

Project Report

Analytics for Hospitals' Health-Care Data

1.Introduction

1.1 Project overview

Healthcare organizations are under increasing pressure to improve patient care outcomes and achieve better care. While this situation represents a challenge, it also offers organizations an opportunity to dramatically improve the quality of care by leveraging more value and insights from their data. Health care analytics refers to the analysis of data using quantitative and qualitative techniques to explore trends and patterns in the acquired data. While healthcare management uses various metrics for performance, a patient's length of stay is an important one.

Being able to predict the length of stay (LOS) allows hospitals to optimize their treatment plans to reduce LOS, to reduce infection rates among patients, staff, and visitors.

1.2. Purpose

The goal of this project is to accurately predict the Length of Stay for each patient so that the hospitals can optimize resources and function better.

2.Literature survey

2.1Existing problem

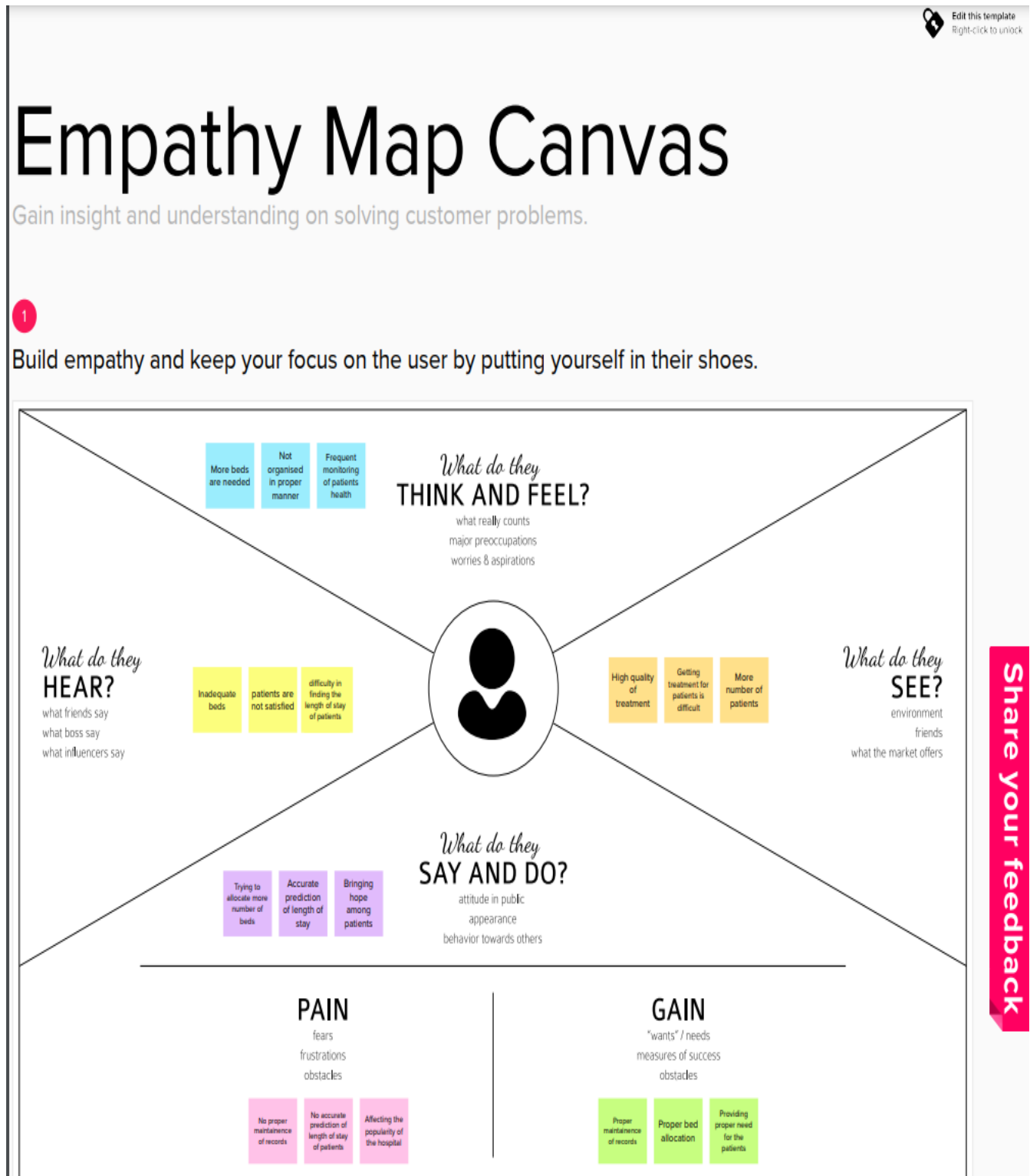
Recent Covid-19 Pandemic has raised alarms over one of the most overlooked areas to focus: Healthcare Management. While healthcare management has various use cases for using data science, patient length of stay is one critical parameter to observe and predict if one wants to improve the efficiency of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

2.2. Problem statement

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

3.Ideation & proposed solution

3.1Empathy map Canvas



3.2 Ideation and Brainstorming

1

Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

🕒 5 minutes

Public hospitals has some main challenges such as deficient infrastructure, deficient manpower, unmanageable patient load and etc.,so peoples can be benefitted if these problems are solved adhering to certain software or some notes to maintain all. Govt Hospitals facing data management due to lack of IT trained staffs.

Private/Small Health sectors cannot store and analyze large data set it consumes lots of money and time.

Researchers faces issues when they are dealing with large datasets as there is Depicting a diversity of opinions and experiences embedded within patient-generated information(not standard data).

Health Researchers and Students are not able to Extract useful Information's due to lack of data's made available publicly as Many hospitals are not sharing health care data being mindful with patients privacy.

Issues with system functionality, including poor user interfaces and fragmented displays, delayed care delivery. Issues with system access, system configuration, and software updates also delayed care.

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!

ushanandhi
ni

Using Health Data For Informed Strategic Planning

Forecasting patient loads
1. Identifying resources (physical and supporting staff)
2. Reducing emergency labor cost

Allocating a sufficient number of workers to deal with workload

Monitoring network traffic changes
Identifying congestion
Optimizing network configuration
Calculating real-time risk score for specific transactions

Allocating resources
Identifying network congestion
Identifying network congestion
Identifying network congestion
Identifying network congestion

Forecasting patient loads
1. Identifying resources (physical and supporting staff)
2. Reducing emergency labor cost

Allocating a sufficient number of workers to deal with workload

Shanmuga priya

Health data should be stored in a cloud database and can be accessed by cloud cost efficiency

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preethika

Incentives of Professionals

Adjusting Staff Schedules

Hybrid works to solve real time problems such as beds available and etc.

Performance bonus can be given frequently

Fulfill the needs of the Staffs

These internal Communications

With MYSQL can manage very large datasets

Sudha

Prior to Emergency Medical Treatment

Expand Hospital Capacity

Computers should be maintained periodically to avoid multi issues

In cloud we pay for what we use

Separate System technicians should have to be hired

Call the nurse first for and problems to avoid congestion can be solved using phone call

Use of public cloud to store larger datasets

Anonymous should be created among youngsters in blood donation

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

20 minutes

Data and Dataset

Using Health Data For Informed Strategic Planning

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Cost

Forecasting patient loads
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Monitoring network traffic changes
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Allocating a sufficient number of workers to deal with workload

Forecasting patient loads
1. Identifying resources (physical and supporting staff)
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Forecasting patient loads
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Privacy

Forecasting patient loads
1. Identifying resources (physical and supporting staff)
2. Reducing emergency labor cost

Monitoring network traffic changes
Identifying congestion
Optimizing network configuration
Calculating real-time risk score for specific transactions

Allocating a sufficient number of workers to deal with workload

Internal Operations

Forecasting patient loads
1. Identifying resources (physical and supporting staff)
2. Reducing emergency labor cost

Monitoring network traffic changes
Identifying congestion
Optimizing network configuration
Calculating real-time risk score for specific transactions

Allocating a sufficient number of workers to deal with workload

Forecasting patient loads
1. Identifying resources (physical and supporting staff)
2. Reducing emergency labor cost

Monitoring network traffic changes
Identifying congestion
Optimizing network configuration
Calculating real-time risk score for specific transactions

