`

ANALYTICS FOR HOSPITAL HEALTH CARE DATA

PROJECT REPORT

Submitted By

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1. INTRODUCTION

1.1 Project Overview

In the ever-evolving technological world of today, data fuels businesses.The careers of the future involve data analytics across every industry — healthcare, finance, sports, retail & e-commerce, streaming, aviation, dating, marketing, weather, education, government, travel, and everything under the sun.Businesses rely on data to stay competitive, agile, and make better-informed decisions. And the healthcare industry is no exception. Working in the healthcare industry for almost a year now, I've realized that the healthcare industry is notorious for being conservative when it comes to technology adoption. We are using legacy systems built 40 years ago with minor transformations made as required over all these years. And NOW is the time for a digital revolution in healthcare.

1.2 Purpose :

This is the purpose of healthcare data analysis: using data-driven findings to predict and solve a problem before it is too late, but also assess methods and treatments faster, keep better track of inventory, involve patients more in their own health, and empower them with the tools to do so.

2. LITERATURE SURVEY

2.1 The current study performs a systematic literature review(SLR) to synthesise prior research on the applicability of big data analytics(BDA) in healthcare.

2.2 Problem Statement Definition

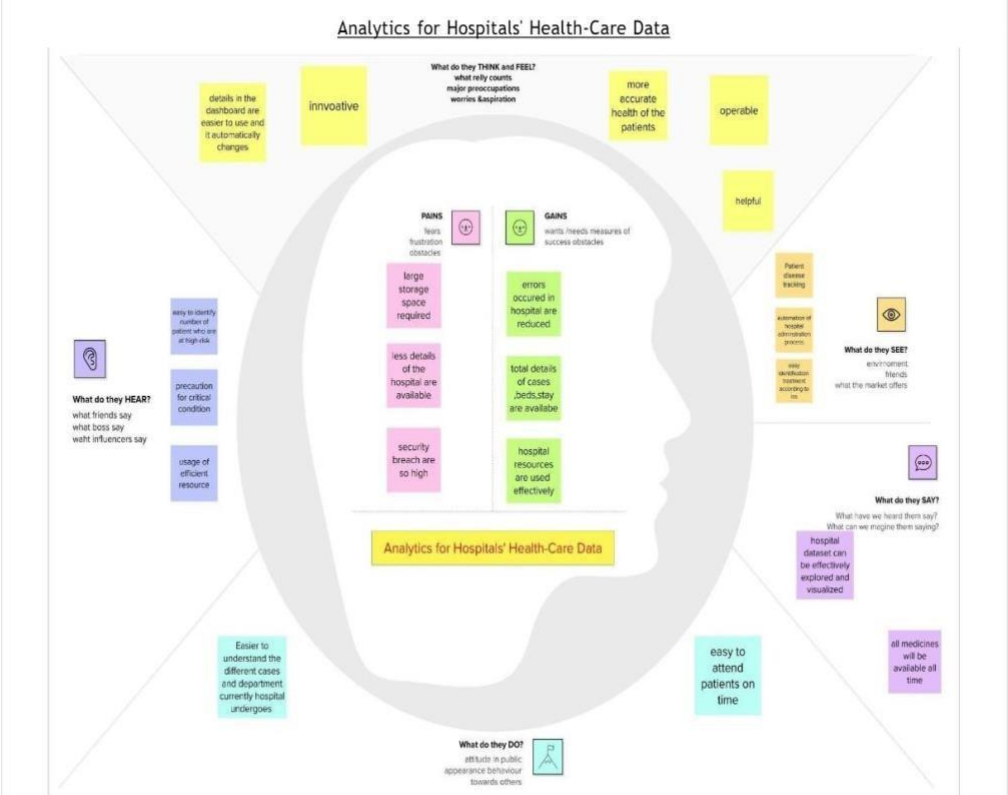
Health care industry desires to clarify the patients using their pathology data for their care management improvement that facilities to build a multi-classification to build care management model with right classification of patient. Descriptive analysis, which examines and describes something that's already happened. Diagnostic analysis, which seeks to understand the cause of an event. Predictive analysis, which explores historical data, past trends, and assumptions to answer questions about the future.

Due to lack of effective data governance procedures, capturing data is one of the biggest obstacles for healthcare organizations.

clarify the patients using their pathology data for their care management improvement that facilities to build a multi-classification to build care management model with right classification of patient.

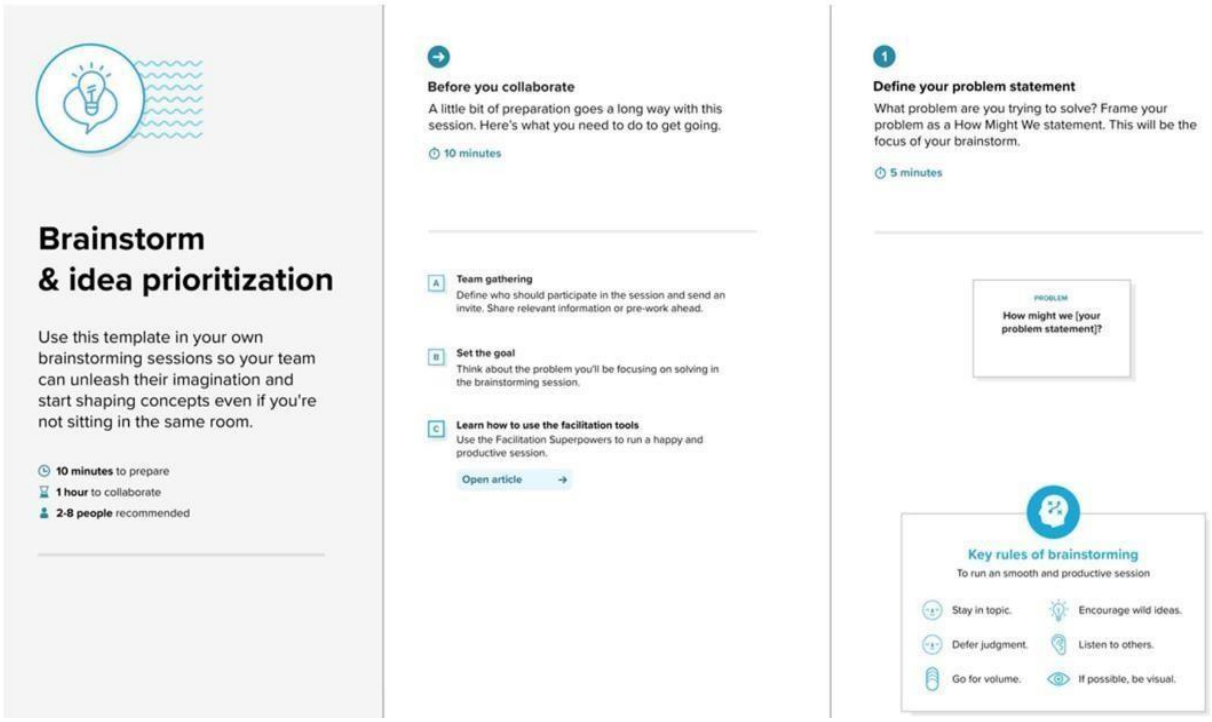
3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

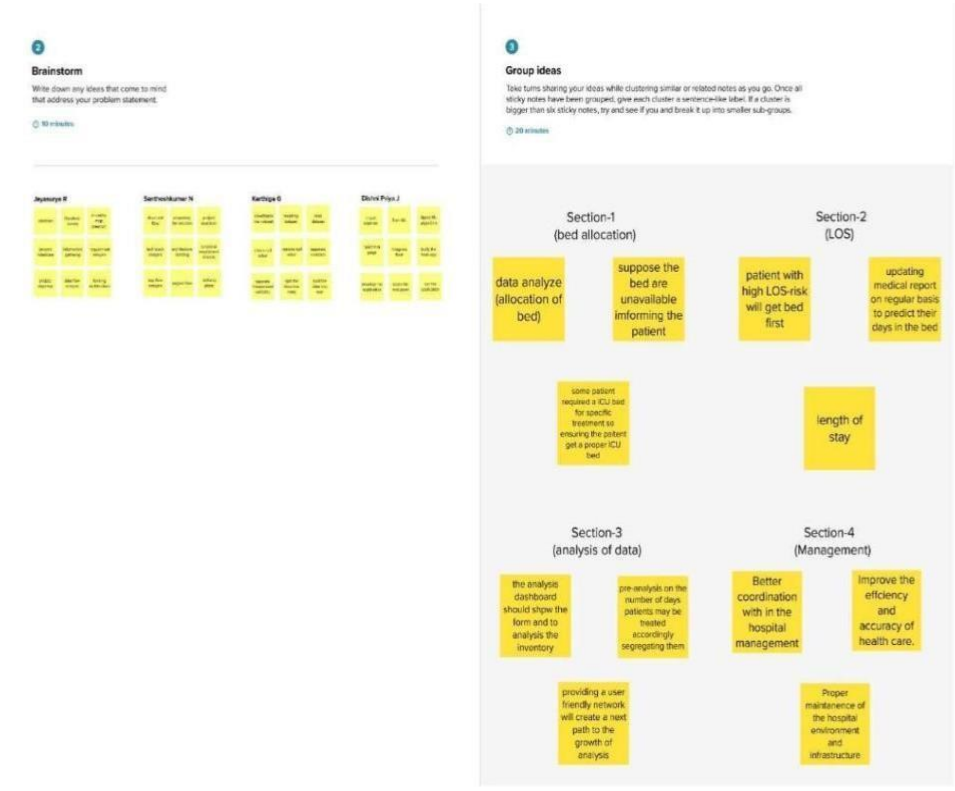


3.2 Ideation & Brainstorming

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



Step-2: Brainstorm, Idea Listing and Grouping



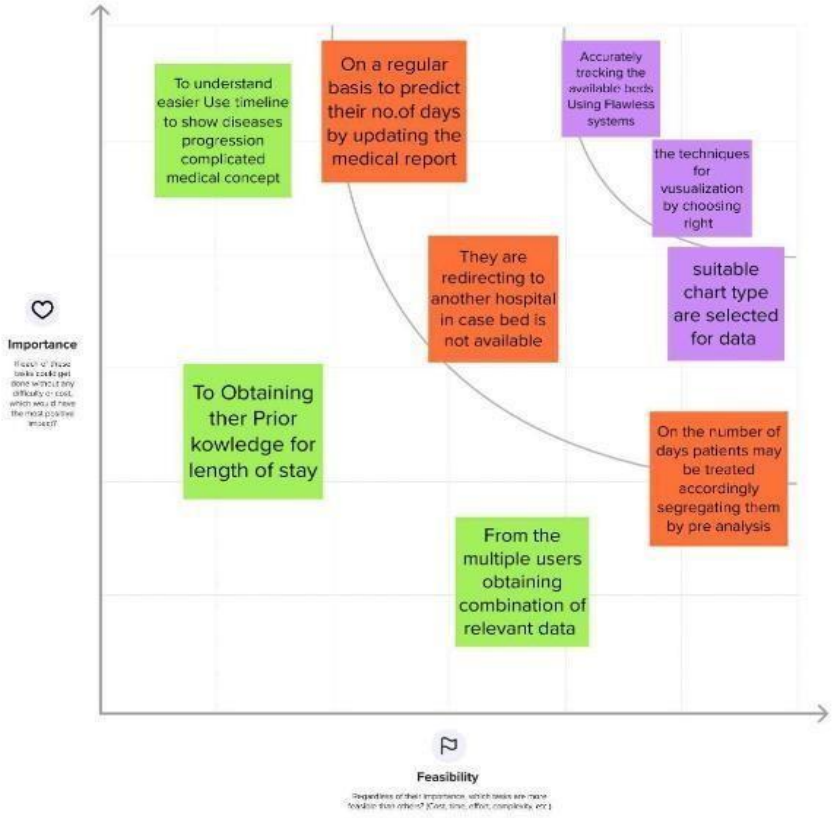
Step-3: Idea Prioritization

4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes



After you collaborate

You can export the mural as an image or pdf to share with members of your company who might find it helpful.

Quick add-ons

A **Share the mural**
Share a view link to the mural with stakeholders to keep them in the loop about the outcomes of the session.

B **Export the mural**
Export a copy of the mural as a PNG or PDF to attach to emails, include in slides, or save in your drive.

