">
     <div><iframe
src="https://us1.ca.analytics.ibm.com/bi/?perspective=story&pathRef=.publi
c_folders%2Fsprint1%2Fstory&action=view&sceneId=model00000184812012e2_0000
0000&sceneTime=0" width="1320" height="840" frameborder="0"
gesture="media" allow="encrypted-media" allowfullscreen=""></iframe></div>
     <div></div>
     <div></div>
</section>
<section class="footer">
    <div class="share">
        <a href="#" class="fab fa-facebook-f"></a>
        <a href="#" class="fab fa-twitter"></a>
        <a href="#" class="fab fa-instagram"></a>
        <a href="#" class="fab fa-linkedin"></a>
        <a href="#" class="fab fa-pinterest"></a>
    </div>
    <div class="links">
        <a href="index.html">home</a>
        <a href="About.html">about</a>
        <a href="SPRINT-3.pdf">Dashboard</a>
        <a href="SPRINT-4(REPORT).pdf">Report</a>
        <a href="SPRINT-4(STORY).pdf">Story</a>
    </div>
    <div class="credit">created by <span>TEAM:PNT2022TMID29950</span> |
all rights reserved</div>
</section>
```

```
<!-- footer section ends -->
<!-- custom js file link  -->
<script src="js/script.js"></script>
</body>
</html>
```

GitHub Project and Demo Link

Github: https://github.com/IBM-EPBL/IBM-Project-21966-1659799833
Demo:
https://drive.google.com/file/d/1eA79gHsEOutMG1XwrpRl1J99tlDt0u76/
view?usp=drivesdk