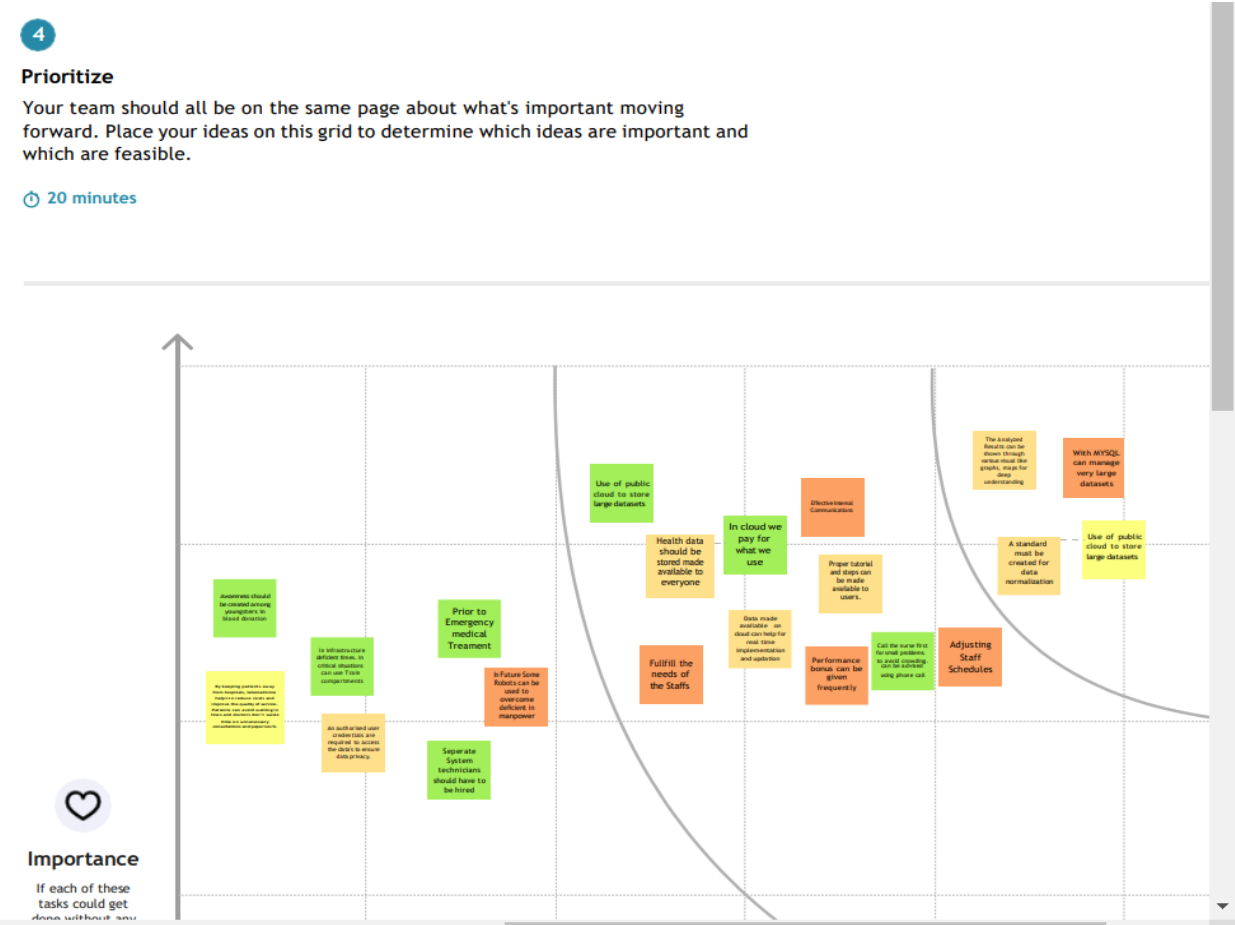
Allocating a sufficient number of workers to deal with workload

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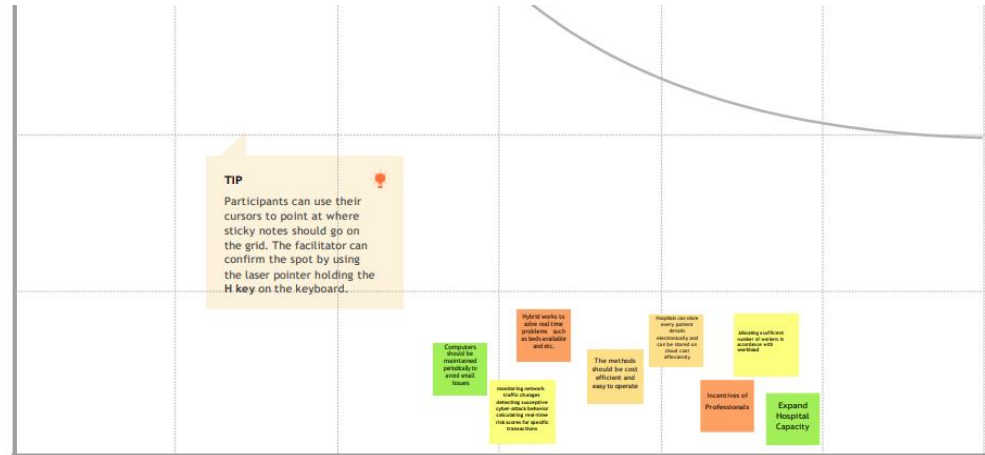
Monitoring network traffic changes
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TIP

Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.



difficulty or cost,
which would have
the most positive
impact?



Feasibility

Regardless of their importance, which tasks are more feasible than others? (Cost, time, effort, complexity, etc.)

3.3 Proposed solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	<ul style="list-style-type: none"> The goal is to predict the bed availability for patients at risky period and improve efficiency in the healthcare industry. The following are the issues that are arising because of mismanagement. <ul style="list-style-type: none"> Poor bed allocation planning. Difficulty in categorizing patients based on LOS Patients may get irritated and might move on to other hospitals because of the unavailability of earliest treatment in case of contagious and serious issues. To provide proper solution for these issues, certain procedures and techniques must be followed.

2.	Idea / Solution description	<ul style="list-style-type: none"> • With the help of data analytics tools and various M-L Algorithms the data patterns are monitored,analyzed to give an information about bed availability and other facilities that are currently in avail to organizations. • Creating interactive dashboard to know the bed and other facilities availabilty. • Automatic update of datas in database reflects in the dashboard and viceversa and to achieve the efficiency of management.
3.	Novelty / Uniqueness	<ul style="list-style-type: none"> • Responsive 24/7 Dashboard that provides the facilities that are in avail and to get the patients details which are categorised based on LOS using various factors
4.	Social Impact / CustomerSatisfaction	<ul style="list-style-type: none"> • This project overall manages the patients record, bed and other facilities in hospital that are in avail using a website dashboard and data analysis of bed. • Increased coordination may improve efficiency and accuracy of health care
5.	Business Model (Revenue Model)	<ul style="list-style-type: none"> • 24/7 support, The components provide immediate, highly focused improvements for maximum benefit.
6.	Scalability of the Solution	<ul style="list-style-type: none"> • For accurate prediction of available beds the best and most suits systems are in flow

3.4 Problem solution fit

Project Title: Analytics for Hospital Health-Care Data

Project Design Phase-I - Solution Fit Template

Team ID: PNT2022TMID04514

Define CS, fit into CC	1. CUSTOMER SEGMENT(S) CS Who is your customer? i.e. working parents of 0-5 y.o. kids Hospital management and patients	6. CUSTOMER CONSTRAINTS CC What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices. Could not predict the Length Of Stay of patients properly especially during the pandemic period	5. AVAILABLE SOLUTIONS AS Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking Hospital bed management using data mining techniques	Explore AS, differentiate
	2. JOBS-TO-BE-DONE / PROBLEMS J&P Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides. Proper data analysis is needed for various needs of patients	9. PROBLEM ROOT CAUSE RC What is the real reason that this problem exists? What is the back story behind the need to do this job? i.e. customers have to do it because of the change in regulations. Insufficient analysis in data ,human error and poor scheduling	7. BEHAVIOUR BE What does your customer do to address the problem and get the job done? i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace) Regularly monitoring the database of patients to avoid error	
Identify strong TR & EM	3. TRIGGERS TR What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news Prevailing emergency situations and Pandemic period situations	10. YOUR SOLUTION SL Using predictive analysis powered by the AI which is used in analytics technique Proper Data analysis and implementation in Interactive dashboard	8. CHANNELS of BEHAVIOUR CH 8.1 ONLINE Usage of data exploration, Secured Login. 8.2 OFFLINE Maintaining Data set for the patients occupancy period, predicting the LOS with doctors	Identify strong TR & EM
	4. EMOTIONS: BEFORE / AFTER EM BEFORE: Unstable physical and psychological state during the pandemic period AFTER : Physical and psychological comfort and security to the patients. Improved bed allocation facilities			

