ANALYTICS FOR HOSPITAL'S HEALTH CARE DATAWITH AN INTERACTIVE DASHBOARD

TEAM ID : PNT2022TMID04319

GIT REPO ID : https://github.com/IBM-EPBL/IBM-Project-10766-1659202737

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1. INTRODUCTION

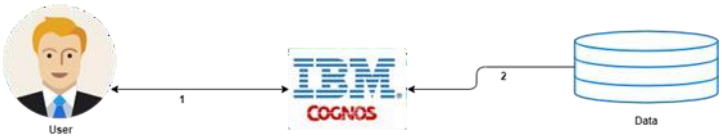
1.1 PROJECT OVERVIEW

Recent Covid-19 pandemic has raised over enormous percentage in the economy. Healthcare Management, while healthcare management has various use-cases for using data science, patient's length of stay is one of the crucial parameter to observe and predict if one wants to improve the efficiency ofthe healthcare management in a hospital

This parameter helps hospitals to identify patients of high LOS-risk (patients who will stay longer) at the time of admission. Once identified, patients with high LOS risk can have their treatment plan optimized to minimize LOS and lower the chance of staff/visitor infection. Also, prior knowledge of LOS can aid in logistics such as room and bed allocation planning.

1.2 PURPOSE OF THE APPLICATION:

The purpose is to accurately predict the Length of Stay for each patienton case by case basis so that the Hospitals can use this information for optimalresource allocation and better functioning. The length of stay is divided into 11different classes ranging from 0-10 days to more than 100 days.



However, the two stages are compulsory for proper wound healing and if the inflammation is continued too long, then it leads to heart failure. An unusual type of heart disease is the acute spasm or contraction in the coronaryarteries.

The spasms become visible in arteries suddenly with no symptom of atherosclerosis. It blocks the blood flow that causes oxygen deprivation in the heart. Male genders are more likely to experience heart attack than females. Moreover, women can experience pain more than an hour and the duration to experience the pain of men is normally less than an hour. The cardiovascular disease has an impact in the complete physiological system, not only in the heart; changes occur everywhere that too in the remote organs such as bone marrow and spleen.

2. LITERATURE SURVEY

2.1 Existing Problem

Healthcare industries generate enormous amount of data, so called big data that accommodates hidden knowledge or pattern for decision making. The huge volume of data is used to make decision which is more accurate than intuition. Exploratory Data Analysis (EDA) detects mistakes, finds appropriate data, checks assumptions and determines the correlation among the explanatory variables. In the context, EDA is considered as analyzing data that excludes inferences and statisticalmodelling.

2.2 References

1. AUTHOR NAME:

   Luo, Lian, Feng, Huang, & Zhang,2017

2. AUTHOR NAME:

   Prop.Nagarathna Kulennavar,Priyanka.K,2014.