Keep moving forward

Strategy blueprint
Define the components of a new idea or strategy.
Open the template →

Customer experience journey map
Understand customer needs, motivations, and obstacles for an experience.
Open the template →

Strengths, weaknesses, opportunities & threats
Identify strengths, weaknesses, opportunities, and threats (SWOT) to develop a plan.
Open the template →

Share template feedback

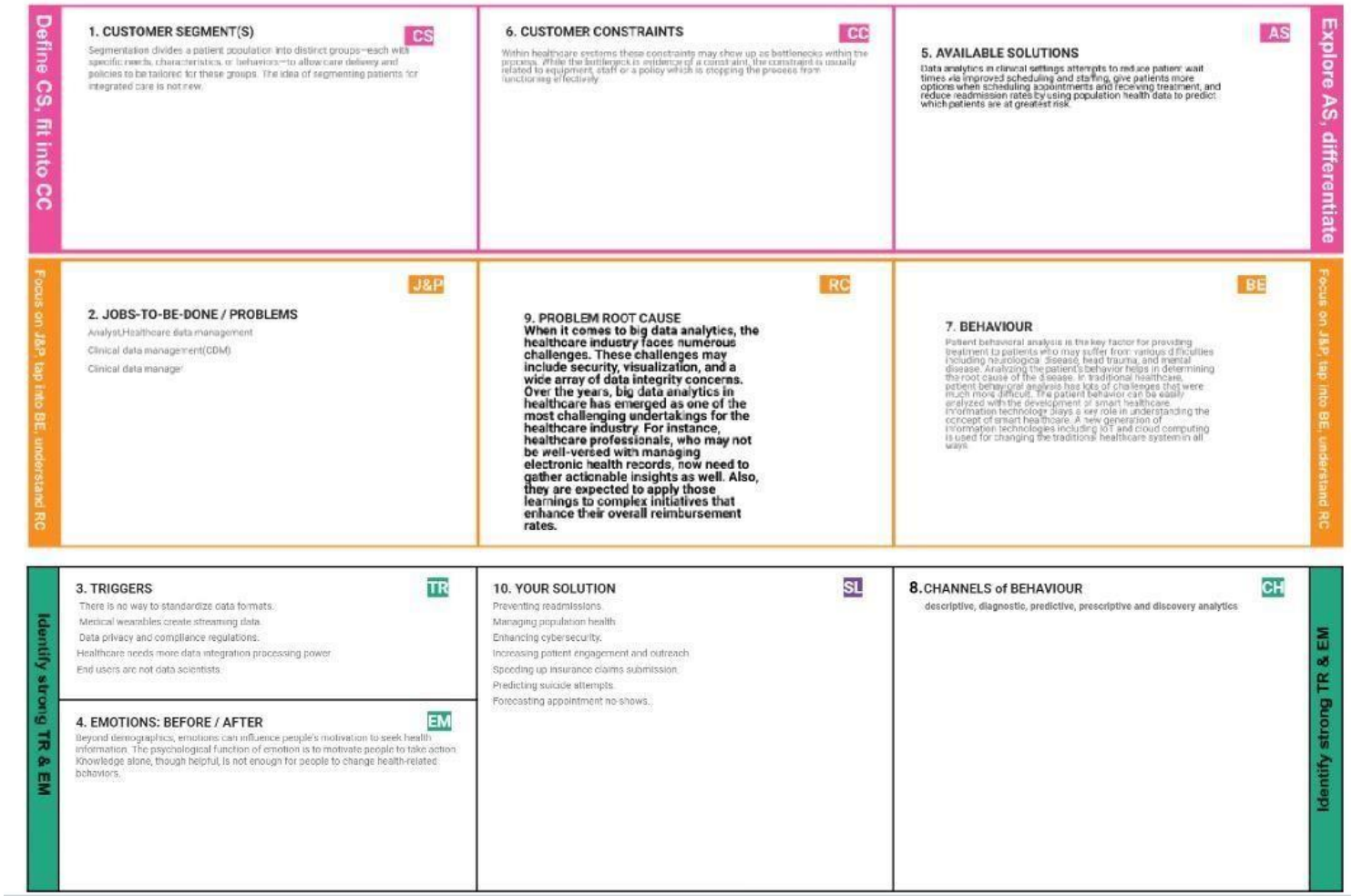
4.PROJECT DESIGN PHASE-1

4.1 Proposed Solution

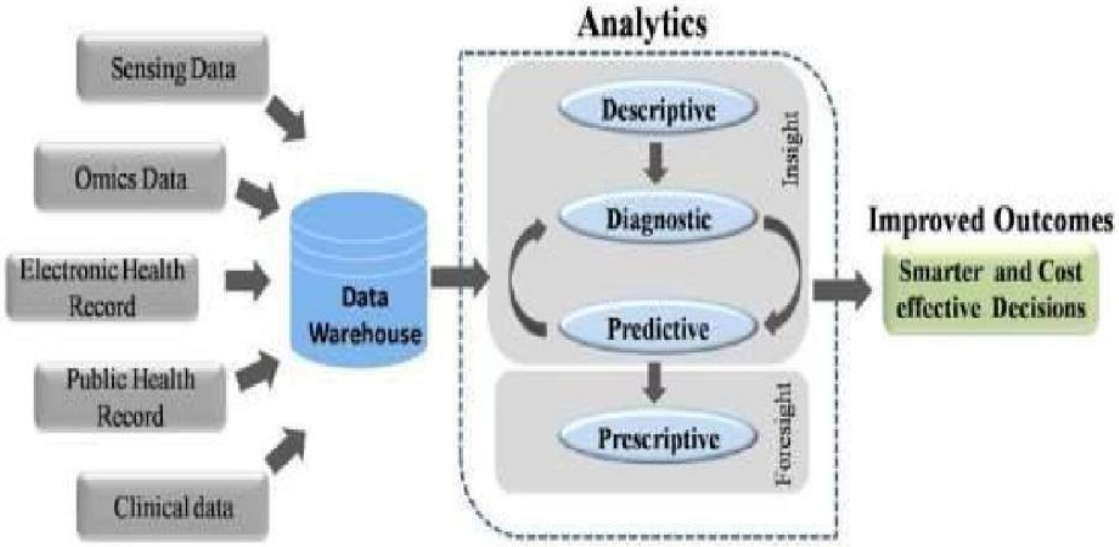
S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Health care industry desires to clarify the patients using their pathology data for their care management improvement that facilities to build a multi-classification to build care management model with right classification of patient . Descriptive analysis, which examines and describes something that's already happened. Diagnostic analysis, which seeks to understand the cause of an event.Predictive analysis, which explores historical data, past trends, and assumptions to answer questions about the future.
2.	Idea / Solution description	When health providers have access to a patient's up-to-date health data, they can provide more efficient, higher quality, safer and more personalised care and care coordination. Patients looking at their own health data gain insight into how their health is evolving over time.
3.	Novelty / Uniqueness	One of the main benefits of data analytics from a healthcare facility's point of view is that it enables them to improve their operations, make their processes more efficient, and lower their costs.
4.	Social Impact / Customer Satisfaction	Right care: Data can improve outcomes, reducing medical errors.Application of big data tools will facilitate evidence-based care that is personalized to the specific patient. Right provider: Proven outcomes for patients to receive the best medical care based on data that helps us better match the provider's skill set with the needs of the patient and allow assessment of specific providers. Right value: Cost-objective healthcare through different methods, such as patient-outcome reimbursement and eliminating fraud, waste, and abuse in the system utilizing big data .

		Right innovation: Innovators will be able to address all aspects of therapeutic innovation discovery, development, and safety utilizing data from past trials as well as analyzing trends from current data.
5.	Business Model (Revenue Model)	Business analytics is playing a huge role in helping companies taking informed decisions, within different therapeutical areas, markets, and regions to reach up to decisions within the stipulated time frame, and get exposed to real-world insights from competitors, payers, regulators, patients, etc.
6.	Scalability of the Solution	Scalability is the ability of a health intervention shown to be efficacious on a small scale and/or under controlled conditions to be expanded under real world conditions to reach a greater proportion of the eligible population, while retaining effectiveness.

4.2 Problem Solution Fit



4.3 Solution Architecture



5.PROJECT DSIGN PHASE – II

5.1 Customer Journey Map

Functional Requirements:

Following are the functional requirements of the proposed solution.

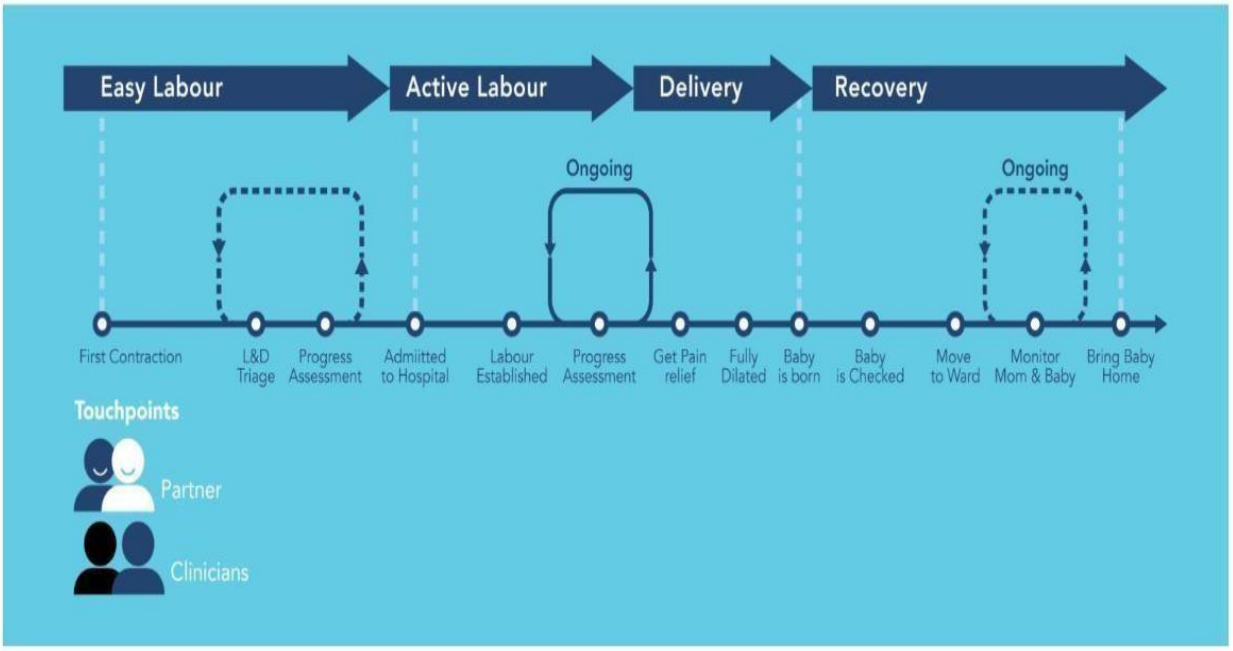
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIN
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Login	User should login with the user name and password.
FR-4	User Installation	user can install the app from google play store or Apple store or directly from the website.

Non-functional Requirements:

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

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Everyone can easily install and use from the play store by using the instructions in the app.
NFR-2	**Security**	The application is very secure and confidential.
NFR-3	**Reliability**	Reliability is the piece of software operating without failure while in a specified environment over a set duration of time.
NFR-4	**Performance**	The app can work fast and more reliable.
NFR-5	**Availability**	It is available in all kind of play stores and more categories and jobs are recommended.
NFR-6	**Scalability**	Our application takes less time to response many requests simultaneously without making server crashes,so this will ensure our application will scalable.