4.Requirements analysis

4.1 Functional requirements

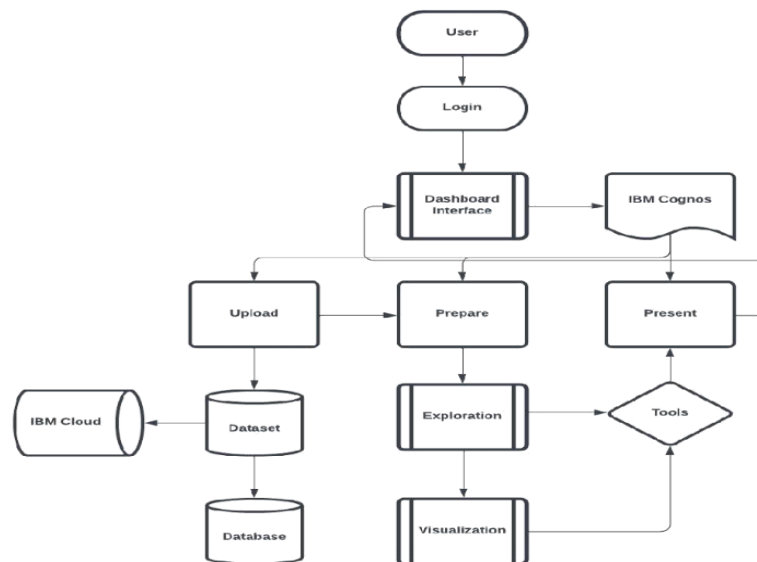
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Appointments	<ul style="list-style-type: none"> • Recurrent appointments and scheduling available time slots on a regular basis. • Displaying the number of appointments on a given day • After the patient is signed in asking for a mobile number and ID to avoid any issues. • Generating the appointment. • Generate the bill automatically for completed appointments • Appointment Status: <ol style="list-style-type: none"> 1.Confirmed 2.Pending 3.Cancelled and No Reschedule 4.Cancelled and Reschedule 5.No Show 6.Completed
FR-2	Clinical Care	<ul style="list-style-type: none"> • The admission for the patient must be examined thoroughly and patients who comes in a critical condition should be given treatment immediately. • Enhanced and improved reliability on reporting the data. • Access medication history from external sources and analyze the drugs(medicines) to be given. • Predicting the length of stay of inpatients.
FR-3	Patient Records	<ul style="list-style-type: none"> • A Proper record or documentations need to be maintained regarding the patients who are all consulted and detailed analysis of their health details. • The records must be easily accessible when required
FR-4	Bed Requirements	<ul style="list-style-type: none"> • Analyzing and monitoring of beds which are required are the most important task.

		<ul style="list-style-type: none"> Using flawless systems for accurately tracking the availability of beds.
FR-5	Providing insights of dataset	<ul style="list-style-type: none"> Raw data collection and sharing of data systems are essential factors in hospital management. Provide dataset without human error.
FR-6	Discharge Summary	<ul style="list-style-type: none"> Unrestricted patients have complete discharge or deferred discharge. Restricted patients have Conditional discharge or absolute discharge They have to be mentioned in the discharge summary.

5.PROJECT DESIGN

5.1 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.



5.2 Solution & Technical Architecture

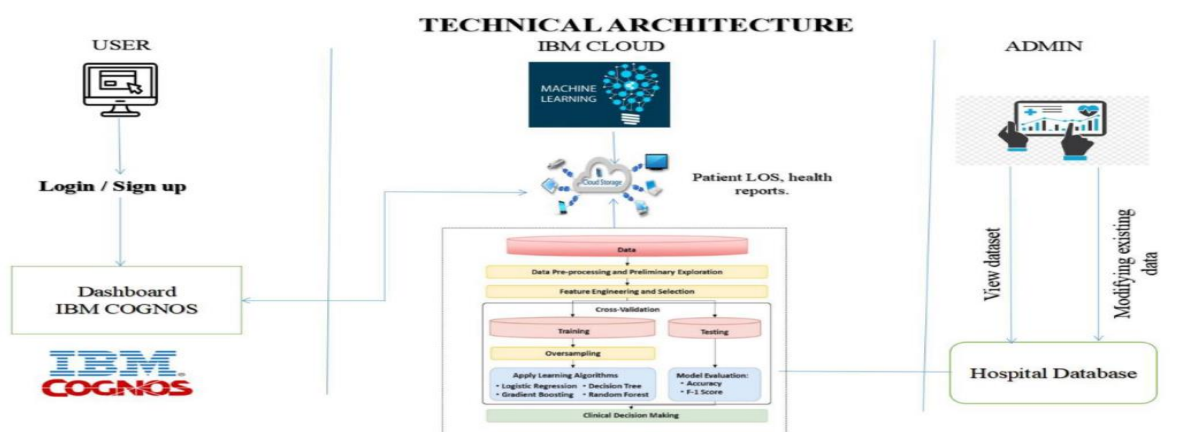


Table-1: Components & Technologies:

S. No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g.Web UI, Mobile App, Chatbot etc.	HTML, CSS, JavaScript
2.	Application Logic-1	Logic for a process in the application	Python
3.	Application Logic-2	Logic for a process in the application	IBM Watson STT service
4.	Database	Data Type, Configurations etc.	MySQL
5.	Cloud Database	Database Service on Cloud	IBM Cloud
6.	File Storage	File storage requirements	IBM Block Storage or Other StorageService or Local Filesystem
7.	External API-1	Purpose of External API used in the application	Aadhar API,etc.
8.	Machine Learning Model	Purpose of Machine Learning Model	Regression Model,etc.
9.	Infrastructure (Server / Cloud)	Application Deployment on Local System / CloudLocal Server Configuration: Cloud Server Configuration :	Local, Cloud Foundry,etc.

Table-2: Application Characteristics:

S. No	Characteristics	Description	Technology
1.	Open-Source Frameworks	List the open-source frameworks used	Python
2.	Security Implementations	List all the security / access controls implemented, use of firewalls etc.	Encryption, Firewall, Antiviruses
3.	Scalable Architecture	Justify the scalability of architecture (3 – tier, Micro-services)	Supports higher workloads
4.	Availability	Justify the availability of application (e.g. use of load balancers, distributed servers etc.)	High availability enables your IT infrastructure to continue functioning even when some of its components fail
5.	Performance	Design consideration for the performance of the application (number of requests per sec, use of Cache, use of CDN's) etc.	A field of practice that uses various tools, processes, and ideas in a scientific manner to improve the desired outcomes of individuals and organizations.

5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the dashboard by entering my email, and password, and confirming my password.	I can access my account in the dashboard	High	Sprint-1
		USN-2	As a user, I will receive a confirmation email once I have registered for the dashboard	I can receive a confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the dashboard through Social Media	I can register & access the dashboard with Social Media Login	Low	Sprint-2
		USN-4	As a user, I can register for the dashboard through Gmail	I can register and access dashboard with Gmail	Medium	Sprint-2
	Login	USN-5	As a user, I can log into the application by entering email & password	I can login to the account in my email login.	High	Sprint-2
	Dashboard	USN-6	As a user, I can use my account in my dashboard for uploading dataset.	I can login to the account for uploading dataset.	Medium	Sprint-3
Customer (Webuser)	Website	USN-7	As a user, I can use my dashboard in website	I can login into the dashboard by visiting website.	Medium	Sprint-3
Customer Care Executive		USN-8	As a user, I can contact Customer care Executive for my login.	I can contact customer executive for my login.	High	Sprint-4
Administrator		USN-9	As a user, I can contact administrator for my queries.	I can contact administrator for solving my queries.	High	Sprint-4
Exploration	Dashboard	USN-10	As a user, I can prepare data by using Exploration Techniques.	I can prepare data by using Exploration Techniques.	High	Sprint-3

Presentation	Dashboard	USN-11	As a user, I can Present data in my dashboard.	I can present data by using my account in dashboard.	High	Sprint-4
Visualization	Dashboard	USN-12	As a user, I can Prepare Data by using Visualization Techniques.	I can prepare data by using Visualization Techniques.	High	Sprint-3

6. Project planning & scheduling

6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Collection	USN-1	The User needs a complete data about the patients admitted in the hospital and a dataset should be prepared.	2	Medium	Shanmuga Priya S, Usha nand hini R
Sprint-1	Data Exploration	USN-2	As a user, I need nicely visualized dashboard of number of beds occupied and number of free beds in hospital.	4	High	Sudharshini B, Preethika S, Shanmuga Priya 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.	2	Medium	Usha nand hini R, Sudhars hini B

Sprint -2	Dashboard	USN - 4	As a user, I want the interactive dashboard to analyse the data. Have the data in terms of Graph.	4	High	Preethika S, Sudharshini B, Ushanandhini R
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.	2	Medium	Shanmuga Priya S, Preethika S
Sprint- 3	Story Creation	USN- 6	As a user, I need the story animation of the data set with insights	4	High	Sudharshini B, Ushanandhini R
Sprint-4	Predict LOS	USN- 7	As a user, I want the flawless system to predict the length of stay of the patients	4	High	Shanmuga Priya S, Ushanandhini R, Preethika S
Sprint-4	Using ML algorithm for Prediction	USN- 8	As a user, I need prior knowledge of LOS can aid in logistics such as room and bed allocation planning.	4	High	Preethika S, Sudharshini B, Shanmuga Priya S,