3. AUTHOR NAME:

   Ritu,Rajesh et al.V.S.Tseng,2017

4. AUTHOR NAME:

   V.S.Tseng,2017

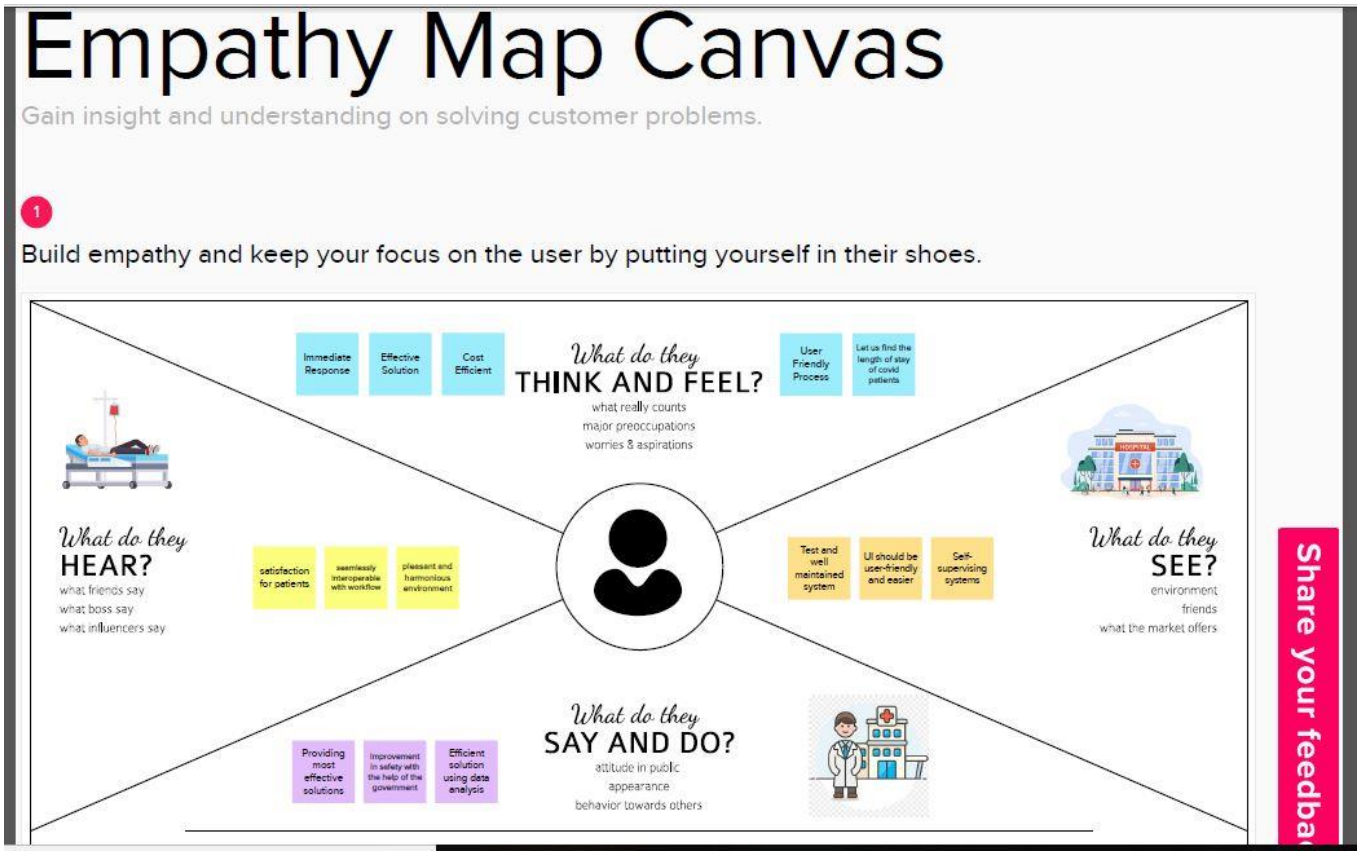
2.3 Problem Statement Definition

1. DESCRIPTION:

The various huge and complicated data sets that are challenging to analyse and managewith conventional software or hardware are referred to as "big data" in the healthcare and medical fields. Data integration, data quality assurance, analysis, modelling, interpretation, and validation are all included in big data analytics. Utilizing big data analytics allows for thorough knowledge discovery from the vast amount of data that isnow available. The integration, exploration, and analysis of massive amounts of complicated heterogeneous data with many types, including biological data, experimental data, electronic health record data, and social media data, is a very promising procedure in medicine and healthcare. Big data analytics integrate a numberof domains, including bioinformatics, medical imaging, sensor informatics, medical informatics, medical informatics, health informatics, and computational biomedicine.

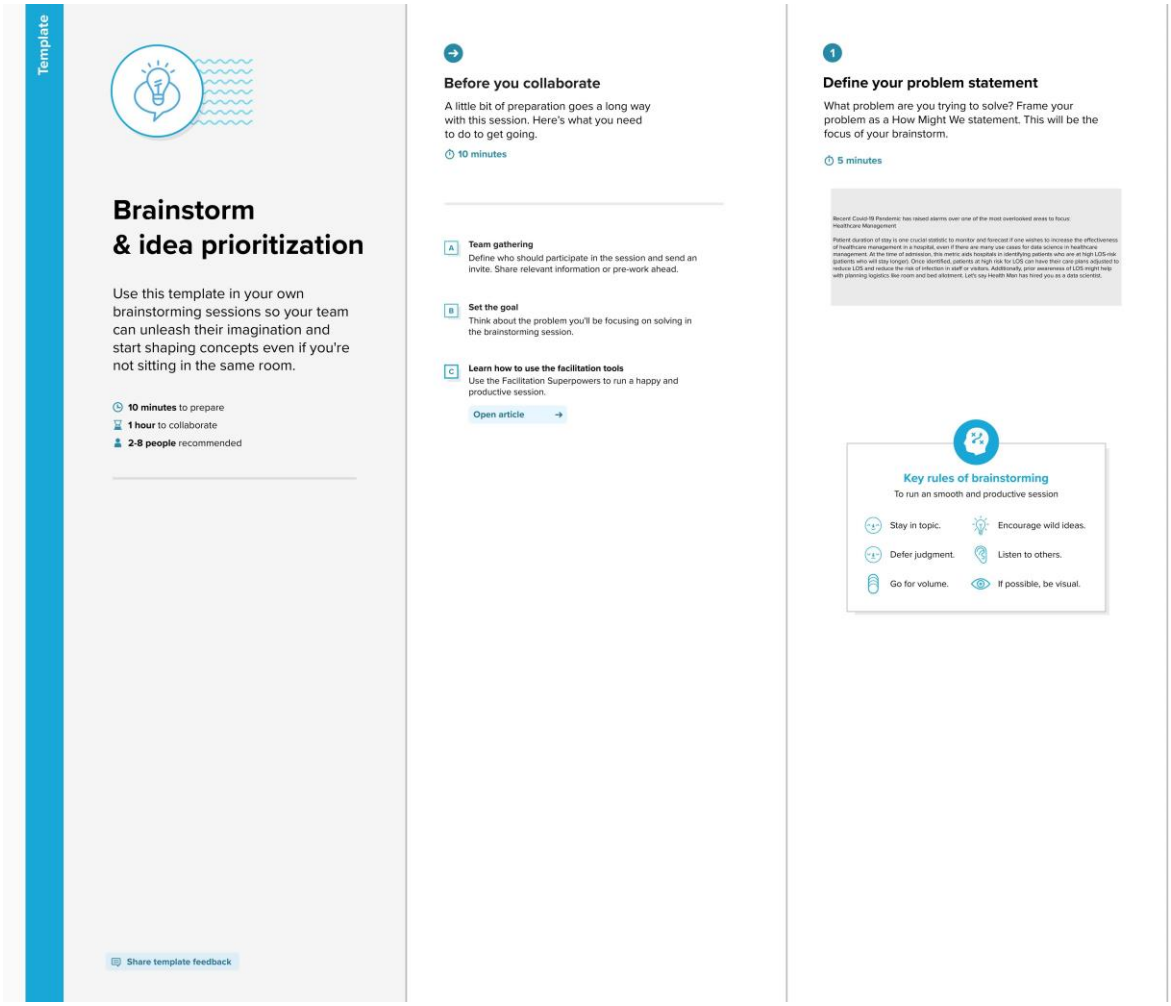
3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