5.2 Functional Requirement



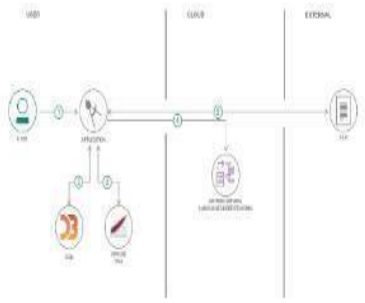
5.3 Data Flow Diagram

Data Flow Diagrams:

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

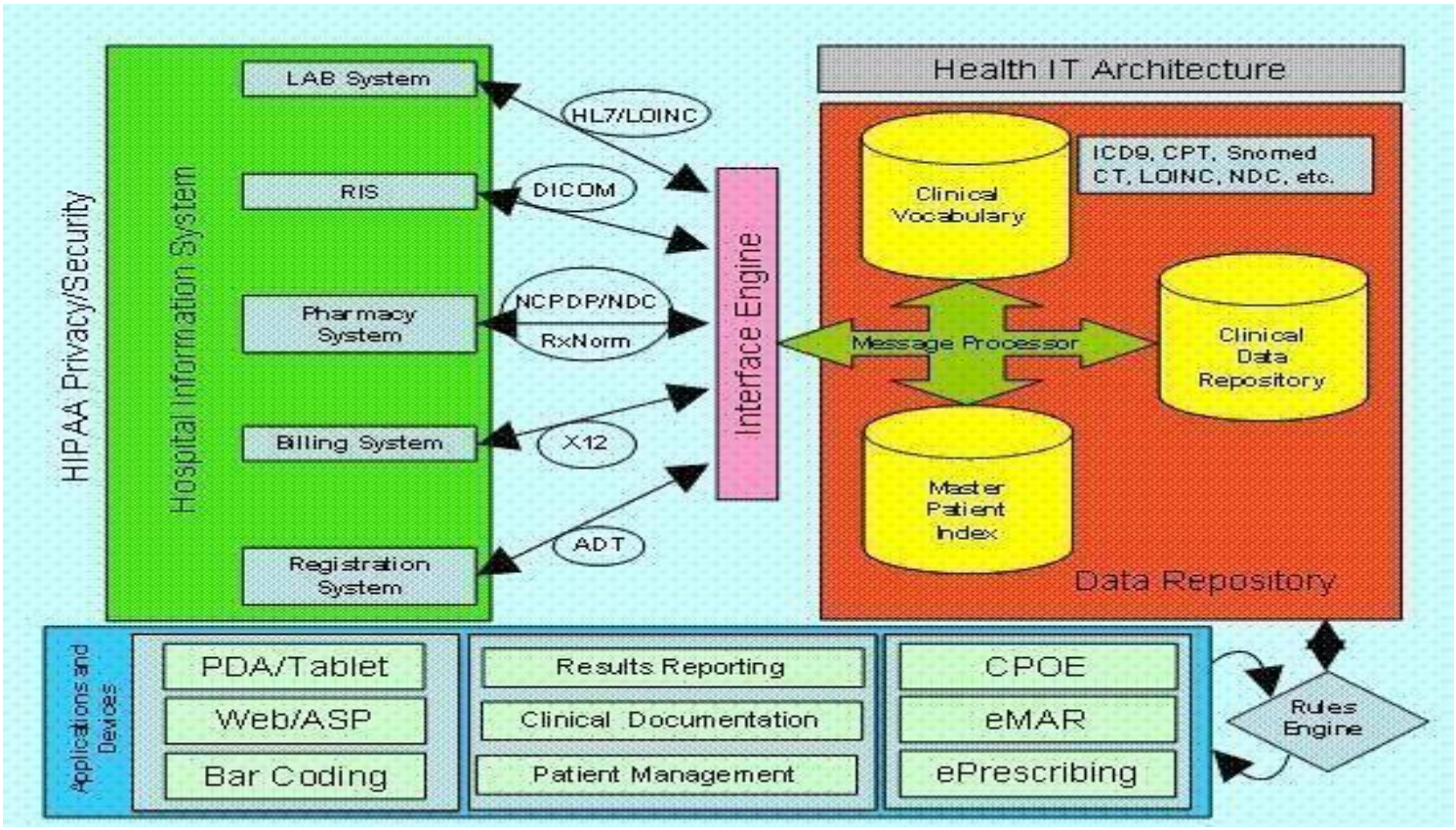
Example: (Simplified)

Flow



1. User configures credentials for the Watson Natural Language Understanding service and starts the app.
2. User selects data file to process and load.
3. Apache Tika extracts text from the data file.
4. Extracted text is passed to Watson NLU for enrichment.
5. Enriched data is visualized in the UI using the D3.js library.

5.4 Technology Architecture



PROJECT PLANNING PHASE

6.1 Sprint Plan (Burn Down Chart)

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

Use the below template to create product backlog and sprint schedule

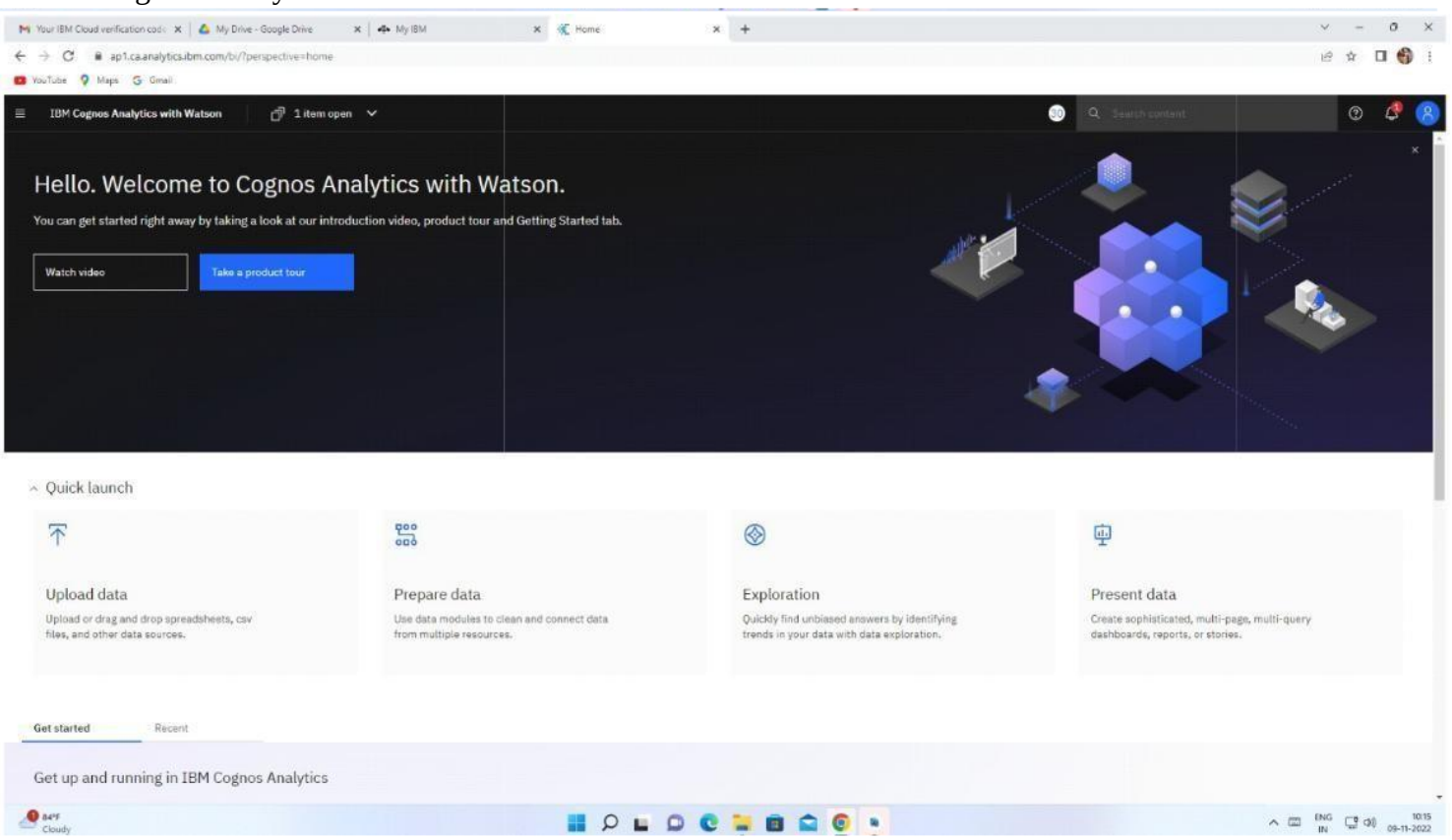
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points
Sprint 1	Registration	USN-1	Installation of the application in the mobile.	
Sprint-1		USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1
Sprint-2		USN-3	As a user, I can register for the application through Facebook	2
Sprint-3		USN-4	As a user, I can register for the application through Gmail	2
Sprint-4	Login	USN-5	As a user, I can log into the application by entering email & password	1
			As a user, I can log into the application by entering email & password.	
	Dashboard		Up to date current patients data.	
	Browser		Website Login Can through the browser.	

6.2 Milestone

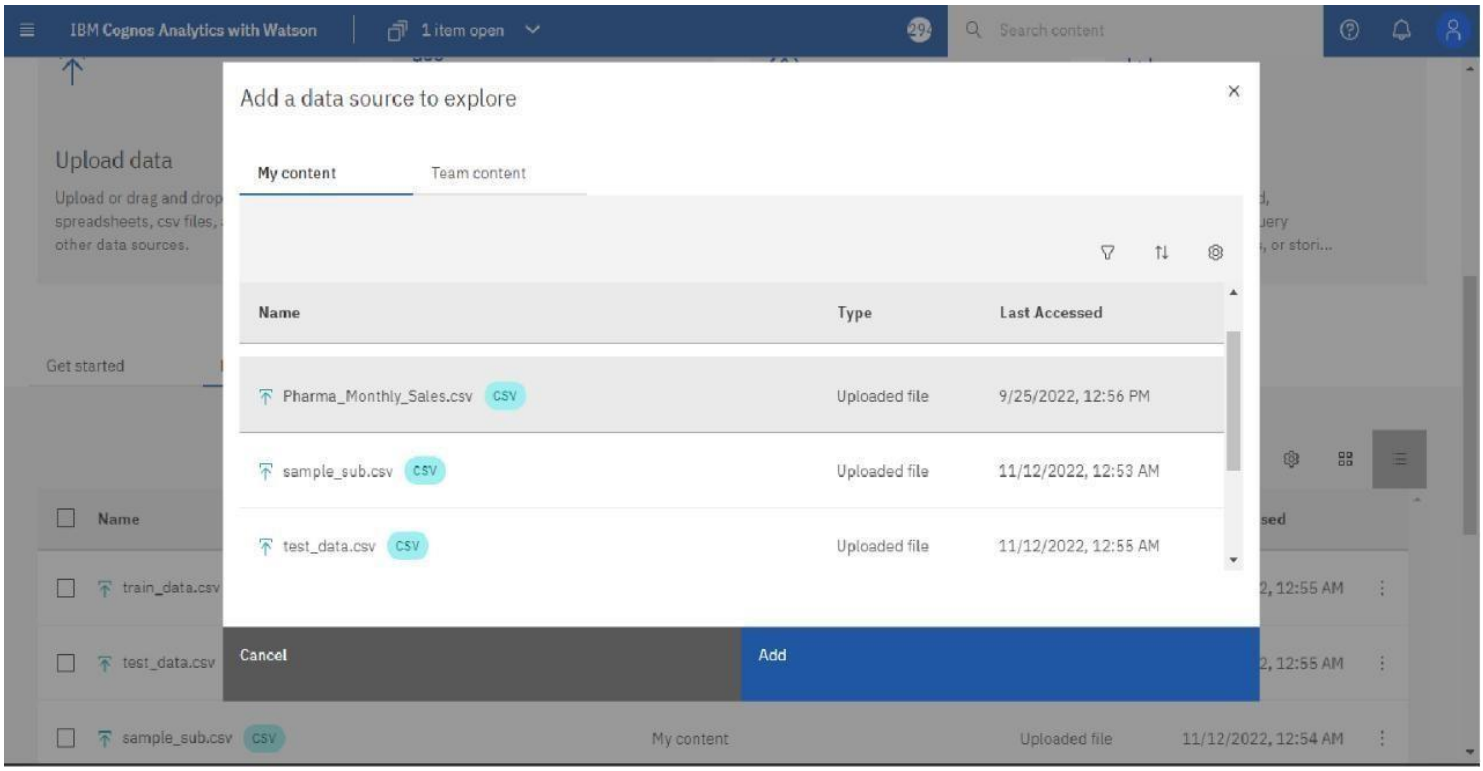
MILESTONES	ACTIVITY LIST
MILESTONE-1	Collecting the data based on the application
MILESTONE-2	Uploading the collected data on the IBM COGNOS platform
MILESTONE-3	Data exploration in the IBM COGNOS platform
MILESTONE-4	Data visualization in the IBM COGNOS platform
MILESTONE-5	Creating an interactive dashboard
MILESTONE-6	Displaying the prepared dashboard
MILESTONE-7	Preparing a standard dataset and removing the unwanted data using the python programming
MILESTONE-8	By using the various algorithm and exploring the result and getting the accurate result with the help of an algorithm which give more accuracy
MILESTONE-9	Displaying the result according to the required format for example displaying the Length Of Stay of a patient
MILESTONE-10	Deployed in the GitHub