Tracker, Velocity & Burndown Chart:

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

Velocity:

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

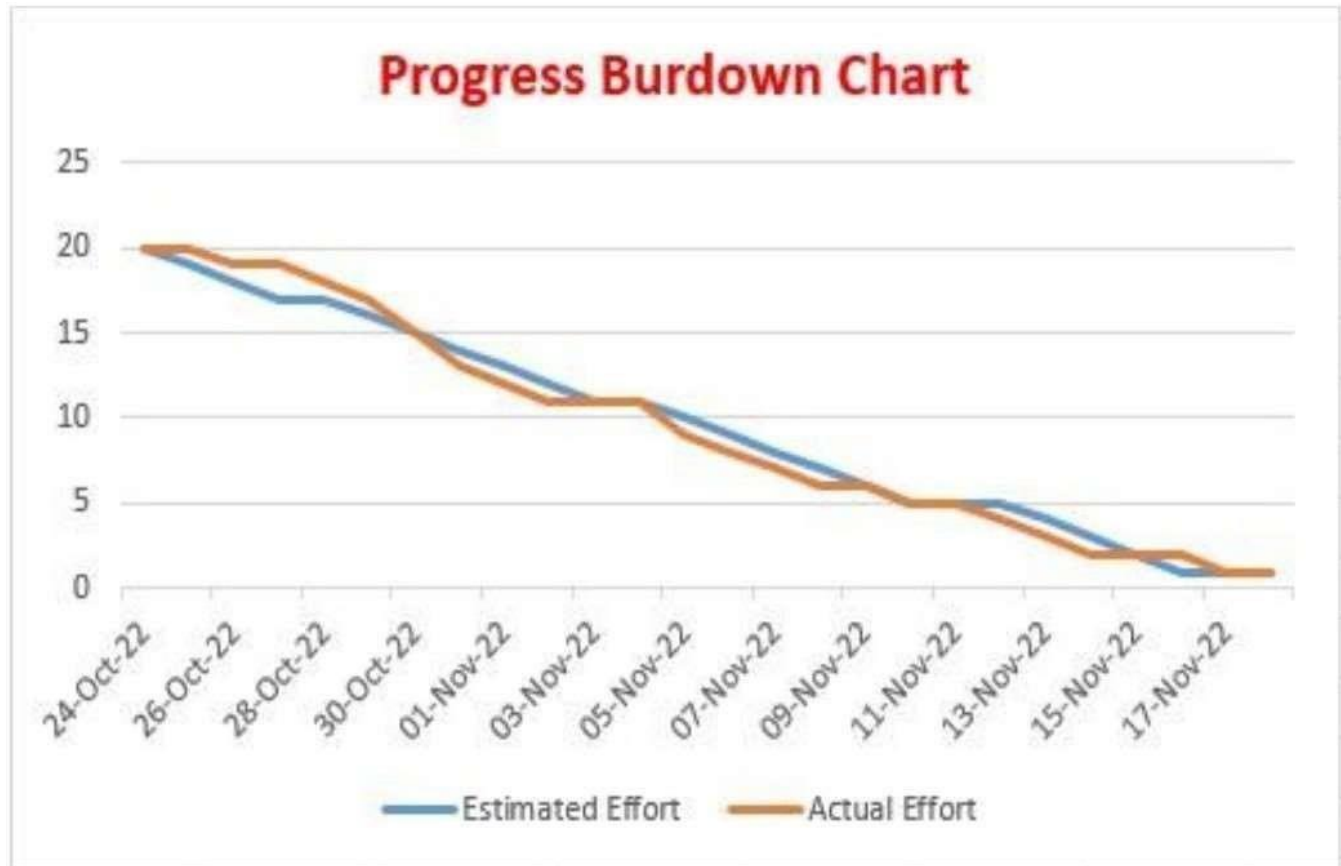
$$AV = \frac{\text{sprint duration}}{\text{velocity}} = \frac{20}{10} = 2$$

Burn Down Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.

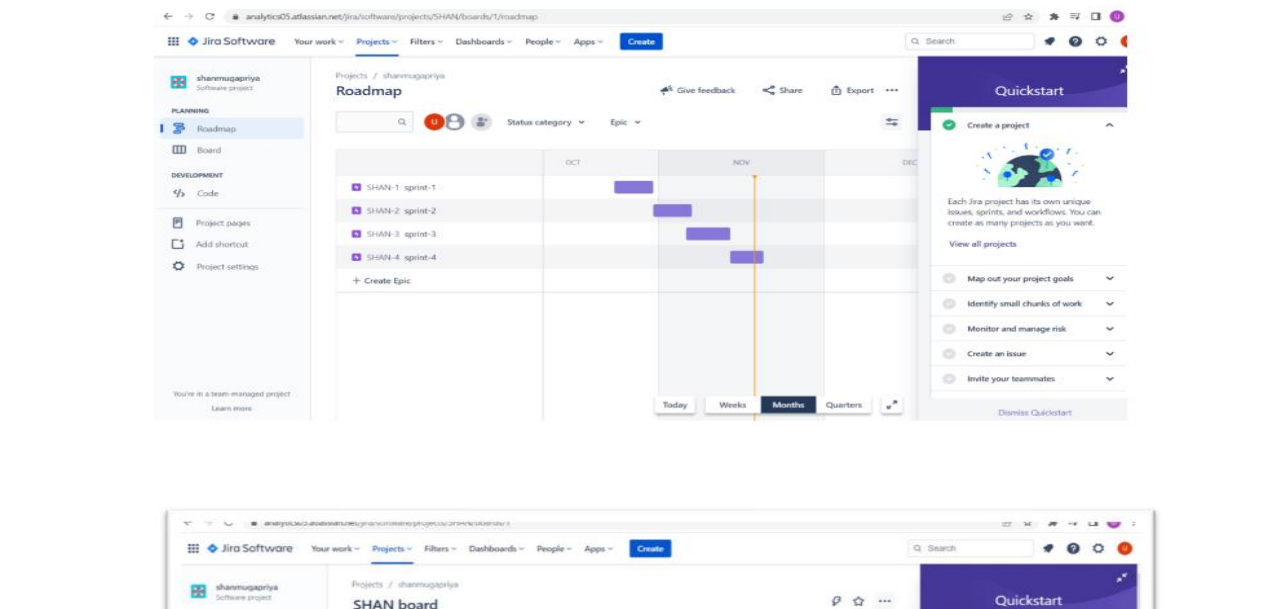
SPRINT	DATE	ESTIMATED EFFORT	ACTUAL EFFORT
SPRINT-1	24-OCT-22	20	20
	25-OCT-22	19	20
	26-OCT-22	18	19
	27-OCT-22	17	19
	28-OCT-22	17	18
	29-OCT-22	16	17
	30-OCT-22	15	15
SPRINT-2	31-OCT-22	14	13
	01-NOV-22	13	12
	02-NOV-22	12	11
	03-NOV-22	11	11
	04-NOV-22	11	11
	05-NOV-22	10	9
	06-NOV-22	9	8
	07-NOV-22	8	7

SPRINT-3	08-NOV-22	7	6
	09-NOV-22	6	6
	10-NOV-22	5	5
	11-NOV-22	5	5
	12-NOV-22	5	5
	13-NOV-22	4	4
SPRINT-4	14-NOV-22	4	4
	15-NOV-22	3	3
	16-NOV-22	2	2
	17-NOV-22	2	2
	18-NOV-22	1	1
	19-NOV-22	1	1



6.2 Reports from JIRA

Jira Sprints



The screenshot shows the Jira Software interface for a project named 'shannugapriya'. The left sidebar contains navigation options: 'Roadmap' and 'Board' (selected). The main area displays the 'SHAN board' with three columns: 'TO DO 4 ISSUES', 'IN PROGRESS 2 ISSUES', and 'DONE 2 ISSUES'. The 'TO DO' column contains four issues: 'Sprint-3 Provided greater details in the EHR's of individual patient with clear idea of what to do.' (SHAN-12), 'Sprint-3 As a user, I need the story animation of the data set with insights' (SHAN-13), 'Sprint-4 As a user, I want the flawless system to predict the length of stay of the patients' (SHAN-14), and 'Sprint-4 As a user, I need prior knowledge of LOS can aid in'. The 'IN PROGRESS' column contains two issues: 'Sprint-2 Tracking a patient Health care over years of visit and Screening of data they have in hospital.' (SHAN-10) and 'Sprint-2 As a user, I want the interactive dashboard to analyse the data. Have the data in terms of Graph.' (SHAN-11). The 'DONE' column contains two issues: 'Sprint-1 The User needs a complete data about the patients admitted in the hospital and a dataset should be prepared.' (SHAN-8) and 'Sprint-1 As a user, I need nicely visualized dashboard of number of beds occupied and number of free beds in hospital' (SHAN-9). A 'Quickstart' panel on the right provides instructions on how to use Kanban boards.