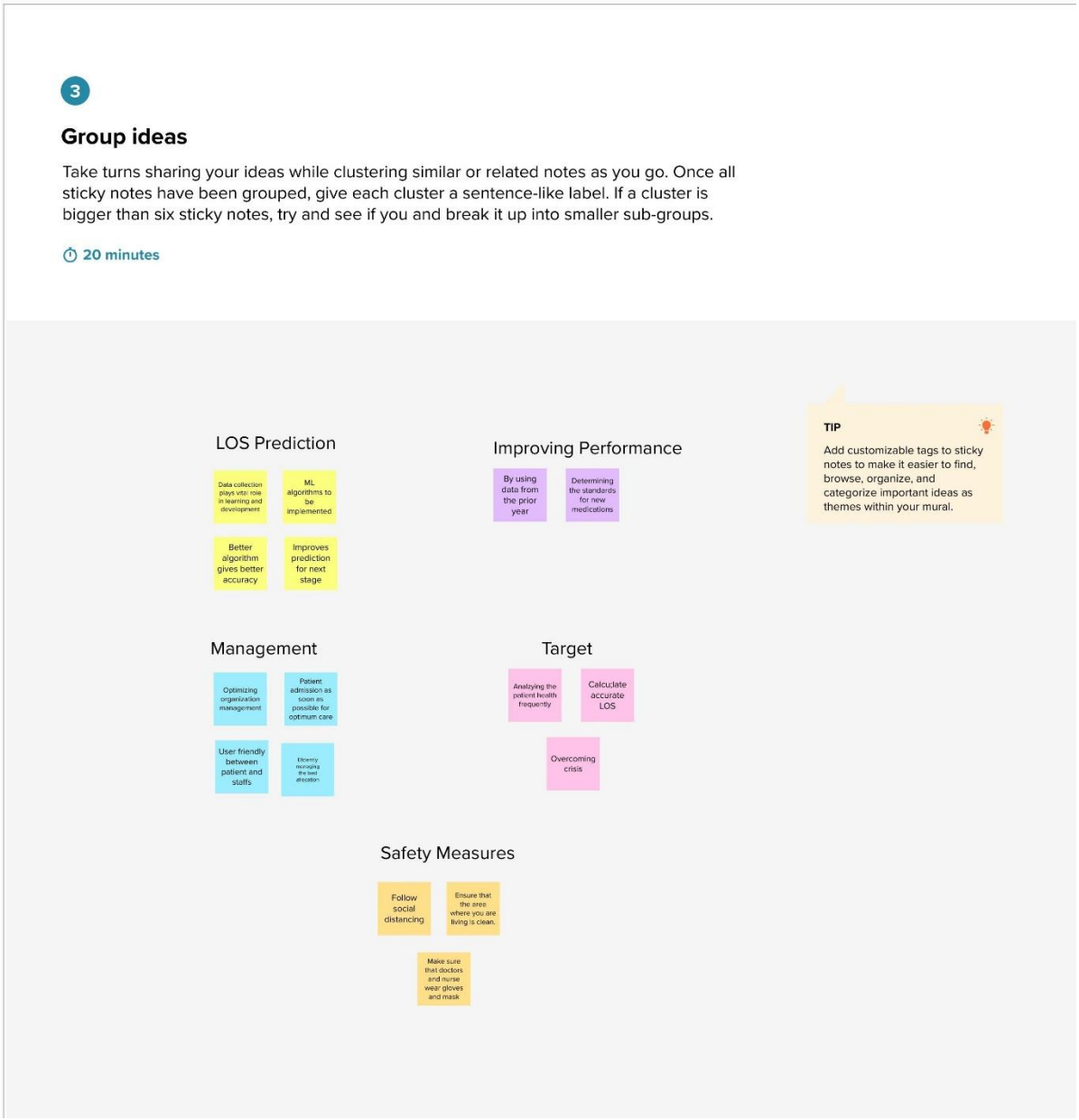


BRAINSTORMING:

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



Step-2: Brainstorm, Idea Listing and Grouping



Step-3: Idea Prioritization

2

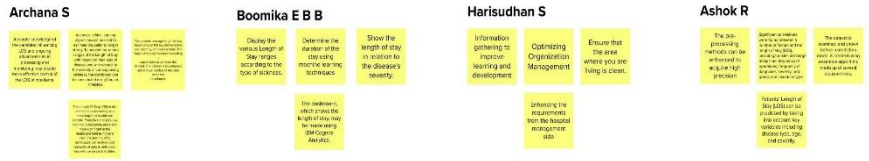
Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

TIP

You can select a sticky note and hit the pencil [switch to sketch] icon to start drawing!