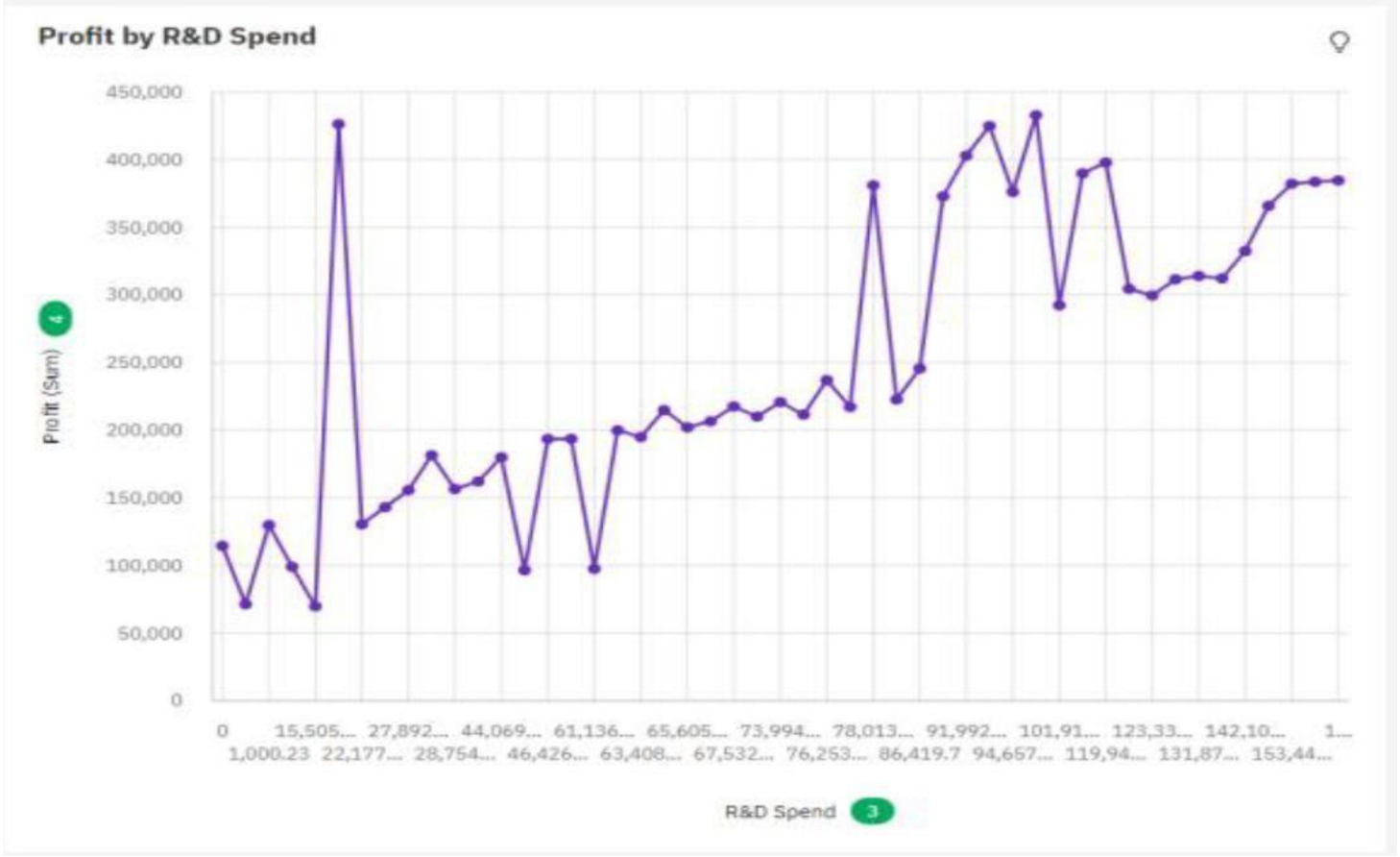
7.DATA COLLECTION

7.1 IBM Cognos Analtyics



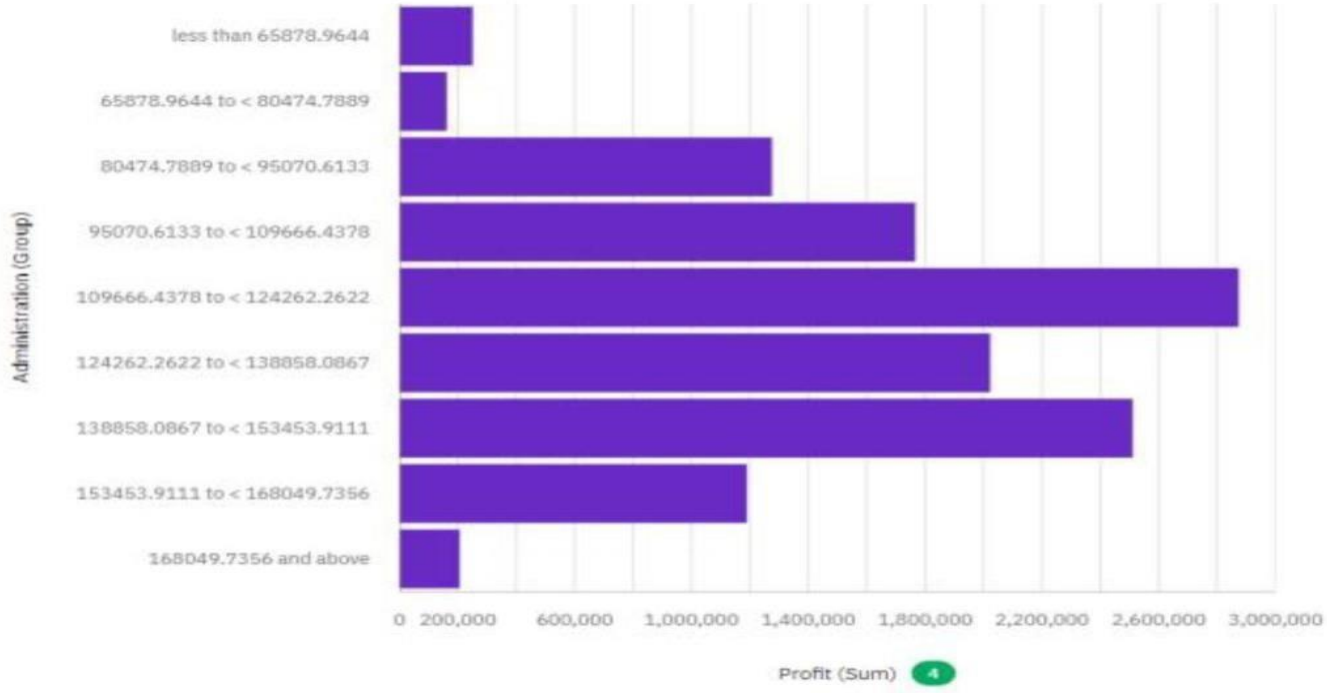
7.2 Working With Datasets



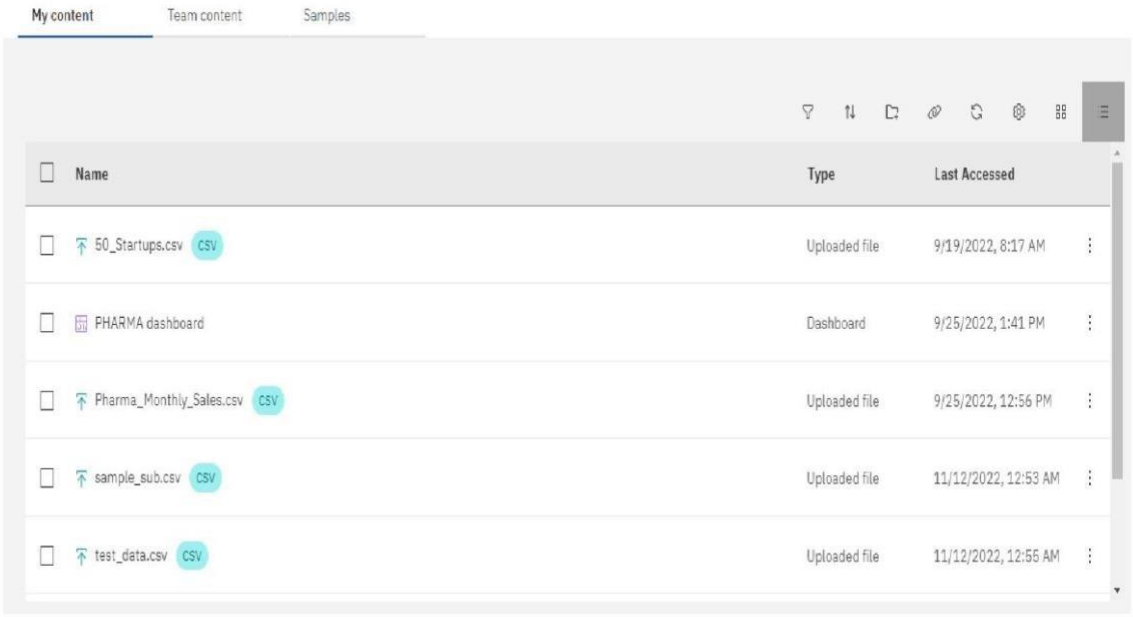

Profit by R&D Spend
Profit (Sum) 4
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
0 15,505... 27,892... 44,069... 61,136... 65,605... 73,994... 78,013... 91,992... 101,91... 123,33... 142,10... 1...
1,000.23 22,177... 28,754... 46,426... 63,408... 67,532... 76,253... 86,419.7 94,657... 119,94... 131,87... 153,44...
R&D Spend 3

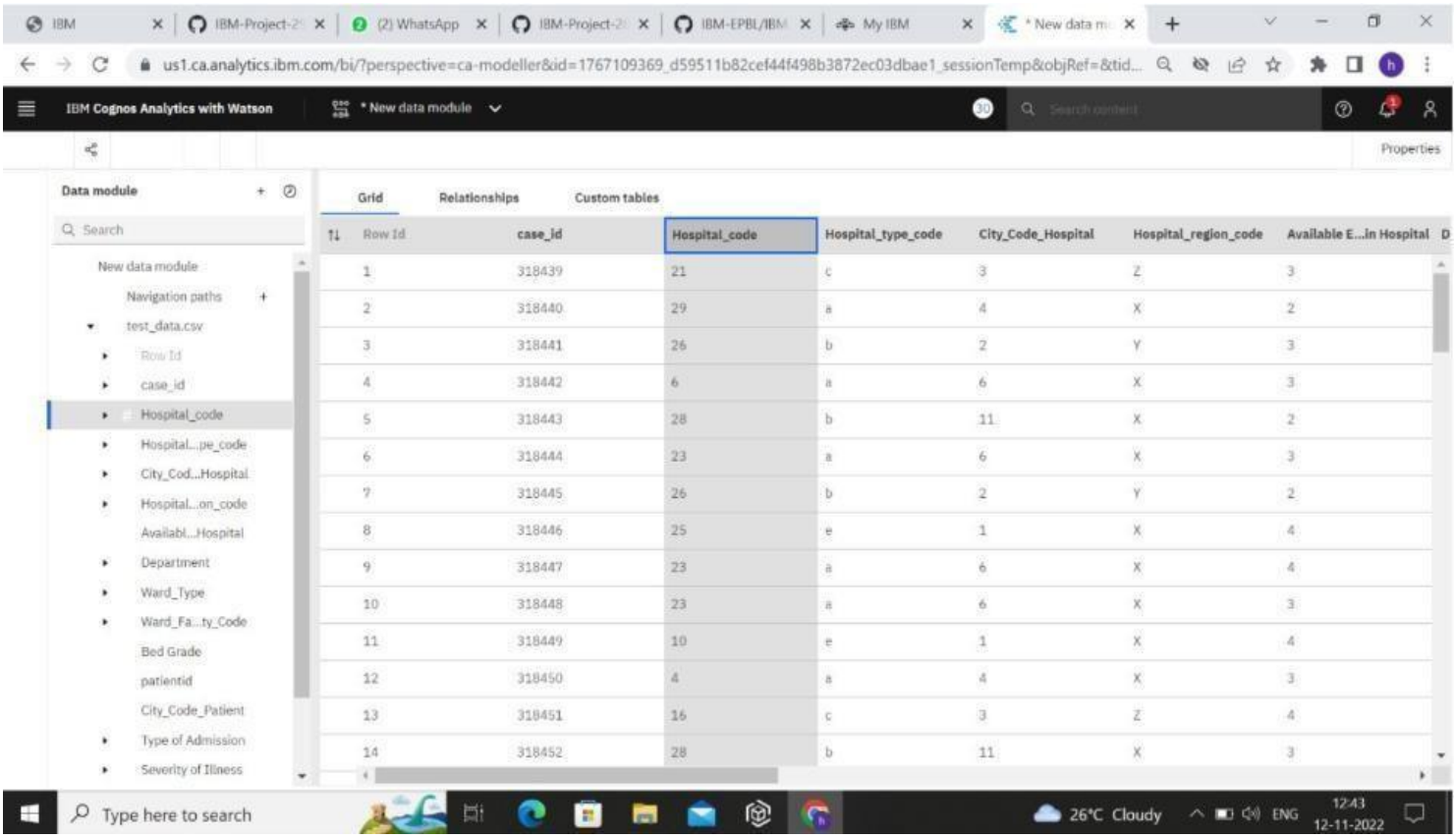
Profit by R&D Spend (Group)