This screenshot shows the same Jira Software interface, but with the 'TO DO' column empty except for a '+ Create issue' button. The 'IN PROGRESS' column remains empty. The 'DONE' column still contains the same two issues: 'Sprint-1 The User needs a complete data about the patients admitted in the hospital and a dataset should be prepared.' (SHAN-8) and 'Sprint-1 As a user, I need nicely visualized dashboard of number of beds occupied and number of free beds in hospital' (SHAN-9). The 'Quickstart' panel on the right is still visible.

7.Coding and Solutioning

7.1. Create and configure IBM CLOUD Services

The screenshot shows the IBM Cloud account settings page. The left sidebar contains a navigation menu with options: Account, Account resources, Resource groups, Cloud Foundry orgs, Licenses and entitlements, Tags, Dashboards, Account settings (selected), IBM Cloud Shell settings, Notification distribution list, Classic infrastructure, Subscriptions, Audit log, and Company information. The main content area is titled 'Account settings' and includes sections for Account (Ushanandhini R's Account, ID: b33b1feb77dc47039f0438af44ea9839), Account Type (Trial (Free), 396 days remaining in Trial), Account upgrade (Pay-As-You-Go, Subscription, Need help?), and Subscription and feature codes. The Pay-As-You-Go section has an 'Add credit card' button. The Subscription section has an 'Upgrade' button. The Need help? section has a 'Contact sales' link.

The screenshot shows the IBM Cognos Analytics with Watson dashboard. The top navigation bar includes the IBM Cognos Analytics with Watson logo, a search bar, and a user profile icon. A blue banner at the top indicates a maintenance period: 'Maintenance: Cognos Analytics will undergo Maintenance: Nov 19 10:00 UTC to bring you the latest updates to Cognos Analytics'. The main content area features a welcome message: 'Hello. Welcome to Cognos Analytics with Watson.' and a prompt to get started by watching an introduction video or taking a product tour. Below this are two buttons: 'Watch video' and 'Take a product tour'. The right sidebar contains a user profile for Ushanandhini R (07e9e7...) with a 'Profile and settings' link, and a list of links: 'My schedules and subscriptions', 'Log my session', 'About', 'Manage product subscription', 'Privacy', 'Cookie Preferences', 'IBM Cognos Analytics Mobile', and 'Log out'. The bottom section, titled 'Quick launch', contains four tiles: 'Upload data' (Upload or drag and drop spreadsheets, csv files, and other data sources.), 'Prepare data' (Use data modules to clean and connect data from multiple resources.), 'Exploration' (Quickly find unbiased answers by identifying trends in your data with data exploration.), and 'Present data' (Create sophisticated, multi-page, multi-query dashboards, reports, or stories.).

Loading Datasets

IBM Cognos Analytics with Watson

11

Search content

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🔔

👤

Quick launch

Upload data

Upload or drag and drop spreadsheets, csv files, and other data sources.

Prepare data

Use data modules to clean and connect data from multiple resources.

Exploration

Quickly find unbiased answers by identifying trends in your data with data explor...

Present data

Create sophisticated, multi-page, multi-query dashboards, reports, or stori...

Get started

Recent

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IBM Cognos Analytics with Watson

Content

11

Search content

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Content

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Samples

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CSV

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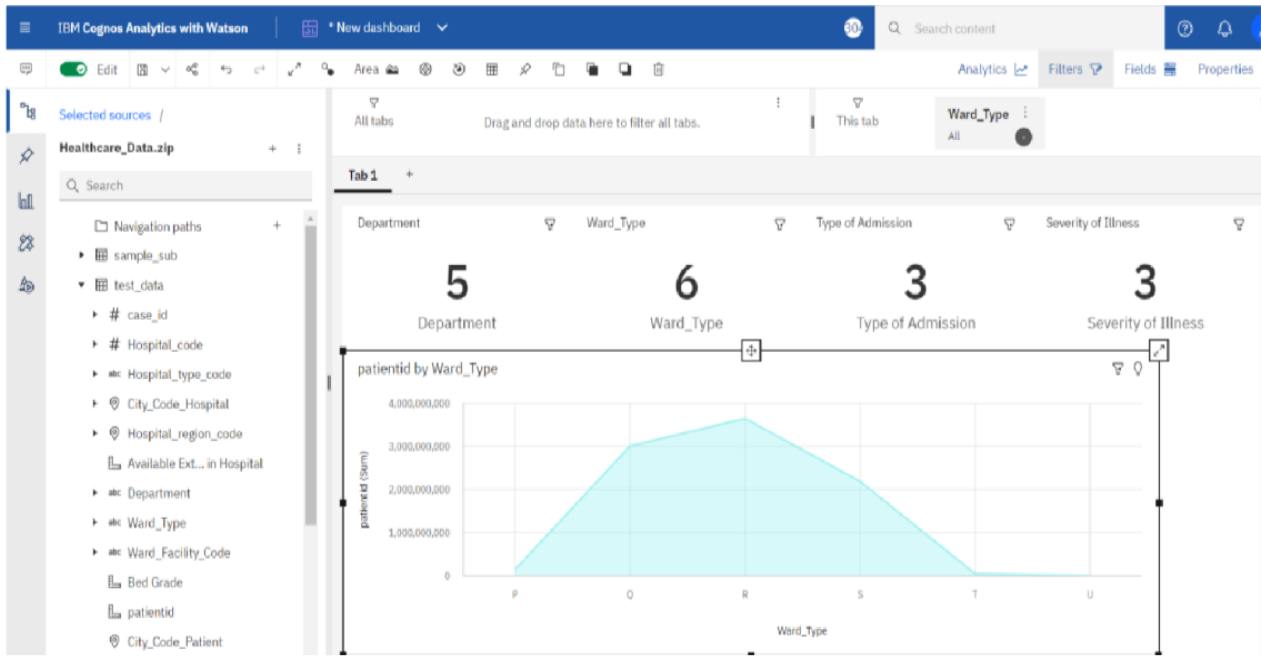
train_data_dictionary.xlsx

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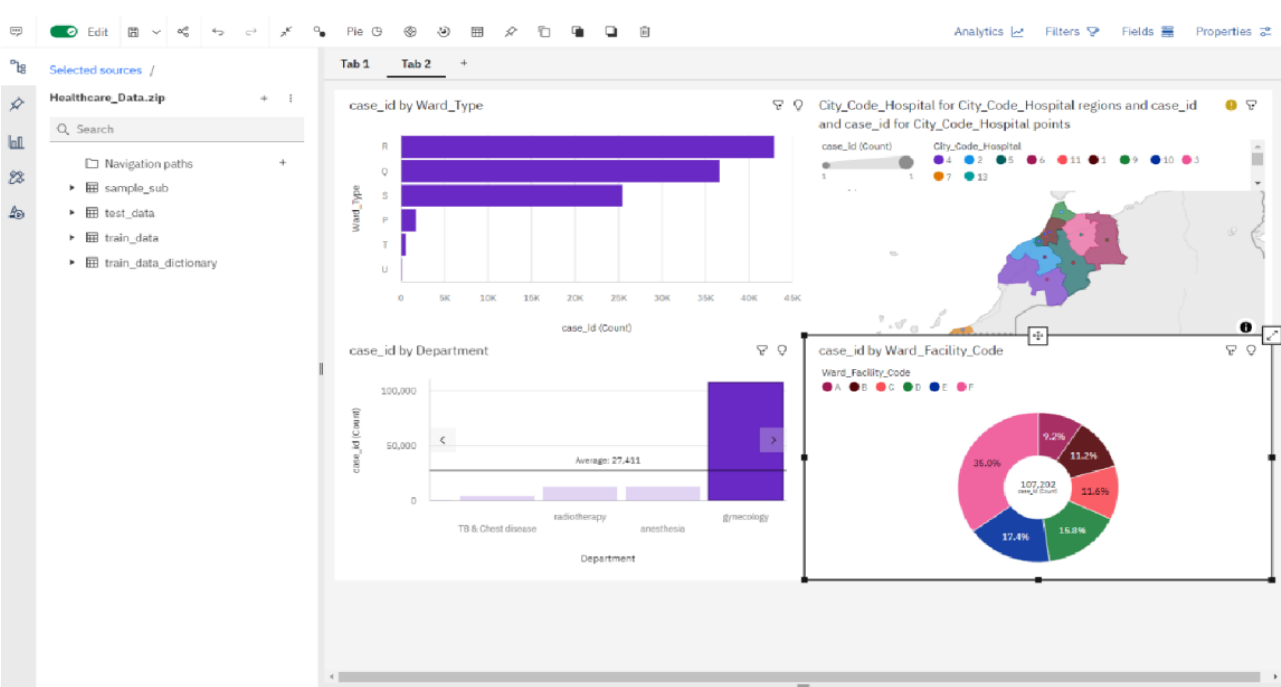
xlsx