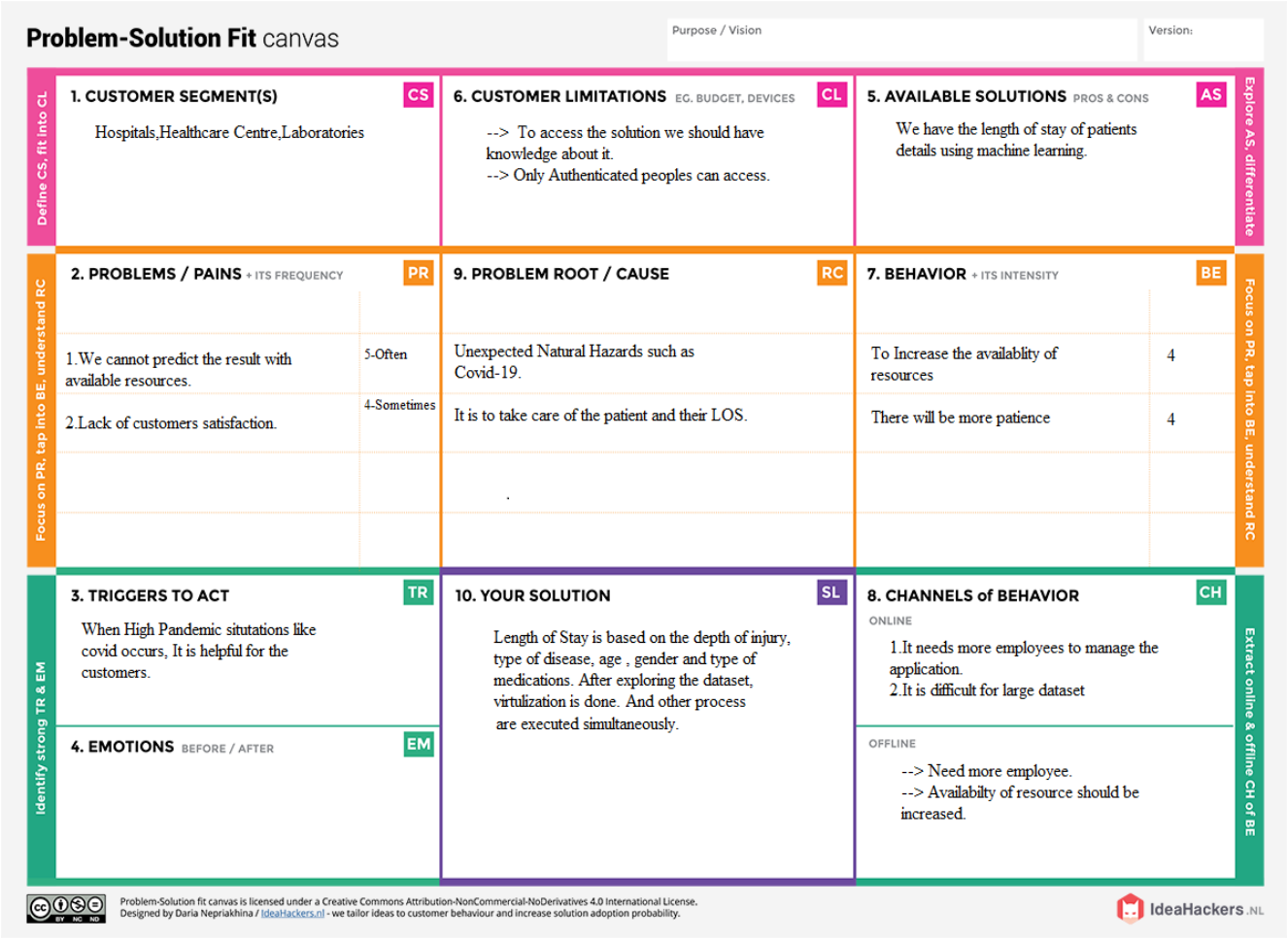


3.2 Proposed Solution

	Parameter	Description
	Problem Statement (Problem to be solved)	To precisely determine the patient'slength of hospital stay
	Idea / Solution description	Gather patient data from medical facilities Examining the specifics of the patient's documents Create a Cognos Analytics dashboard to show patient data
	Novelty / Uniqueness	Accurate understanding of the factorsassociating with the LOS and progressive improvements in processing and monitoring may allowmore efficient management of the LOS of inpatients.
	Social Impact / Customer Satisfaction	A shorter LOS reduces the risk of acquiring staph infections and other healthcare-related conditions, frees up vital bed spaces, and cuts overall medical expenses.

	Business Model (Revenue Model)	The length of stay (LOS) is an important indicator of the efficiency of hospital management. Reduction in the number of inpatient days results in decreased risk of infection and medication side effects, improvement in the quality of treatment, and increased hospital profit with more efficient bed management.
	Scalability of the Solution	Remote patient monitoring systems enabling effective distancetreatment. Patient portals that allow people to better manage their health themselves;

3.3 Problem Solution fit



Problem-Solution Fit canvas

Purpose / Vision

Version:

Define CS, fit into CL

1. CUSTOMER SEGMENT(S) CS

Hospitals,Healthcare Centre,Laboratories

6. CUSTOMER LIMITATIONS EG. BUDGET, DEVICES CL

--> To access the solution we should have knowledge about it.
--> Only Authenticated peoples can access.

5. AVAILABLE SOLUTIONS PROS & CONS AS

We have the length of stay of patients details using machine learning.

Explore AS, differentiate

Focus on PR, tap into BE, understand RC

2. PROBLEMS / PAINS + ITS FREQUENCY PR

1.We cannot predict the result with available resources.	5-Often
2.Lack of customers satisfaction.	4-Sometimes

9. PROBLEM ROOT / CAUSE RC

Unexpected Natural Hazards such as Covid-19.
It is to take care of the patient and their LOS.

7. BEHAVIOR + ITS INTENSITY BE

To Increase the availablity of resources	4
There will be more patience	4

Focus on PR, tap into BE, understand RC

Identify strong TR & EM

3. TRIGGERS TO ACT TR

When High Pandemic situtations like covid occurs, It is helpful for the customers.

4. EMOTIONS BEFORE / AFTER EM

10. YOUR SOLUTION SL

Length of Stay is based on the depth of injury, type of disease, age , gender and type of medications. After exploring the dataset, virtulization is done. And other process are executed simultaneously.

8. CHANNELS of BEHAVIOR CH

ONLINE

1.It needs more employees to manage the application.
2.It is difficult for large dataset

OFFLINE

--> Need more employee.
--> Availabilty of resource should be increased.

Extract online & offline CH of BE

IdeaHackers.NL

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 Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Operability	Using IBM Cognos Analytics the dashboard can be created and used to display the different ranges of the length of stay with respect to severity of corresponding disease.
FR-4	Accuracy	Using Different Machine Learning techniques with high accuracy the LOS can be predicted.
FR-5	Compliance	The Product is to be used within the hospital and patient's info can't be shared because it also contains some sensitive information
FR-6	Productivity	The dashboard is thought to enhance the forecasts of Length of Stay, resulting in a situation where delivering an improved solution

4.2 Non-Functional requirements

Non-functional Requirements:

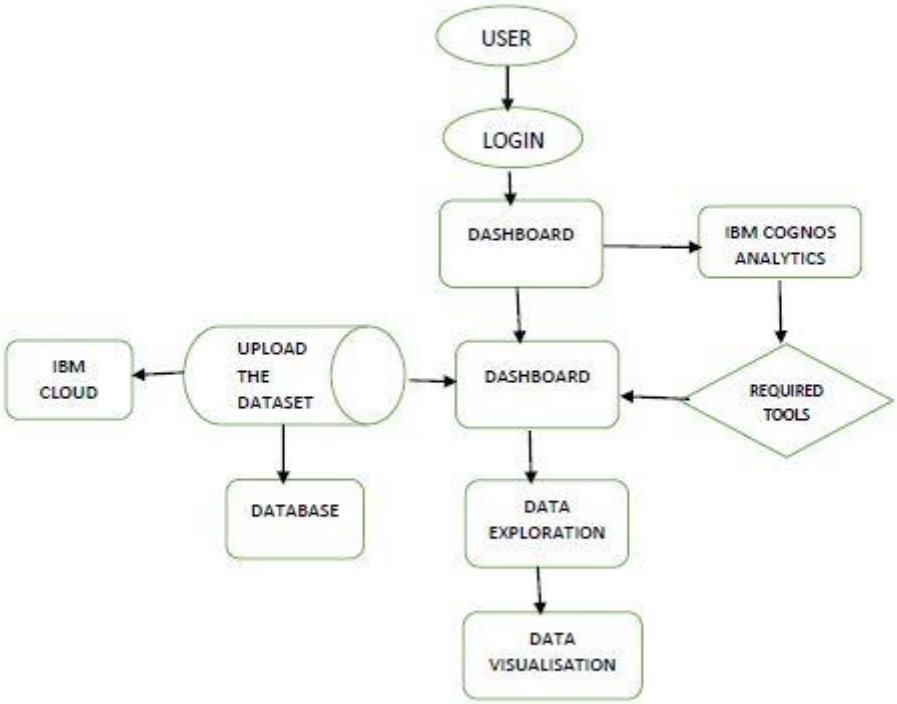
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The Dashboard is designed so that the user can can provide a summary of the data on Length Of Stay.Employing tools for visualisation.
NFR-2	**Security**	There must be a certain amount of general security.
NFR-3	**Reliability**	This dashboard will be dependable and constant for the users and supports the user's efficient, effective usage in a trustworthy manner.