Profit by Administration (Group)

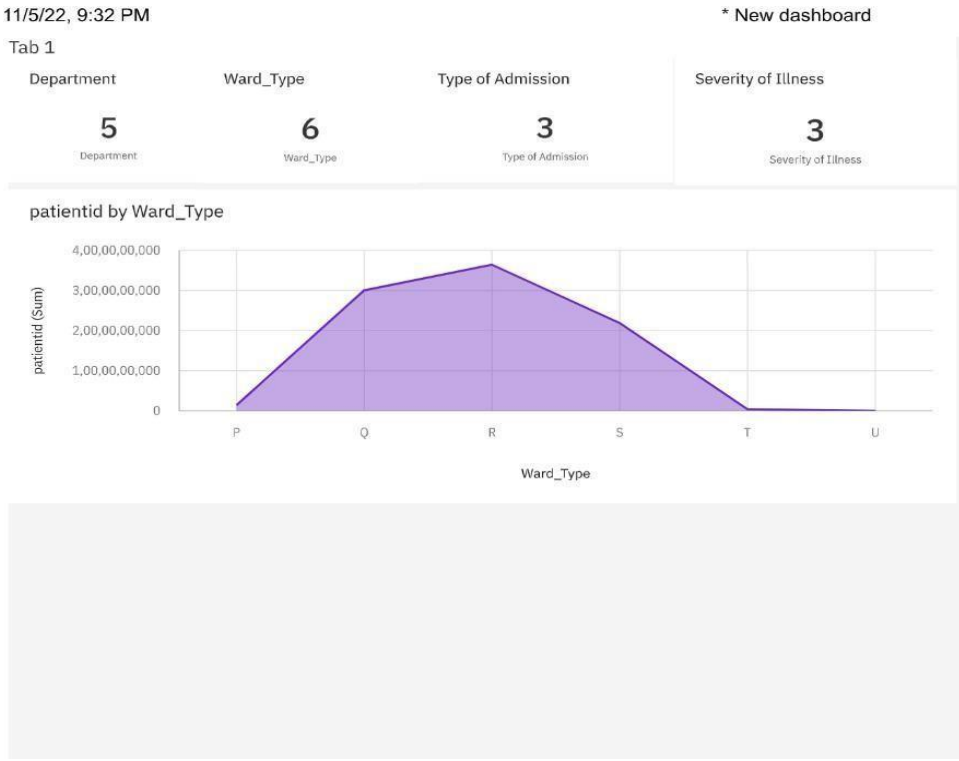


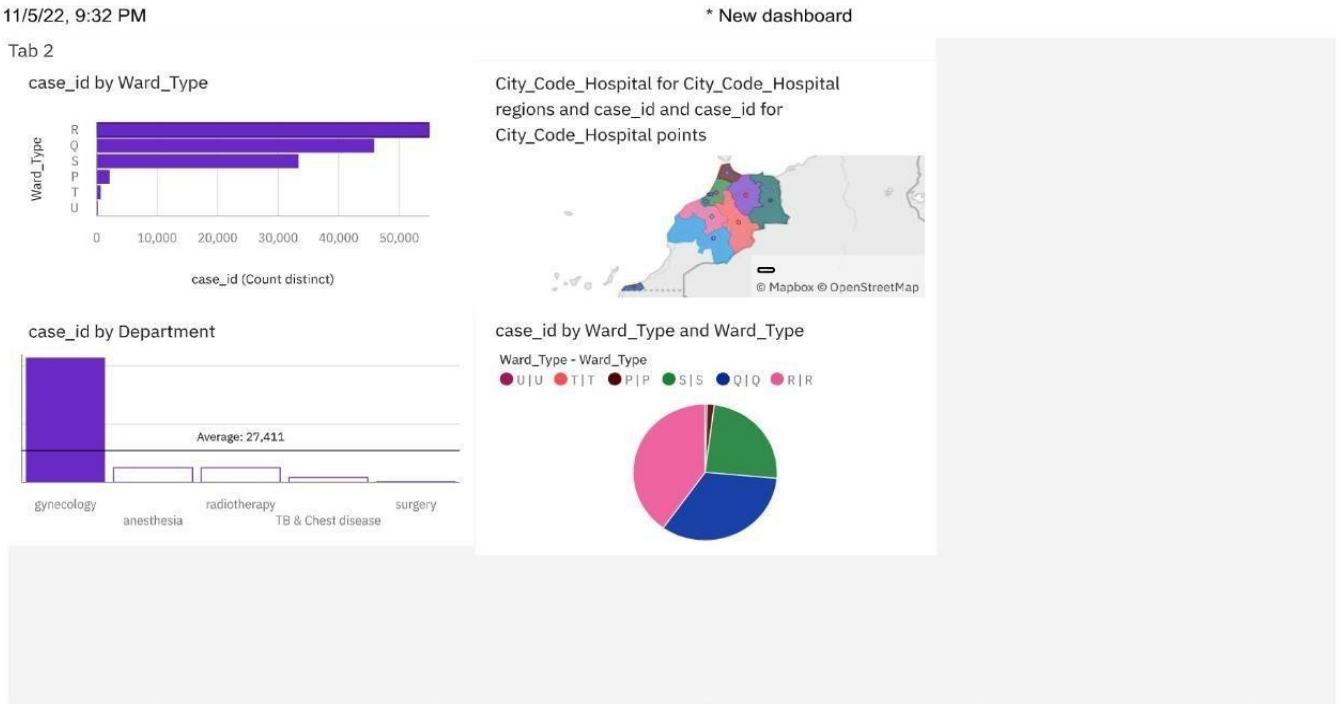

Profit by R&D Spend (Group)
2,000,000
1,500,000
1,000,000
500,000
0
Profit (Sum)
less than 16534.9200
16534.9200 to < 33069.8400
33069.8400 to < 49604.7600
49604.7600 to < 66139.6800
66139.6800 to < 82674.6000
82674.6000 to < 99209.5200
99209.5200 to < 115744.4400
115744.4400 to < 132279.3600
132279.3600 to < 148814.2800
148814.2800 and above
R&D Spend (Group)


My content
Team content
Samples
Name
Type
Last Accessed
50_Startups.csv CSV
Uploaded file
9/19/2022, 8:17 AM
PHARMA dashboard
Dashboard
9/25/2022, 1:41 PM
Pharma_Monthly_Sales.csv CSV
Uploaded file
9/25/2022, 12:56 PM
sample_sub.csv CSV
Uploaded file
11/12/2022, 12:53 AM
test_data.csv CSV
Uploaded file
11/12/2022, 12:55 AM


IBM Cognos Analytics with Watson
* New data module
Properties
Data module
Search
New data module
Navigation paths
test_data.csv
Row Id
case_id
Hospital_code
Hospital...pe_code
City_Cod...Hospital
Hospital...on_code
Availabl...Hospital
Department
Ward_Type
Ward_Fa...ty_Code
Bed Grade
patientid
City_Code_Patient
Type of Admission
Severity of Illness
Grid
Relationships
Custom tables
Row Id
case_id
Hospital_code
Hospital_type_code
City_Code_Hospital
Hospital_region_code
Available E...in Hospital
1 318439 21 c 3 Z 3
2 318440 29 a 4 X 2
3 318441 26 b 2 Y 3
4 318442 6 a 6 X 3
5 318443 28 b 11 X 2
6 318444 23 a 6 X 3
7 318445 26 b 2 Y 2
8 318446 25 e 1 X 4
9 318447 23 a 6 X 4
10 318448 23 a 6 X 3
11 318449 10 e 1 X 4
12 318450 4 a 4 X 3
13 318451 16 c 3 Z 4
14 318452 28 b 11 X 3
Type here to search
26°C Cloudy
ENG
12:43
12-11-2022

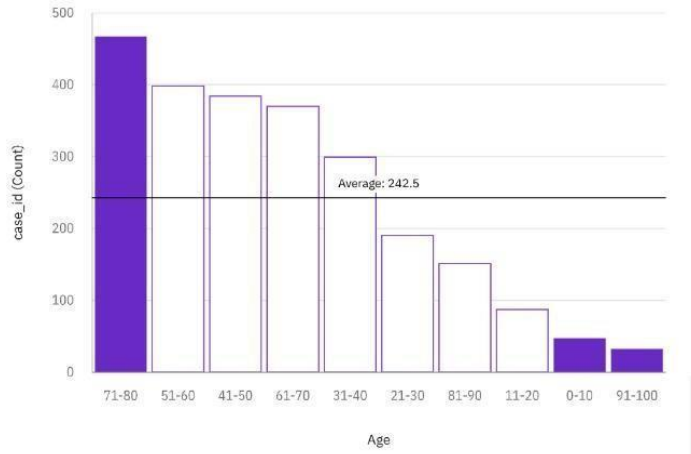
7.3 Data Visualization





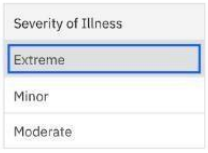
Tab 3

case_id by Age



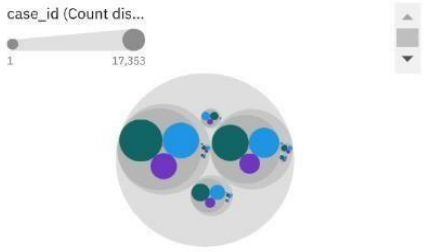
Department

Severity of Illness

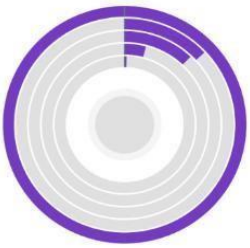


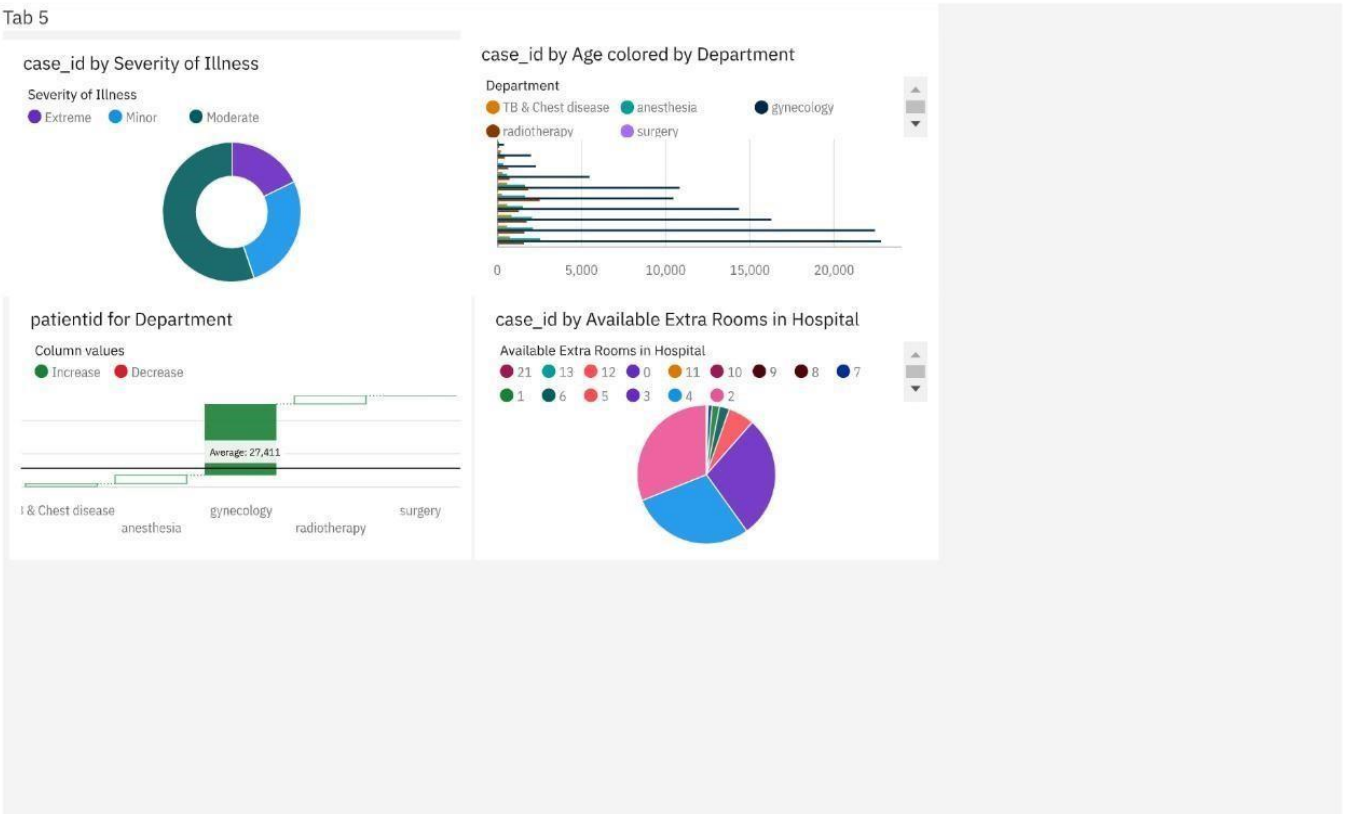
Tab 4

Bed Grade, Department and Ward_Type hierarchy colored by Ward_Type and sized by case_id