7.2.Data Visualizations

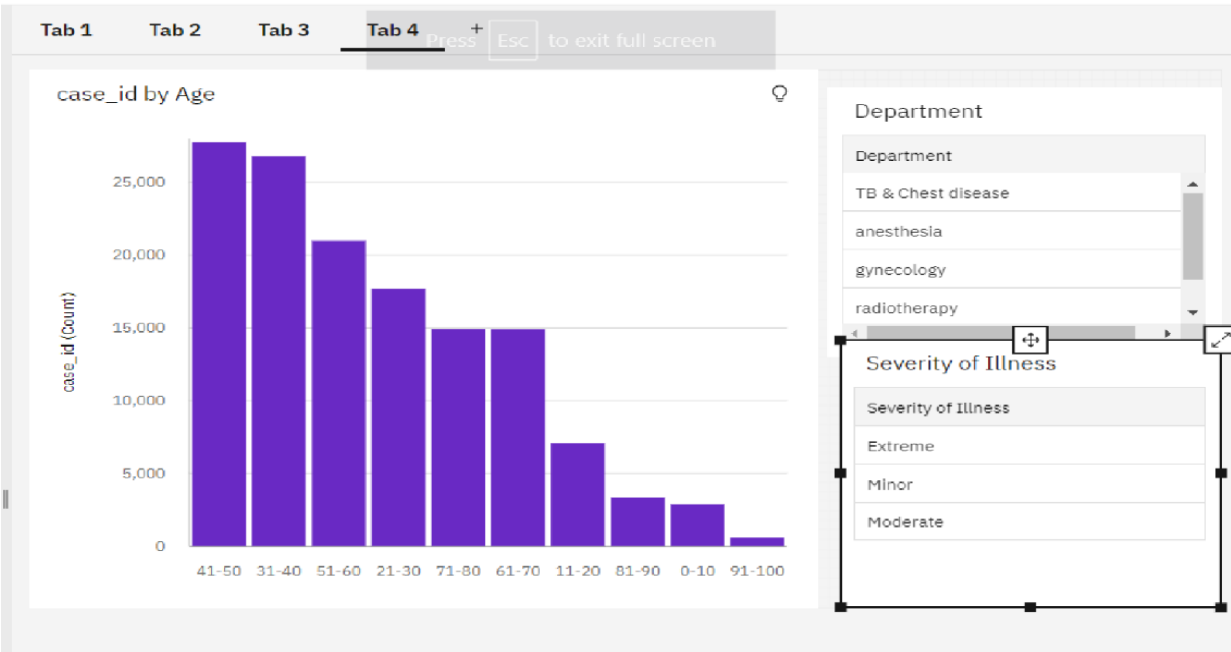
1.Number of patients by ward types



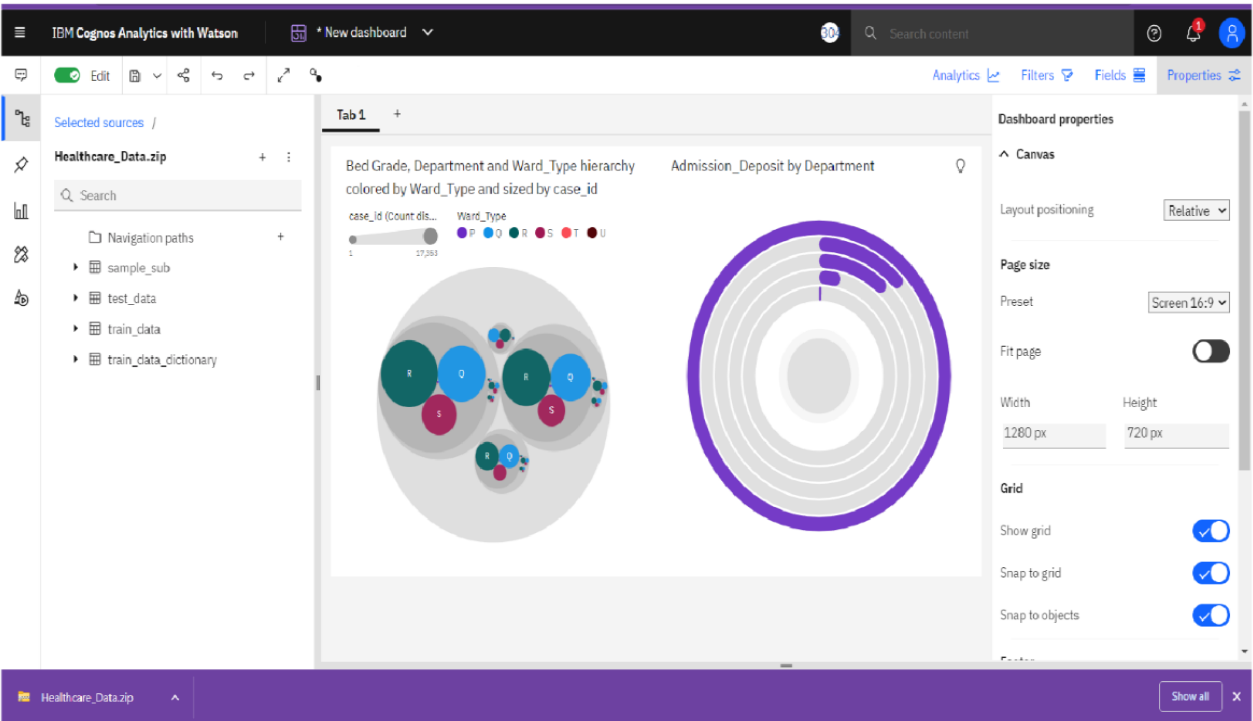
2.Dashboard to show number of patients



3.Age wise patients with Department and severity filters



4.Dashboard with Hierarchy Bubble and Radial Visuals



5.Null values cleaning process

```
File Edit View Insert Cell Kernel Widgets Help
Not Trusted Python 3 (ipykernel)

In [1]: import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

In [5]: train = pd.read_csv(r'C:\Users\mohan\OneDrive\Documents\IBPL Project\Healthcare_Data\train_data.csv')

In [7]: train.head()

Out[7]:
```