5.PROJECT DESIGN

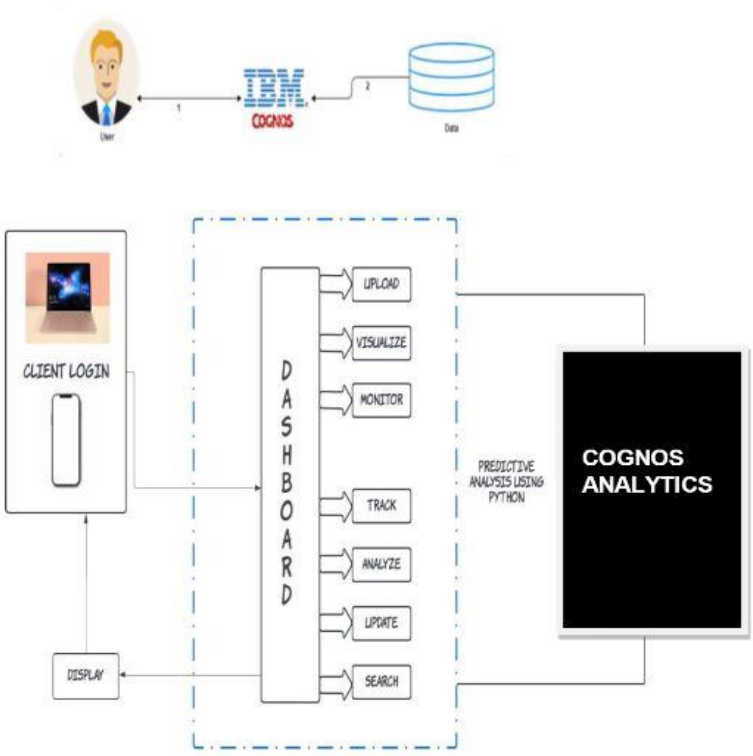
5.1 Data Flow Diagrams

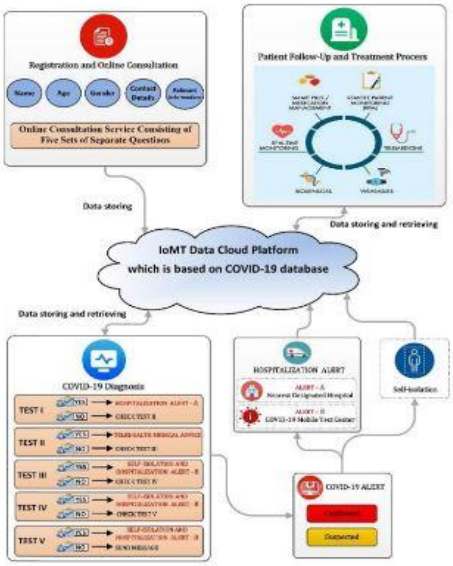
Example:



5.2 Solution and Technical Architecture

Solution Architecture:





5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Web user)		USN-1	As a user, registering for the application by entering my email, password, and confirmation of the password	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Gmail	I can register & access the dashboard	Medium	Sprint-2
	Login	USN-4	As a user, I can log into the application by entering email & password	I can access the dashboard	High	Sprint-2
	Dashboard	USN-5	As a user, I can upload the datasets to the dashboard	I can access various operations	High	Sprint-3
	View	USN-6	As a user, I can view the patient details	I can view the visual data and the result after the prediction	High	Sprint-3
Admin	Analyse	USN-7	As an admin, I will analyse the given dataset	I can analyse the dataset	High	Sprint-4
	Predict	USN-8	As an admin, I will predict the length of stay	I can predict the length of stay	High	Sprint-4