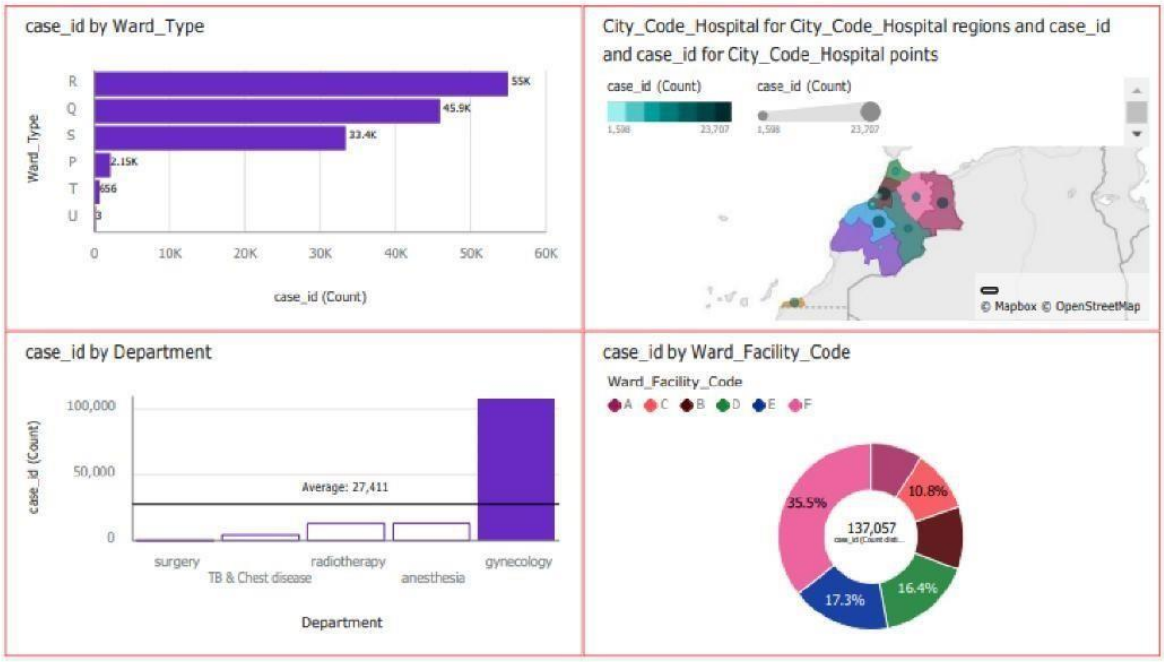
Admission_Deposit by Department



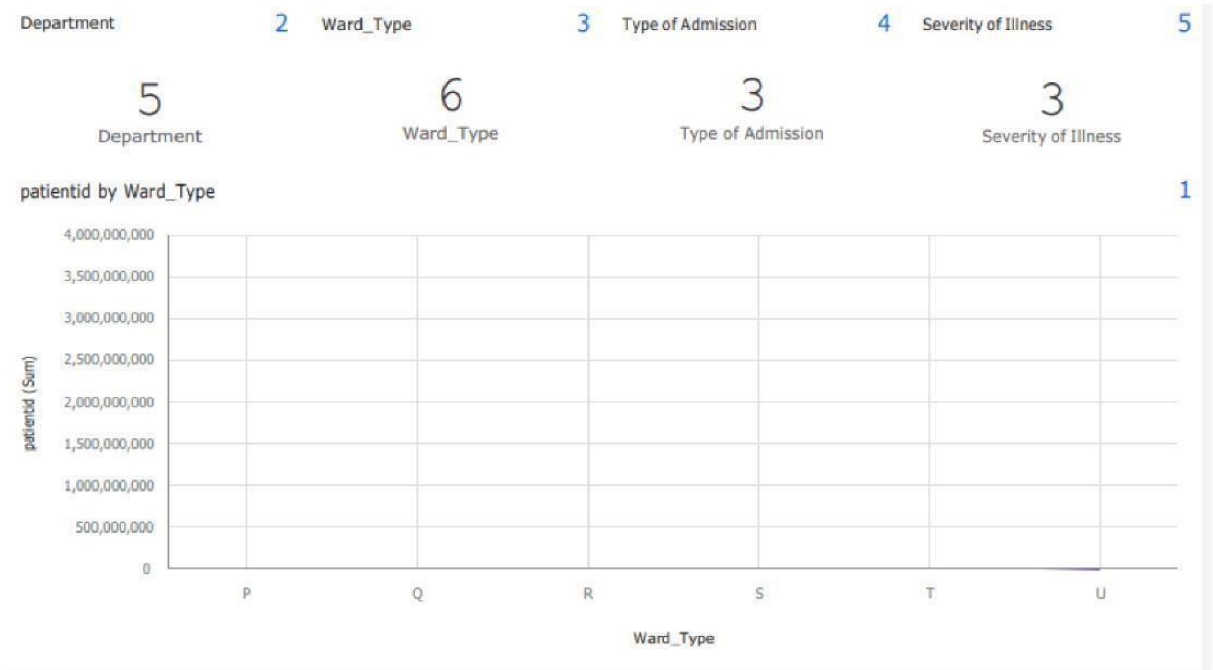


Age Wise Patients with Department and Severity Filters

DASHBOARD TO SHOW NUMBER OF PATIENTS



DASHBOARD TO SHOW NUMBER OF PATIENTS



DASHBOARD TO SHOW NUMBER OF PATIENTS

Filter(s) applied to the visualization(s) on the previous page:

Widget 1
Ward_Type All

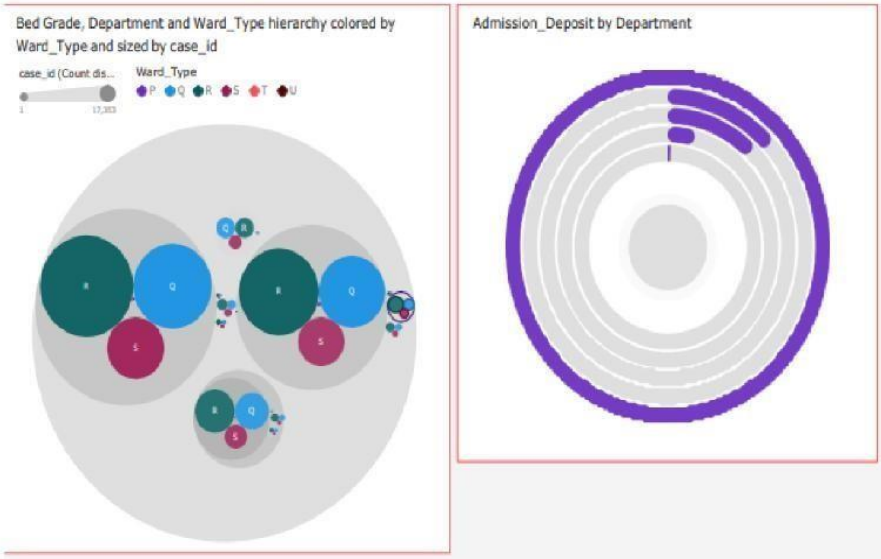
Widget 2
Ward_Type All

Widget 3
Ward_Type All

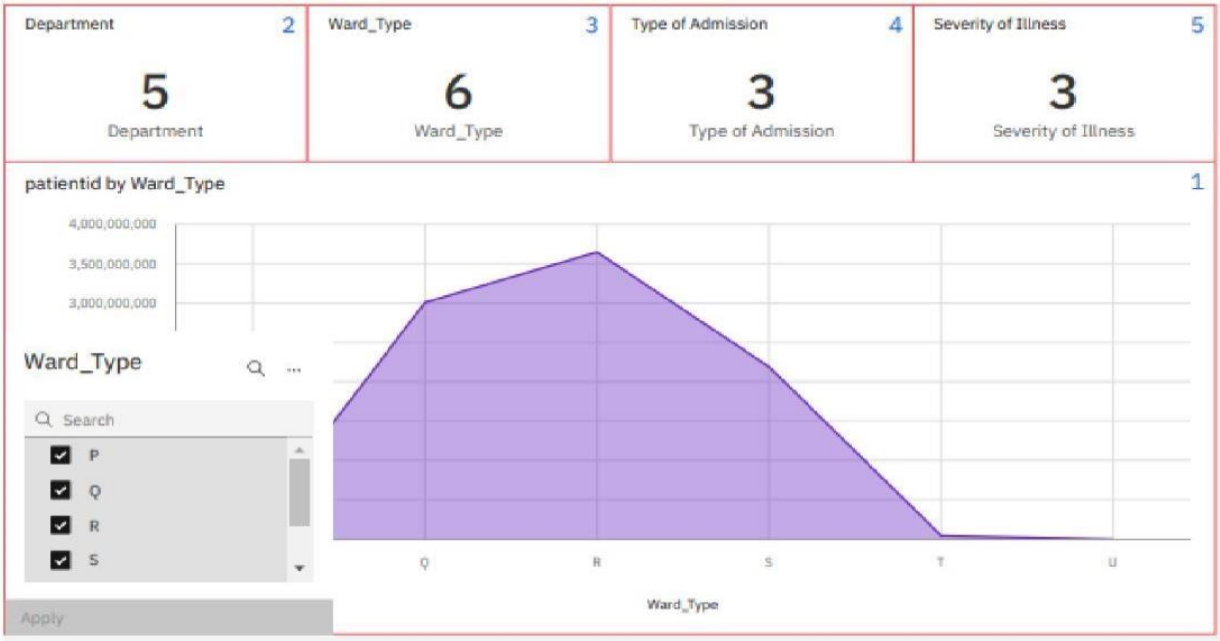
Widget 4
Ward_Type All

Widget 5
Ward_Type All

DASHBOARD WITH HIERARCHY BUBBLE AND RADIAL VISUALS STORY



NUMBER OF PATIENTS BY WARD TYPE



NUMBER OF PATIENTS BY WARD TYPE

Filter(s) applied to the visualization(s) on the previous page:

Widget 1
Ward_Type All

Widget 2
Ward_Type All

Widget 3
Ward_Type All

Widget 4
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Widget 5
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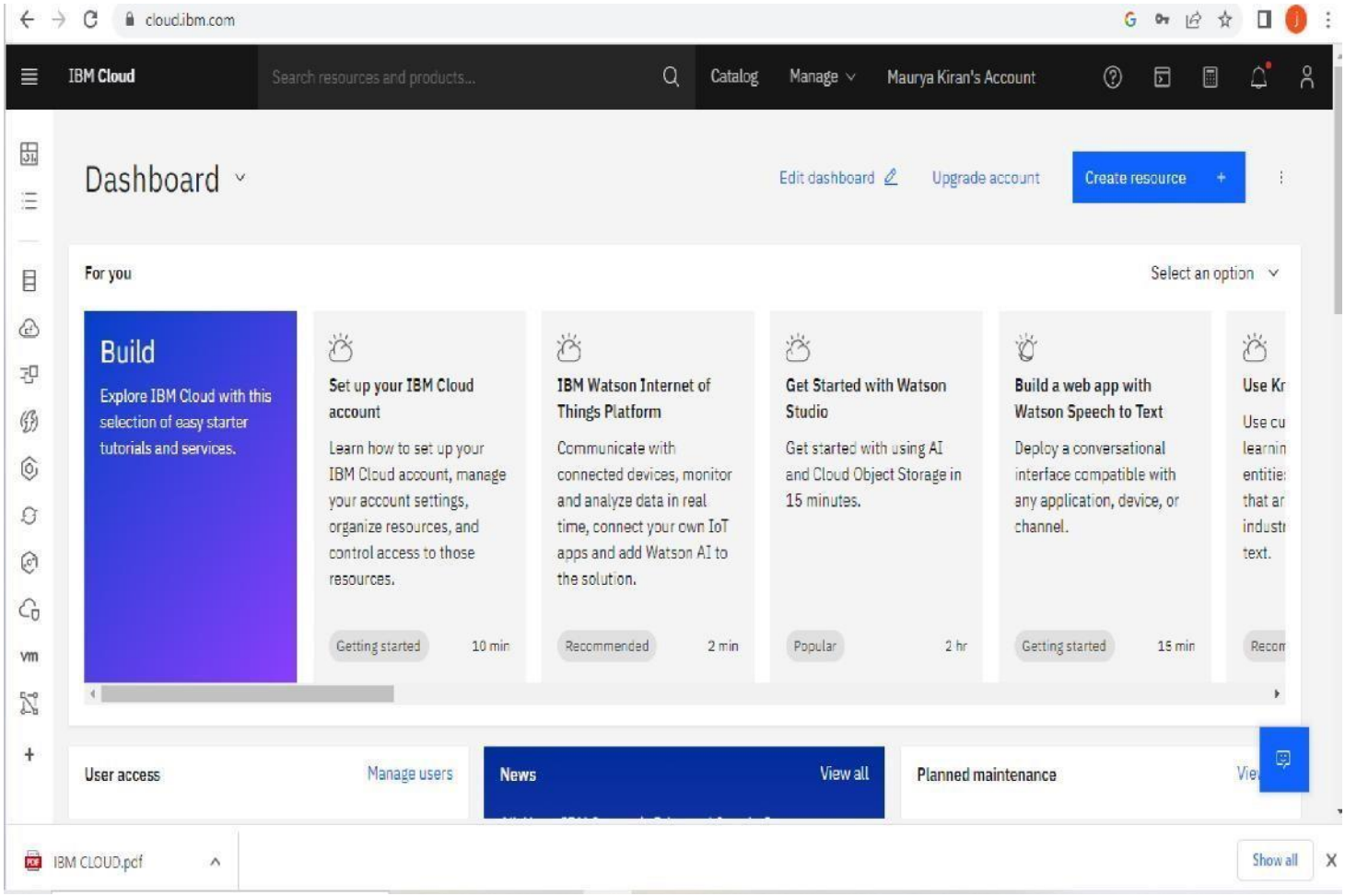
8.1 IBM Cloud


cloud.ibm.com
IBM Cloud
Search resources and products...
Catalog
Manage
Maurya Kiran's Account
Dashboard
Edit dashboard
Upgrade account
Create resource
For you
Select an option
Build
Explore IBM Cloud with this selection of easy starter tutorials and services.
Set up your IBM Cloud account
Learn how to set up your IBM Cloud account, manage your account settings, organize resources, and control access to those resources.
Getting started
10 min
IBM Watson Internet of Things Platform
Communicate with connected devices, monitor and analyze data in real time, connect your own IoT apps and add Watson AI to the solution.
Recommended
2 min
Get Started with Watson Studio
Get started with using AI and Cloud Object Storage in 15 minutes.
Popular
2 hr
Build a web app with Watson Speech to Text
Deploy a conversational interface compatible with any application, device, or channel.
Getting started
15 min
User access
Manage users
News
View all
Planned maintenance
IBM CLOUD.pdf
Show all

9.TESTING

9.1 Test Cases

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute
RegisterPage_TC_OC	Functional	Register page	verify user can submit the register form and registeration success page is displayed		1.click REGISTER From the dashboard in the homepage 2.Enter valid username/email in Email text box 3.Enter valid password text box 4.Click on register button
Health care data_TC	Functional	detectionPage	the URL to be tested is entered into the Textbox		1.click CHECK YOUR WEBSITE From the homepage 2.Enter the URL to be tested in text box 3.Click on submit button
Health care data_TC	Functional	detectionPage	the URL to be tested is entered into the Textbox		1.click CHECK YOUR WEBSITE From the homepage 2.Enter the URL to be tested in text box 3.Click on submit button

9.2 USER ACCEPTANCE TESTING

ACCEPTENCE TESTING

TEAM ID	PNT2022TMID32523
PROJECT NAME	ANALYTICS FOR HOSPITALS HEALTH-CARE DATA

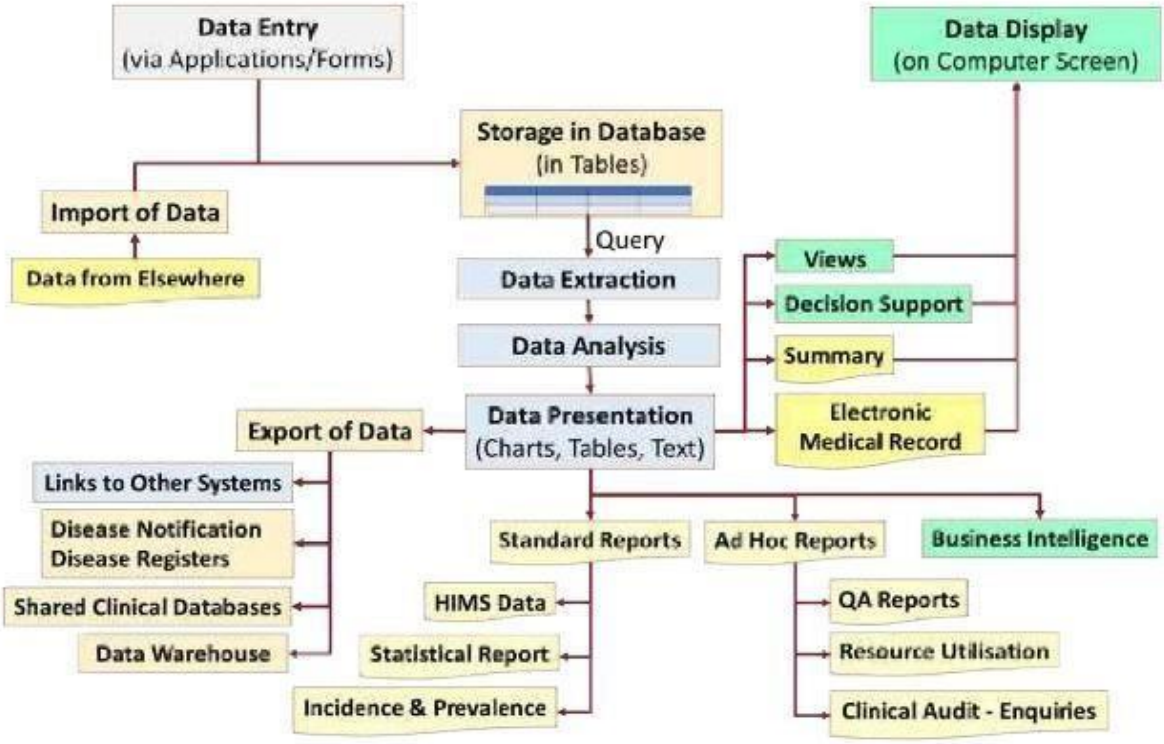
CONTENT

- UAT Initialize and Design
- UAT execution and Report submission
- Utilization of testing

User Acceptance Testing

- User acceptance testing also called application testing or end user testing. is a phase of software development in which the software is testing in the real world by its intended audience.
- The key factor in domain expertise, a good understanding of the way an application should work and testing from the perspective of end- users.

- All business requirement and satisfies real users.



UAT EXECUTION AND REPORT SUBMISSION.

In UAT test report phase, test engineers prepare reports and submit to TL or PM for review process and once it's review it will be share to client and shareholder. UAT report is generally placed in project or product common share repository for better/easy access team.

UAT testcases execution report will be in common repository.

UTILIZATION OF TESTING TOOLS

UAT testing various tools can be used to track and report.

Tools usage with in a project is purely based on client decision.as a client suggested team can go for open source or licensed and final decision by client.

➢UAT Testing team will use various tools to track progression the market.

This report shows the number of test case that have passed , filed 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
3Execution Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

10.RESULTS

10.1 Performance Metrics

HEALTHCARE PERFORMANCE MEASUREMENTS

Spearhead hospital and health system improvements by using standardized data and analytics on a variety of topics

what are healthcare performance measurements

Healthcare performance measurements are aggregated, quantified and analyzed data on a particular healthcare- related activity.

Their purpose is to identify opportunities for reducing costs, improving quality of care and increasing efficiency of care delivery.

They're also used to monitor other initiatives that an institution wants to track- or needs to track- to satisfy regulatory requirements.

These measurement initiatives are typically developed and operated with the active involvement of the physicians and hospital staff whose performance is being measured- as well as government and other third- party agencies- to ensure that the measures are meaningful, and the data are accurate.

Types of healthcare performance measurements include:

1) Quality and efficiency of patient care
2) Cost of healthcare services
3) Disparities in performance
4) Care outcomes

Level of safety and adherence to governmentally- mandated standards There are many reasons why healthcare performance measurements are important to healthcare institutions and society,

- Good health is more important to people than most other goods or services.
- Governments and individuals spend a lot on healthcare.
- People want to make informed decisions about their healthcare.
- Governments bodies can make better healthcare polices.

Using software for healthcare performance measurements,

In 2009, the US government created a USD 27billion incentive program to encourage healthcare providers to adopt EHRs.

Prioritizing healthcare performance measurements- which are more important?

1)Length of stay
2)Readmission rates
3)Mortality rates
4)Hospital incidents
5)CMS program performance initiatives
6)Average cost per discharge
7)operating margin
8)Bad debt

IBM Watson Health Solutions,

IBM, through its Watson health solutions, has been a leader in providing solutions for clinical quality measures and quality reporting for core measures.

It has a track record of accurate, on- time submissions- making it a leader for the CMS Hospital Inpatient Quality Reporting Program (HIQRP) or for accreditation from the joint commission (TJC).

Table 1: National Performance Comparisons (All Hospitals in Study)

Table 1: National Performance Comparisons (All Hospitals in Study)						
Domain	Performance Measures	Medians		Benchmark Compared With Peer Group		
		Benchmark Hospitals (Winners)	Peer Hospitals (Nonwinners)	Difference	Percent Difference	Comments
Clinical Outcomes	Inpatient Mortality Index[1]	0.77	0.99	-0.22	-22.3%	Lower mortality
	Complications Index[1]	0.73	0.92	-0.18	-20.1%	Fewer complications
	HAI Index[2]	0.60	0.69	-0.09	-13.1%	Fewer infections
Extended Outcomes	30-Day Mortality Rate[3]	11.6	12.3	-0.7	n/a[7]	Lower 30-day mortality
	30-Day Hosp-Wide Readmission Rate[4]	15.0	15.6	-0.6	n/a[7]	Fewer 30-day readmissions
Operational Efficiency	Average Length of Stay[1]	4.4	4.7	-0.4	-7.7%	Shorter stays
	ED Throughput Measure[5]	111.3	131.0	-19.8	-15.1%	Less time to service
	Inpatient Expense per Discharge[6]	$6,186	$7,190	-$1,004	-14.0%	Lower inpatient cost
	Medicare Spend per Beneficiary[5]	0.96	0.99	-0.03	-3.4%	Lower Episode Cost
Financial Health	Operating Profit Margin[6]	15.8	4.0	11.8	n/a[7]	Higher profitability
Patient Experience	HCAHPS Top Box (%)[5]	77.0	71.0	6.0	n/a[7]	Better patient experience