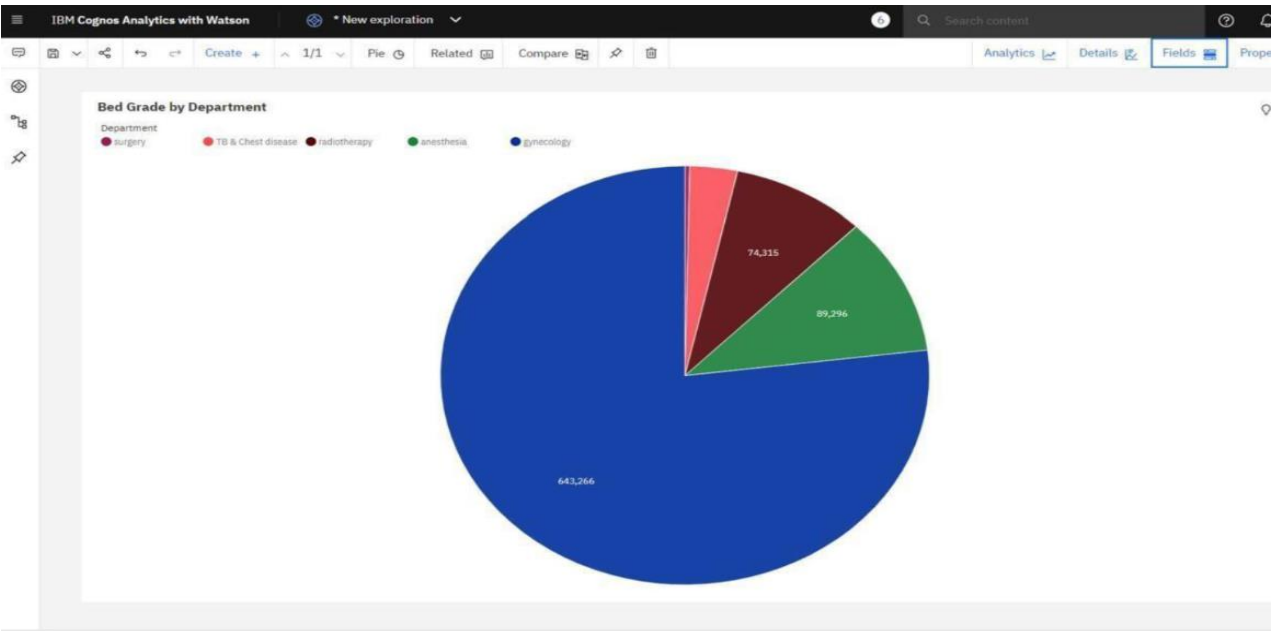
	case_id	Hospital_code	Hospital_type_code	City_Code_Hospital	Hospital_region_code	Available Extra Rooms in Hospital	Department	Ward_Type	Ward_Facility_Code	Bed Grade	patient
0	1	8	c	3	Z	3	radiotherapy	R	F	2.0	313
1	2	2	c	5	Z	2	radiotherapy	S	F	2.0	313
2	3	10	s	1	X	2	anesthesia	S	E	2.0	313
3	4	26	b	2	Y	2	radiotherapy	R	D	2.0	313
4	5	26	b	2	Y	2	radiotherapy	S	D	2.0	313

```

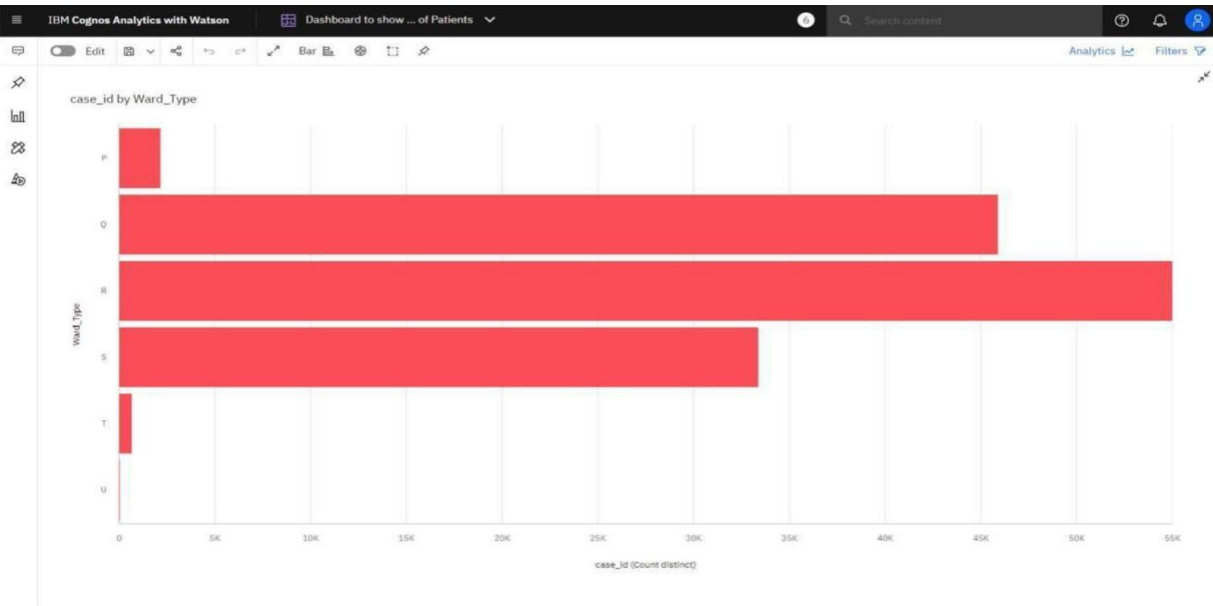
In [8]: train.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 318438 entries, 0 to 318437
Data columns (total 12 columns):
 #   Column                                Non-Null Count  Dtype
---  -
 0   case_id                              318438 non-null  int64
 1   Hospital_code                        318438 non-null  int64
 2   Hospital_type_code                  318438 non-null  object
 3   City_Code_Hospital                  318438 non-null  int64
 4   Hospital_region_code                318438 non-null  object
 5   Available Extra Rooms in Hospital    318438 non-null  int64
 6   Department                           318438 non-null  object
```