6. PROJECT PLANNING & SCHEDULING

PROJECT PLANNING AND ESTIMATION

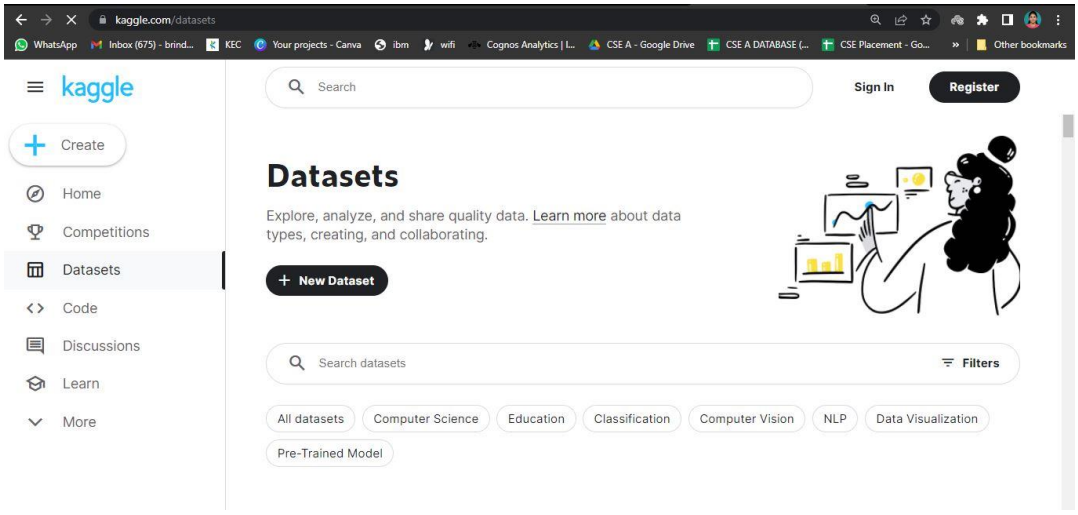
Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team members
Sprint-1	Registration	USN-1	As a user, I can register for the dashboard by entering the email password by confirming the password.	10	High	Brindha G
Sprint-1		USN-2	As a user, I will receive a confirmation email once I have registered for the dashboard	10	High	Ashwanth V Praveen
Sprint-2		USN-3	As a user, I can register dashboard.	8	Low	Gowri P
Sprint-2		USN-4	As a user, I can register through Gmail in the dashboard.	8	Medium	Aishwarya K
Sprint-2	Login	USN-5	As a user, I can log into using entering email & password	4	High	Brindha G
Sprint-3	Dashboard	USN-6	As a user, I can use my account in my dashboard for uploading dataset.	8	Medium	Ashwanth V Praveen
Sprint-3	Website	USN-7	As a user, I can use my dashboard in website	5	Medium	Gowri P

6.1 Sprint Planning & Estimation

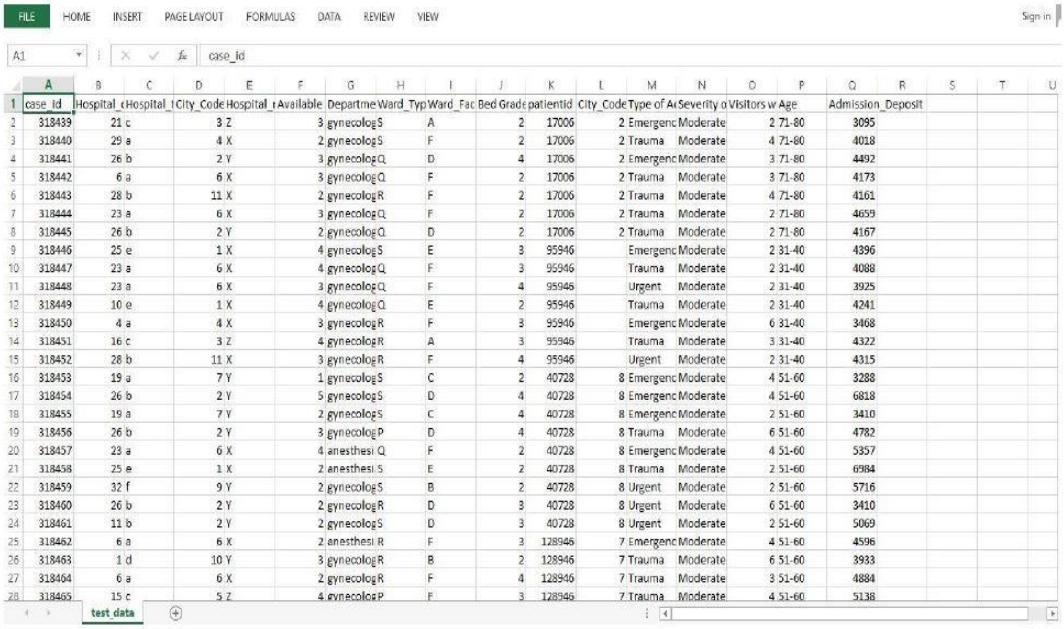
SPRINT 1:

UNDERSTANDING DATASETS



Sprint 2:

WORKING WITH DATASET



FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW Sign in

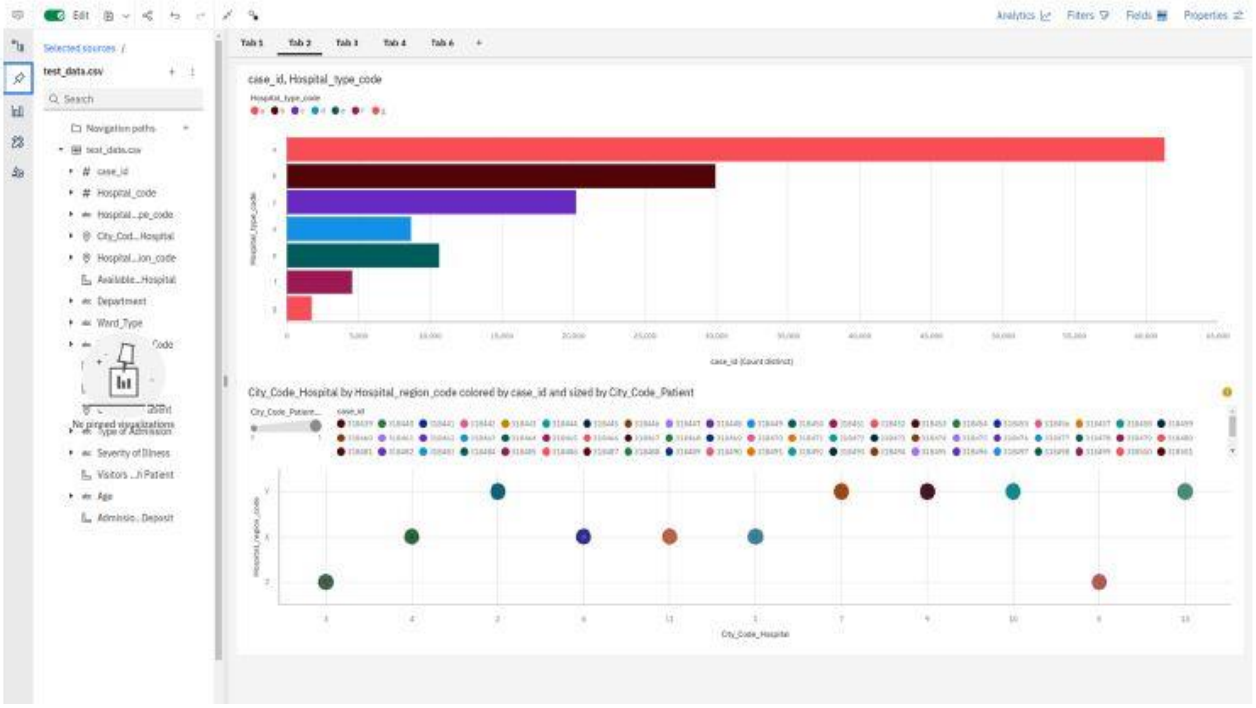
A1 case_id

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	case_id	Hospital_c	Hospital_t	City_Code	Hospital_t	Available	Departme	Ward_Typ	Ward_Fac	Bed Grade	patientid	City_Code	Type of Ac	Severity o	Visitors w	Age	Admission_Deposit				
2	318439	21	c	3	Z	3	gynecolog	S	A	2	17006	2	Emergenc	Moderate	2	71-80	3095				
3	318440	29	a	4	X	2	gynecolog	S	F	2	17006	2	Trauma	Moderate	4	71-80	4018				
4	318441	26	b	2	Y	3	gynecolog	Q	D	4	17006	2	Emergenc	Moderate	3	71-80	4492				
5	318442	6	a	6	X	3	gynecolog	Q	F	2	17006	2	Trauma	Moderate	3	71-80	4173				
6	318443	28	b	11	X	2	gynecolog	R	F	2	17006	2	Trauma	Moderate	4	71-80	4161				
7	318444	23	a	6	X	3	gynecolog	Q	F	2	17006	2	Trauma	Moderate	2	71-80	4659				
8	318445	26	b	2	Y	2	gynecolog	Q	D	2	17006	2	Trauma	Moderate	2	71-80	4167				
9	318446	25	e	1	X	4	gynecolog	S	E	3	95946		Emergenc	Moderate	2	31-40	4396				
10	318447	23	a	6	X	4	gynecolog	Q	F	3	95946		Trauma	Moderate	2	31-40	4088				
11	318448	23	a	6	X	3	gynecolog	Q	F	4	95946		Urgent	Moderate	2	31-40	3925				
12	318449	10	e	1	X	4	gynecolog	Q	E	2	95946		Trauma	Moderate	2	31-40	4241				
13	318450	4	a	4	X	3	gynecolog	R	F	3	95946		Emergenc	Moderate	6	31-40	3468				
14	318451	16	c	3	Z	4	gynecolog	R	A	3	95946		Trauma	Moderate	3	31-40	4322				
15	318452	28	b	11	X	3	gynecolog	R	F	4	95946		Urgent	Moderate	2	31-40	4315				
16	318453	19	a	7	Y	1	gynecolog	S	C	2	40728	8	Emergenc	Moderate	4	51-60	3288				
17	318454	26	b	2	Y	5	gynecolog	S	D	4	40728	8	Emergenc	Moderate	4	51-60	6818				
18	318455	19	a	7	Y	2	gynecolog	S	C	4	40728	8	Emergenc	Moderate	2	51-60	3410				
19	318456	26	b	2	Y	3	gynecolog	P	D	4	40728	8	Trauma	Moderate	6	51-60	4782				
20	318457	23	a	6	X	4	anesthesi	Q	F	2	40728	8	Emergenc	Moderate	4	51-60	5357				
21	318458	25	e	1	X	2	anesthesi	S	E	2	40728	8	Trauma	Moderate	2	51-60	6984				
22	318459	32	f	9	Y	2	gynecolog	S	B	2	40728	8	Urgent	Moderate	2	51-60	5716				
23	318460	26	b	2	Y	2	gynecolog	R	D	3	40728	8	Urgent	Moderate	6	51-60	3410				
24	318461	11	b	2	Y	2	gynecolog	S	D	3	40728	8	Urgent	Moderate	2	51-60	5069				
25	318462	6	a	6	X	2	anesthesi	R	F	3	128946	7	Emergenc	Moderate	4	51-60	4596				
26	318463	1	d	10	Y	3	gynecolog	R	B	2	128946	7	Trauma	Moderate	6	51-60	3933				
27	318464	6	a	6	X	2	gynecolog	R	F	4	128946	7	Trauma	Moderate	3	51-60	4884				
28	318465	15	c	5	Z	4	gynecolog	P	F	3	128946	7	Trauma	Moderate	4	51-60	5138				

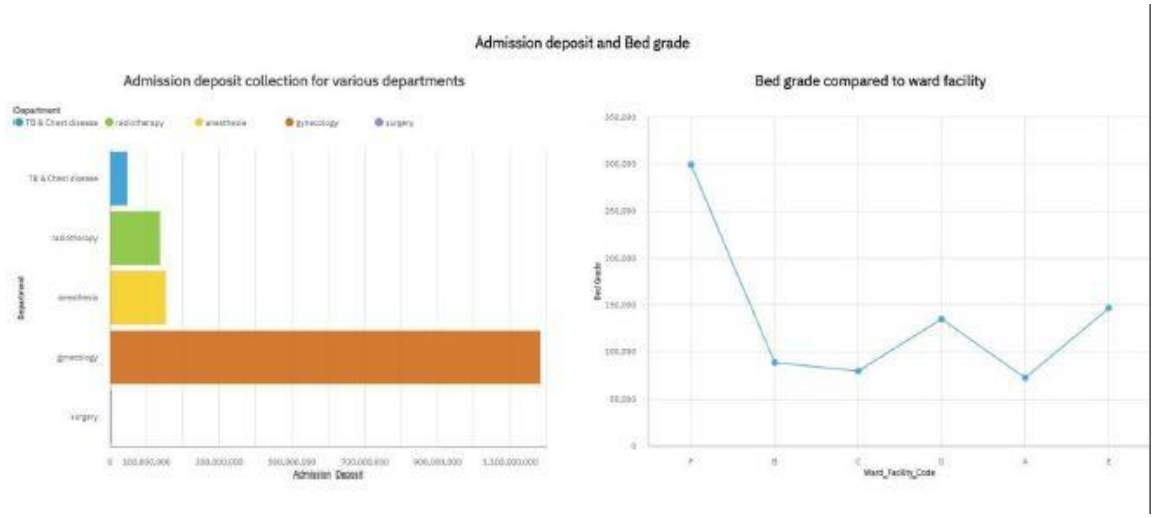
test data

Sprint 3

DASHBOARD VISUALIZATION



Sprint 4



7.CODING AND RESULT:

7.1 FEATURE 1

Index.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>IBM Cognos Analytics Dashboard</title>
<link rel="stylesheet" href="https://cdn.jsdelivr.net/npm/bootstrap@4.6.2/dist/css/bootstrap.min.css"
integrity="sha384-xOolHFLEh07PJGoPkLv1IbcEPTNtaed2xpHsD9ESMhqIYd0nLMwNLD69Npy4HI+N"
crossorigin="anonymous">
<style>
```

```
@import url('https://fonts.googleapis.com/css2?family=JetBrains+Mono:wght@300&display=swap'); body,
html {
font-family: 'Playfair Display';
height: 100vh;
}
.title {
text-align: center;
}
#content {
height: 100%;
}
#dashboard {
height: 100%;
}
#report {}
.iframe {
height: 100%;
}
#navBarItem {
padding-left: 20px;
}
.nav-item :hover {
background-color: rgb(68, 68, 151);
cursor: default;
border-radius: 10px;
}
</style>
```

```
</head><body>
<nav class="navbar navbar-dark bg-primary navbar-expand-lg">
<button class="navbar-toggler" type="button" data-toggle="collapse" data-target="#navbarNav"
aria-controls="navbarNav" aria-expanded="false" aria-label="Toggle navigation">
<span class="navbar-toggler-icon"></span>
</button>
<div class="collapse navbar-collapse" id="navbarNav">
<ul class="navbar-nav">
<li class="nav-item active">
<div class="nav-link" id="navBarItem" onclick="renderHome()" name="home">Home</div>
</li>
<li class="nav-item active">
<div class="nav-link" id="navBarItem" onclick="renderDash()" name="dashboard">Dashboard</div>
</li>
<li class="nav-item active">
<div class="nav-link" id="navBarItem" onclick="renderRep()" name="reports">Reports</div>
</li>
<li class="nav-item active">
<div class="nav-link" id="navBarItem" onclick="renderStatus()" name="reports">Story</div>
</li></ul>
</div>
</nav>
<div id="content"></div>
</body>
</html>
```

```
<script> const content = document.getElementById('content');
renderHome();
function renderHome() {
content.innerHTML = `<div id="dashboard">
<div class="title">
<h1>IBM Nalayathiran Project</h1><br />
<h1>Analytics for Hospitals' Health-Care Data</h1>
</div>
<table class="table">
<thead>
<tr>
<th scope="col">Team Id</th>
<th scope="col">PNT2022TMID04331</th>
</tr>
</thead>
<tbody>
<tr>
<th scope="row">Name</th>
<td>Akshay Prabu V S</td>
</tr>
<tr>
<th scope="row">Name</th>
<td>Amal Hadeez F</td>
</tr>
<tr>
<th scope="row">Name</th>
<td>Arun G</td>
</tr>
<tr>
<th scope="row">Name</th>
<td>Hareesh Raj R</td>
</tr>
</tbody>
</table>
```

```
</div>`
}
function renderDash() {
content.innerHTML = `<div id="dashboard">
<div class="title">
<h1>IBM Cognos Dashboard</h1>
</div>
<div class="iframe">
<iframe
src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&amp;pathRef=.my_folders%2FDashboard&amp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedded&amp;action=view&amp;mode=dashboard&amp;subView=model0000018493a9d7e6_00000000"
width="100%" height="100%" frameborder="0" gesture="media" allow="encrypted-media"
allowfullscreen=""></iframe>
</div>
</div>`
}
function renderRep() {
content.innerHTML = `<div id="dashboard">
<div class="title">
<h1>IBM Cognos Report</h1>
</div>
<div class="iframe">
<iframe
src="https://us3.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2FReport&amp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedded&amp;action=run&amp;prompt=false" width="100%" height="100%" frameborder="0" gesture="media" allow="encrypted-media"
allowfullscreen=""></iframe>
</div>
</div>`
}
function renderStatus() {
content.innerHTML = `<div id="dashboard">
```

```
<div class="title">
<h1>IBM Cognos Story</h1>
</div>
<div class="iframe">
<iframe
src="https://us3.ca.analytics.ibm.com/bi/?perspective=story&amp;pathRef=.my_folders%2Fstory&amp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedded&amp;action=view&amp;sceneId=model00000184910944c8_00000000&amp;sceneTime=0" width="100%"
height="100%" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>
</div>`
}
</script>
<script src="https://cdn.jsdelivr.net/npm/jquery@3.5.1/dist/jquery.slim.min.js"
integrity="sha384-DfXdz2htPH0lsSSs5nCTpuj/zy4C+OGpamoFVy38MVBnE+IbbVYUew+OrCXaRkfj"
crossorigin="anonymous"></script>
<script src="https://cdn.jsdelivr.net/npm/bootstrap@4.6.2/dist/js/bootstrap.bundle.min.js"
integrity="sha384-Fy6S3B9q64WdZWQUiU+q4/2Lc9npb8tCaSX9FK7E8HnRr0Jz8D6OP9dO5Vg3Q9ct"
crossorigin="anonymous"></script>
```

ADVANTAGES AND DISADVANTAGES

ADVANTAGES:

- This is one of the fastest ways to determine if a person is likely to suffer from a coviddiseaseor not.
- User Friendly
- Easy to understand
- Secure
- Dashboard provides insightful information

DISADVANTAGES:

- Users need to know all the fields
- Does Not take null value as input
- Does not provide suggestions to user

APPENDIX

GITHUB LINK: https://github.com/IBM-EPBL/IBM-Project-10766-1659202737