Table 2: Major Teaching Hospital Performance Comparisons

Table 2: Major Teaching Hospital Performance Comparisons						
Domain	Performance Measures	Medians		Benchmark Compared With Peer Group		
		Benchmark Hospitals (Winners)	Peer Hospitals (Nonwinners)	Difference	Percent Difference	Comments
Clinical Outcomes	Inpatient Mortality Index[1]	0.91	1.00	-0.09	-9.2%	Lower mortality
	Complications Index[1]	0.94	0.97	-0.03	-2.9%	Fewer complications
	HAI Index[2]	0.64	0.82	-0.19	-22.9%	Fewer infections
Extended Outcomes	30-Day Mortality Rate[3]	11.5	12.0	-0.5	n/a[7]	Lower 30-day mortality
	30-Day Hosp-Wide Readmission Rate[4]	15.1	16.2	-1.1	n/a[7]	Fewer 30-day readmissions
Operational Efficiency	Average Length of Stay[1]	4.4	5.0	-0.6	-11.5%	Shorter stays
	ED Throughput Measure[5]	161.0	205.0	-44.0	-21.5%	Less time to service
	Inpatient Expense per Discharge[6]	$6,420	$8,456	-$2,036	-24.1%	Lower inpatient cost
	Medicare Spend per Beneficiary[5]	0.97	1.01	-0.04	-3.5%	Lower Episode Cost
Financial Health	Operating Profit Margin[6]	11.7	3.8	7.9	n/a[7]	Higher profitability
Patient Experience	HCAHPS Top Box (%)[5]	77.0	71.0	6.0	n/a[7]	Better patient experience

Table 2: Major Teaching Hospital Performance Comparisons

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Domain	Performance Measures	Medians		Benchmark Compared With Peer Group		
		Benchmark Hospitals (Winners)	Peer Hospitals (Nonwinners)	Difference	Percent Difference	Comments
Clinical Outcomes	Inpatient Mortality Index[1]	0.91	1.00	-0.09	-9.2%	Lower mortality
	Complications Index[1]	0.94	0.97	-0.03	-2.9%	Fewer complications
	HAI Index[2]	0.64	0.82	-0.19	-22.9%	Fewer infections
Extended Outcomes	30-Day Mortality Rate[3]	11.5	12.0	-0.5	n/a[7]	Lower 30-day mortality
	30-Day Hosp-Wide Readmission Rate[4]	15.1	16.2	-1.1	n/a[7]	Fewer 30-day readmissions
Operational Efficiency	Average Length of Stay[1]	4.4	5.0	-0.6	-11.5%	Shorter stays
	ED Throughput Measure[5]	161.0	205.0	-44.0	-21.5%	Less time to service
	Inpatient Expense per Discharge[6]	$6,420	$8,456	-$2,036	-24.1%	Lower inpatient cost
	Medicare Spend per Beneficiary[5]	0.97	1.01	-0.04	-3.5%	Lower Episode Cost
Financial Health	Operating Profit Margin[6]	11.7	3.8	7.9	n/a[7]	Higher profitability
Patient Experience	HCAHPS Top Box (%)[5]	77.0	71.0	6.0	n/a[7]	Better patient experience

Table 4: Large Community Hospital Performance Comparisons

Table 4: Large Community Hospital Performance Comparisons						
Domain	Performance Measures	Medians		Benchmark Compared With Peer Group		
		Benchmark Hospitals (Winners)	Peer Hospitals (Nonwinners)	Difference	Percent Difference	Comments
Clinical Outcomes	Inpatient Mortality Index[1]	0.79	1.02	-0.23	-22.1%	Lower mortality
	Complications Index[1]	0.86	0.99	-0.13	-13.0%	Fewer complications
	HAI Index[2]	0.57	0.68	-0.10	-15.2%	Fewer infections
Extended Outcomes	30-Day Mortality Rate[3]	11.6	12.4	-0.8	n/a[7]	Lower 30-day mortality
	30-Day Hosp-Wide Readmission Rate[4]	15.2	15.5	-0.3	n/a[7]	Fewer 30-day readmissions
Operational Efficiency	Average Length of Stay[1]	4.7	5.0	-0.3	-6.0%	Shorter stays
	ED Throughput Measure[5]	122.5	148.3	-25.8	-17.4%	Less time to service
	Inpatient Expense per Discharge[6]	$6,373	$6,786	-$412	-6.1%	Lower inpatient cost
	Medicare Spend per Beneficiary[5]	1.00	1.01	-0.01	-1.1%	Lower Episode Cost
Financial Health	Operating Profit Margin[6]	15.0	6.6	8.4	n/a[7]	Higher profitability
Patient Experience	HCAHPS Top Box (%)[5]	79.0	70.0	9.0	n/a[7]	Better patient experience

Table 5: Medium Community Hospital Performance Comparisons

Table 5: Medium Community Hospital Performance Comparisons						
Domain	Performance Measures	Medians		Benchmark Compared With Peer Group		
		Benchmark Hospitals (Winners)	Peer Hospitals (Nonwinners)	Difference	Percent Difference	Comments
Clinical Outcomes	Inpatient Mortality Index[1]	0.74	0.98	-0.23	-23.8%	Lower mortality
	Complications Index[1]	0.77	0.98	-0.21	-21.5%	Fewer complications
	HAI Index[2]	0.54	0.61	-0.07	-11.5%	Fewer infections
Extended Outcomes	30-Day Mortality Rate[3]	11.4	12.3	-0.8	n/a[7]	Lower 30-day mortality
	30-Day Hosp-Wide Readmission Rate[4]	14.8	15.6	-0.8	n/a[7]	Fewer 30-day readmissions
Operational Efficiency	Average Length of Stay[1]	4.4	4.9	-0.5	-9.9%	Shorter stays
	ED Throughput Measure[5]	103.8	131.3	-27.5	-21.0%	Less time to service
	Inpatient Expense per Discharge[6]	$5,896	$6,869	-$973	-14.2%	Lower inpatient cost
	Medicare Spend per Beneficiary[5]	0.95	0.99	-0.05	-4.6%	Lower Episode Cost
Financial Health	Operating Profit Margin[6]	14.8	4.7	10.1	n/a[7]	Higher profitability
Patient Experience	HCAHPS Top Box (%)[5]	76.5	70.0	6.5	n/a[7]	Better patient experience

Table 6: Small Community Hospital Comparisons

Table 6: Small Community Hospital Comparisons						
Domain	Performance Measures	Medians		Benchmark Compared With Peer Group		
		Benchmark Hospitals (Winners)	Peer Hospitals (Nonwinners)	Difference	Percent Difference	Comments
Clinical Outcomes	Inpatient Mortality Index[1]	0.51	1.00	-0.49	-49.2%	Lower mortality
	Complications Index[1]	0.58	0.90	-0.32	-35.1%	Fewer complications
	HAI Index[2]	n/a	n/a	n/a	n/a	n/a
Extended Outcomes	30-Day Mortality Rate[3]	11.6	12.4	-0.8	n/a[7]	Lower 30-day mortality
	30-Day Hosp-Wide Readmission Rate[4]	14.7	15.4	-0.7	n/a[7]	Fewer 30-day readmissions
Operational Efficiency	Average Length of Stay[1]	4.3	4.9	-0.6	-13.0%	Shorter stays
	ED Throughput Measure[5]	93.8	100.5	-6.8	-6.7%	Less time to service
	Inpatient Expense per Discharge[6]	$6,344	$7,577	-$1,233	-16.3%	Lower inpatient cost
	Medicare Spend per Beneficiary[5]	0.90	0.96	-0.06	-6.1%	Lower Episode Cost
Financial Health	Operating Profit Margin[6]	17.2	1.7	15.5	n/a[7]	Higher profitability
Patient Experience	HCAHPS Top Box (%)[5]	76.5	73.0	3.5	n/a[7]	Better patient experience

Figure 1 State-level Performance Comparisons, 2021 Study

Figure 2 State-level Performance Comparisons, 2020 Study

Table 7. 100 Top Hospitals Two-year State-level Performance Comparisons

Northeast		Midwest		South		West	
Current Study	Previous Study	Current Study	Previous Study	Current Study	Previous Study	Current Study	Previous Study
CT	CT	IL	IL	AL	AL	AK	AK
ME	ME	IN	IN	AR	AR	AZ	AZ
MA	MA	IA	IA	DE	DE	CA	CA
NH	NH	KS	KS	DC	DC	CO	CO
NJ	NJ	MI	MI	FL	FL	HI	HI
NY	NY	MN	MN	GA	GA	ID	ID
PA	PA	MO	MO	KY	KY	MT	MT
RI	RI	NE	NE	LA	LA	NV	NV
VT	VT	ND	ND	MD	MD	NM	NM
		OH	OH	MS	MS	OR	OR
		SD	SD	NC	NC	UT	UT
		WI	WI	OK	OK	WA	WA
				SC	SC	WY	WY
				TN	TN		
				TX	TX		
				VA	VA		
				WV	WV		

Model Performance Metrics,

Most model- performance measures are based on the comparison of the models predictions with the (known) values of the dependent variable in a dataset.

Performance Metrics In Healthcare,

A healthcare key performance indicator (KPI) or metric is a well- defined performance measure that is used to observe, analyse, optimize, and transform a health process to increase satisfaction for both patients and healthcare providers alike.

11.1 ADVANTAGES AND DISADVANTAGES

Advantages

Higher-Quality Care

Because big data draws from a number of sources, including previous doctor and pharmacy visits, social media, and other outside sources, it can create a more complete picture of a patient. Using traditional charts filled by employees with medical transcription training online, doctors only had

access to a limited amount of patient information, such as a few charts and some personal information

Early Intervention

The overall goal of big data in healthcare is to use predictive analysis to find and address medical issues before they turn into larger problems. Big data definitely makes the entire process more efficient. For example, a patient who is seeing a doctor about trying to lose weight could be prescribed medicine to address high cholesterol.

Fraud Detection

A growing problem in the healthcare and insurance spaces is fraud, or patients submitting false claims in hopes of being paid. Big data is useful in fighting this because it can access a huge amount of data to find inconsistencies in submitted claims and flag potentially fraudulent claims for further review.

Disadvantages

Privacy

One of the strongest negatives relating to big data is the lack of privacy, especially when it comes to confidential medical records. To be effective and get the full, comprehensive look at a patient, big data must have access to everything, including private records and social media posts.

Replacing Doctors

While some people see the ability to predict future medical issues as a positive, big data also poses the risk of replacing doctors. Big data simply isn't at the point yet where it can be used on its own, and it definitely lacks the personal touch of a human doctor. Some experts fear that the growth of big data could potentially undermine doctors and leave patients turning to technology for answers instead of using a licensed doctor.

12.CONCLUSION

Thus the project using IBM CLOUD is tested,verified and executed successfully.

13.FUTURE SCOPE

In future, we planned to implement this project in large scale with extra features which will be helpful and used by all the people.

14.APPENDIX

index.html

```
 <!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Login Form</title>
<link rel="stylesheet" href="style.css">
<link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/5.15.3/css/all.min.css" /> </head>
<body>
<div class="wrapper">
<header>Login Form</header>
<form action="https://symphonious-rugelach-c4bfbe.netlify.app/"> <div class="field
email">
<div class="input-area">
<input type="text" placeholder="Email Address">
<i class="icon fas fa-envelope"></i>
<i class="error error-icon fas fa-exclamation-circle"></i> </div>
<div class="error error-txt">Email can't be blank</div>
 </div>
<div class="field password">
<div class="input-area">
<input type="password" placeholder="Password">
<i class="icon fas fa-lock"></i>
<i class="error error-icon fas fa-exclamation-circle"></i>
</div>
<div class="error error-txt">Password can't be blank</div>
</div>
<div class="pass-txt">
<a href="#">Forgot password?</a></div>
<input type="submit" value="Login">
</form>
<div class="sign-txt">Not yet member? <a href="#">Signup now</a></div> </div>
<script src="script.js">
</script>
</body>
</html> report.html
  <html lang="en">

  <head>

  <title>Data Analytics</title>

  <meta charset="utf-8">

  <meta name="viewport" content="width=device-width, initial-scale=1">

  <link rel="stylesheet"
  href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css"> <script
  src="https://ajax.googleapis.com/ajax/libs/jquery/3.6.0/jquery.min.js"></scrip t> <script
  src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></sc ript>
  </head>

  <body>



  <nav class="navbar navbar-inverse ">
```

```
<div class="container-fluid">
<div class="navbar-header">
<a class="navbar-brand" href="#">Analytics for Hospitals' Health-Care Data</a>
</div>
<ul class="nav navbar-nav">
<li><a href="index.html">Home</a></li>
<li><a href="dashboard.html">Dashboard</a></li>
<li class="active"><a href="#">Report</a></li>
<li><a href="story.html">Story</a></li>
</ul>
</div>
</nav>

<div class="container">
<iframe src="https://us1.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2FReport%2FHealth%2BCare%2BData%2BAnalytics%2BReport&amp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedded&amp;action=run&amp;format=HTML&amp;prompt=false" width="1000" height="900" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe> </br>
</div>

</body>
</html>
```

GITHUB:

https://github.com/IBM-EPBL/IBM-Project-7905-1658902353