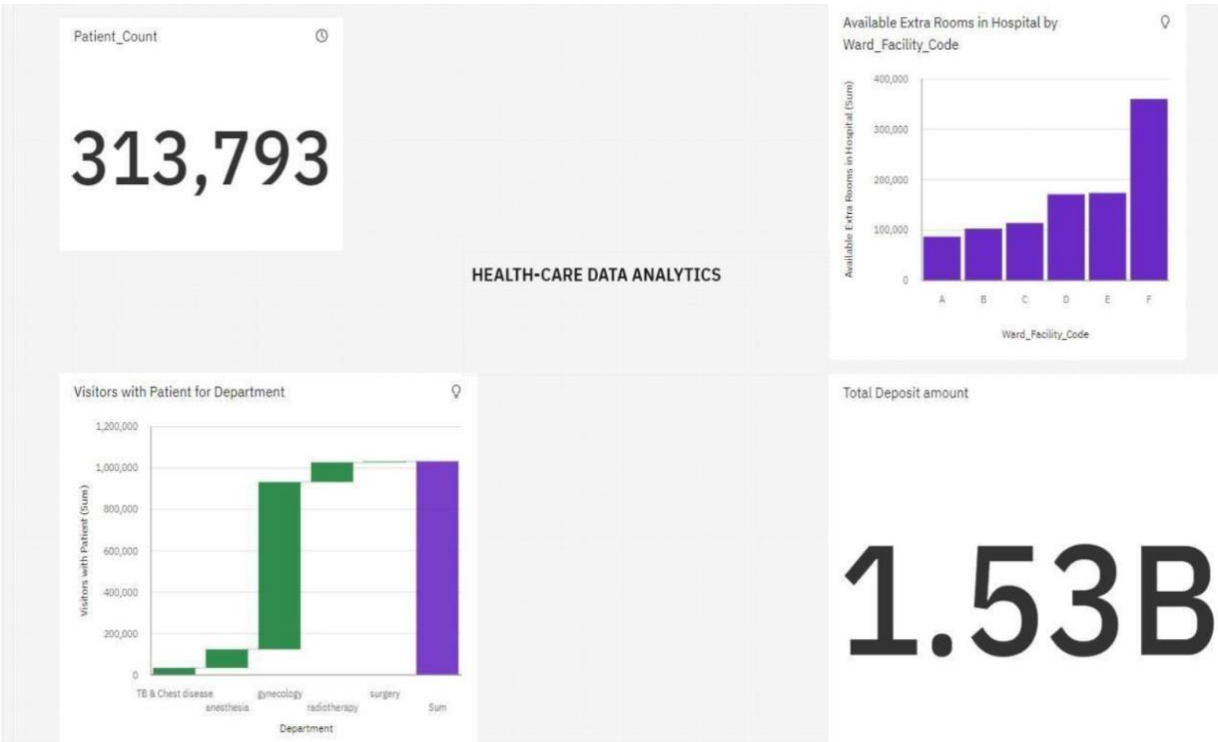
6. BedGrade by Department



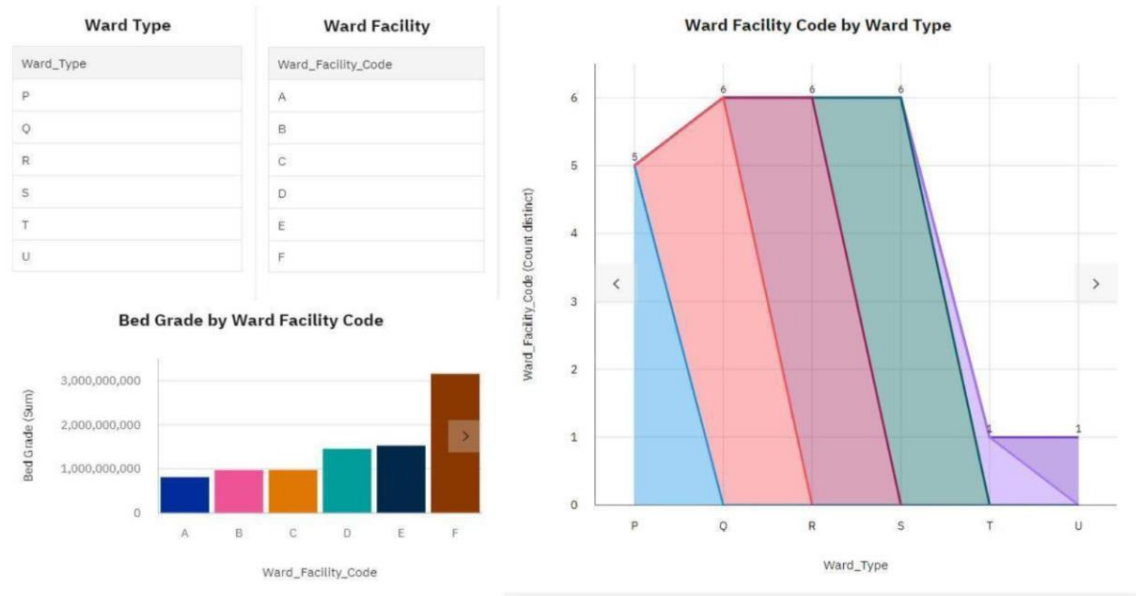
7. Case Id by Ward type



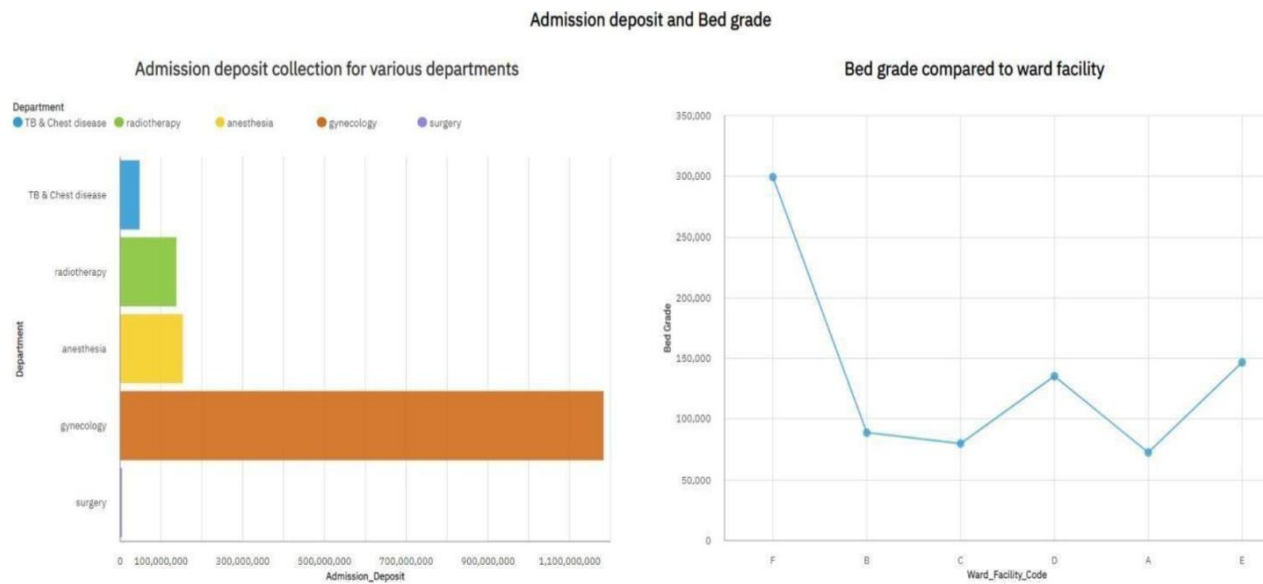
7.3.Dashboard creation with datasets



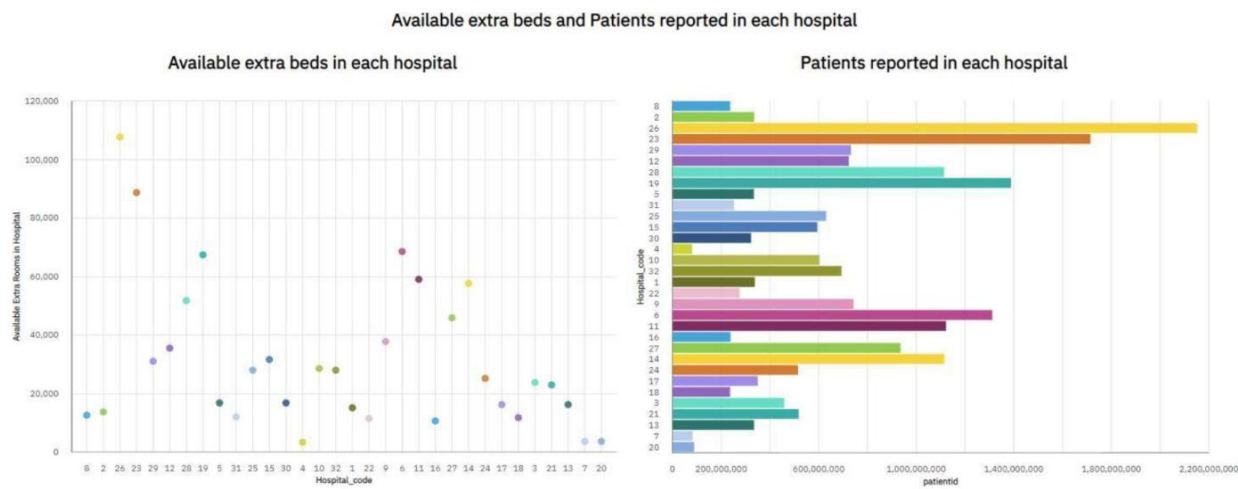
WARD TYPE AND WARD FACILITIES ANALYSIS:



8.Results



Available extra beds and Patients reported in each hospital:

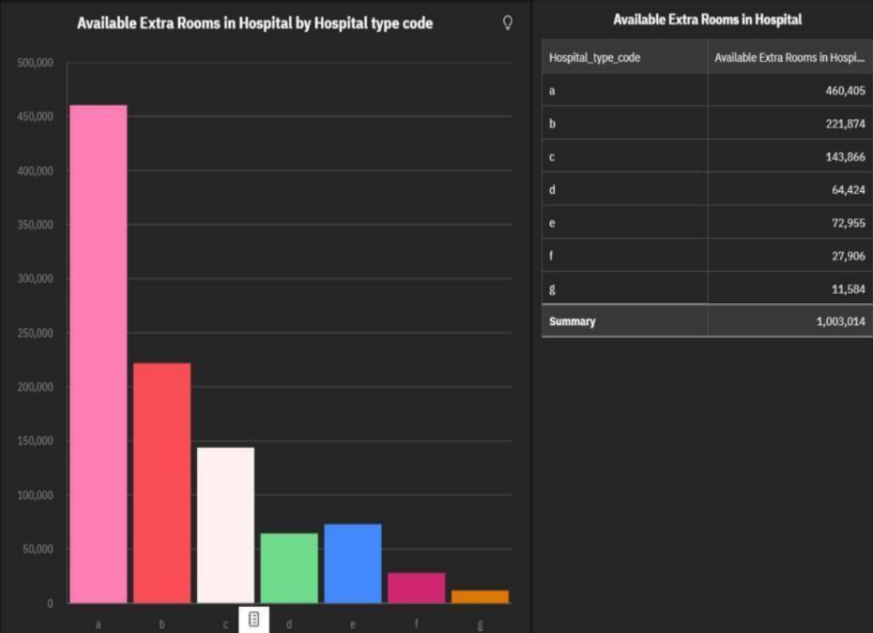


Availability of extra rooms in hospital region code and type code:



Availability of extra rooms in Hospital depending on hospital type code

- This plot can be used to get insight on the availability of beds in each hospital using hospital type code.
- From this we can see that A has the highest availability of extra beds followed by the others.



9. Advantages and Disadvantages

9.1 Advantages

→ As the internet reaches the far ends of our world, so does digital health. With a simple internet connection, anyone can access **patient health records** online without visiting the medical center. Gone are those days of securely storing all the handwritten prescriptions and test reports. With **electronic health record** apps, you can store all the relevant health data in one place without worrying about losing one.

→ Personal digital health tools like fitness bands let you know your health-related data on a real-time basis.

→ Those technological marvels constantly track your vitals and auto-dial emergency numbers in case anything wrong happens to you.

9.2 DISADVANTAGES

→ Adapting to new technologies has always been a challenge for senior citizens.

→ Adapting to new technologies has always been a challenge for senior citizens. Some of them prefer the old-school treatment methods instead of getting used to digital health facilitators.

→ If not done properly, these apps can often crash, resulting in an inconvenience.

10.CONCLUSION

This research demonstrates Analytics for hospital and health care data with data visualization and analytics. This information is gathered from a series of health information systems (HIS) and other technological tools utilized by health care professionals, insurance companies and government organizations. Consider the impact this has had on the COVID-19 pandemic. The data being collected is analyzed in real time to understand the effects of the virus better and predict future trends so we may slow the spread and prevent future outbreaks. Health care data management has the potential to lead to better care if used properly.

Healthcare analytics can be understood as the gathering and analysis of healthcare sector data with the purpose of deriving insights and prompting decision-making. Ranging from main areas like medical expenses, clinical data, patient behavior, or pharmaceuticals, healthcare data analytics can be employed at both the macro and micro level to sufficiently boost operations, enhance patient care, and curtail overall expenses.

Nevertheless this data, while being highly advantageous is also pretty complicated. Be it the data from electronic health records (EHR) or the data gained by assessing real-time vital signs, the data is not only derived from a number of varying sources, but it is also required to follow government regulations, making it a complex and precarious process.

11.FUTURE SCOPE

The data analytics market in the healthcare space has only increased over the last few years. Considering the rising costs of medical treatments globally, a proper body of knowledge was needed to reduce the costs at the business-level as well as the professional-level. McKinsey, in one of its reports, states that healthcare expenses constitute 17.6 percent of the GDP in the USA, which is approximately US\$600 billion, more than what is the set benchmark for the ideal size of population in the country. This is a serious indicator of bigger trouble. Hence, the usage of healthcare data analytics is being promoted these days.

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.