# ANALYTICS FOR HOSPITALS' HEALTH-CARE DATA

**TEAM ID**: **PNT2022TMID25381**


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# Project Report

# 1.INTRODUCTION:

## 1.1 Project Overview:

Data analytics refers to the process and practice of analysing data to answer questions, extract insights, and identify trends. This term also includes the way of how this data is gathered, cleaned and summarized for use and finally the processing of data to support data analytics and predictive modelling.

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.

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.

The goal 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.

## 1.2 PURPOSE:

There are many reasons why healthcare professionals might want to predict the length of stay of their patients. For example,if a hospital is trying to forecast how many beds will be needed in the coming days or weeks, they will need to know how long their patients are likely to stay. The purpose of predicting the length of stay of the patients is to estimate the amount of time that a patient will spend in a hospital. This information improves bed turnover, allowing hospitals to match demand with capacity for elective and emergent admissions, intensive care

unit (ICU) care, and interhospital transfers. Length of Stay(LOS) is also an important metric for quality of care, so knowing how to predict it can help healthcare professionals identify areas where they can improve.

## 2. LITERATURE SURVEY:

### 2.1 Existing Problem:

There is an error in the existing prediction of length of stay in the hospital. The error is that the length of stay is being predicted as shorter than it actually is. This approximate prediction is causing problems for patients who are planning their hospital stay and for the hospital staff who are trying to allocate resources for the patients.

### 2.2 Reference:

- Janice Hammond, 2015.
- LexisNexis, 2015.
- Title : Predicting Length of Stay Across Hospital Departments
  Author : Jesus Manuel Puentes Gutierrez.

### 2.3 Problem Statement Definition:

To understand your customer's point of view create a problem statement. The Customer Problem Statement template helps you focus on what matters to create experiences people will love.

A well-articulated customer problem statement allows you and your team to find the ideal solution for the challenges your customers face. Throughout the process, you'll also be able to empathize with your customers, which helps you better understand how they perceive your product or service.

**Customer Problem Statement for Hospitals' Health-Care data:**


| **Problem Statement (PS)** | **I am (Customer)** | **I'm trying to** | **But** | **Because** | **Which makes me feel** |
|---|---|---|---|---|---|
| PS-1 | a patient | get admitted to the hospital | there is not enough availability of beds | the number of patients is more than the bed available | anxious that I might not get cured |
| PS-2 | a nurse | Allocate resources to the patient | there is not enough available | sufficient resources have not been allocated to the hospital | scared that the patient will not get the right treatment |

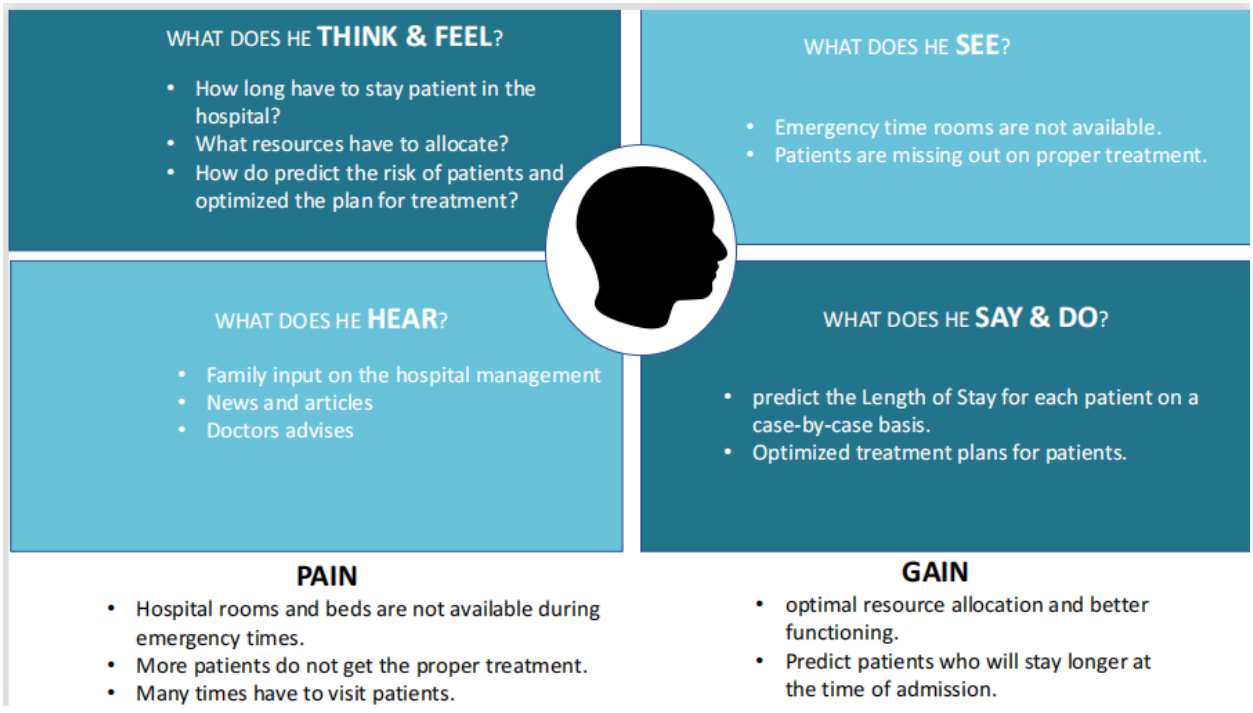
## 3. IDEATION & PROPOSED SOLUTION:

### 3.1 Empathy Map Canvas:

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviors and attitudes.It is a useful tool to helps teams better understand their users.

Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.

**Empathy map for Predicting Length of Stay (LOS):**



### 3.2 Ideation & Brainstorming:

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

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

This is used to work as a team to present the ideas of each and evry person. In the Analytics for hospitals health-care data project, this brainstorming session helped in getting different possible ideas from the point-of-view of every actor involved in the hospitals health-care system.

Template

# Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

- **10 minutes** to prepare
- **1 hour** to collaborate
- **2-8 people** recommended

## Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

10 minutes

**A Team gathering**
Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

**B Set the goal**
Think about the problem you'll be focusing on solving in the brainstorming session.

**C Learn how to use the facilitation tools**
Use the Facilitation Superpowers to run a happy and productive session.

Open article →

## 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

PROBLEM

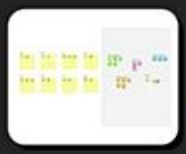
**How might we predict the Length of the Stay (LOS) for each patient ?**

### Key rules of brainstorming

To run an smooth and productive session

- Stay in topic.
- Encourage wild ideas.
- Defer judgment.
- Listen to others.
- Go for volume.
- If possible, be visual.

Share template feedback

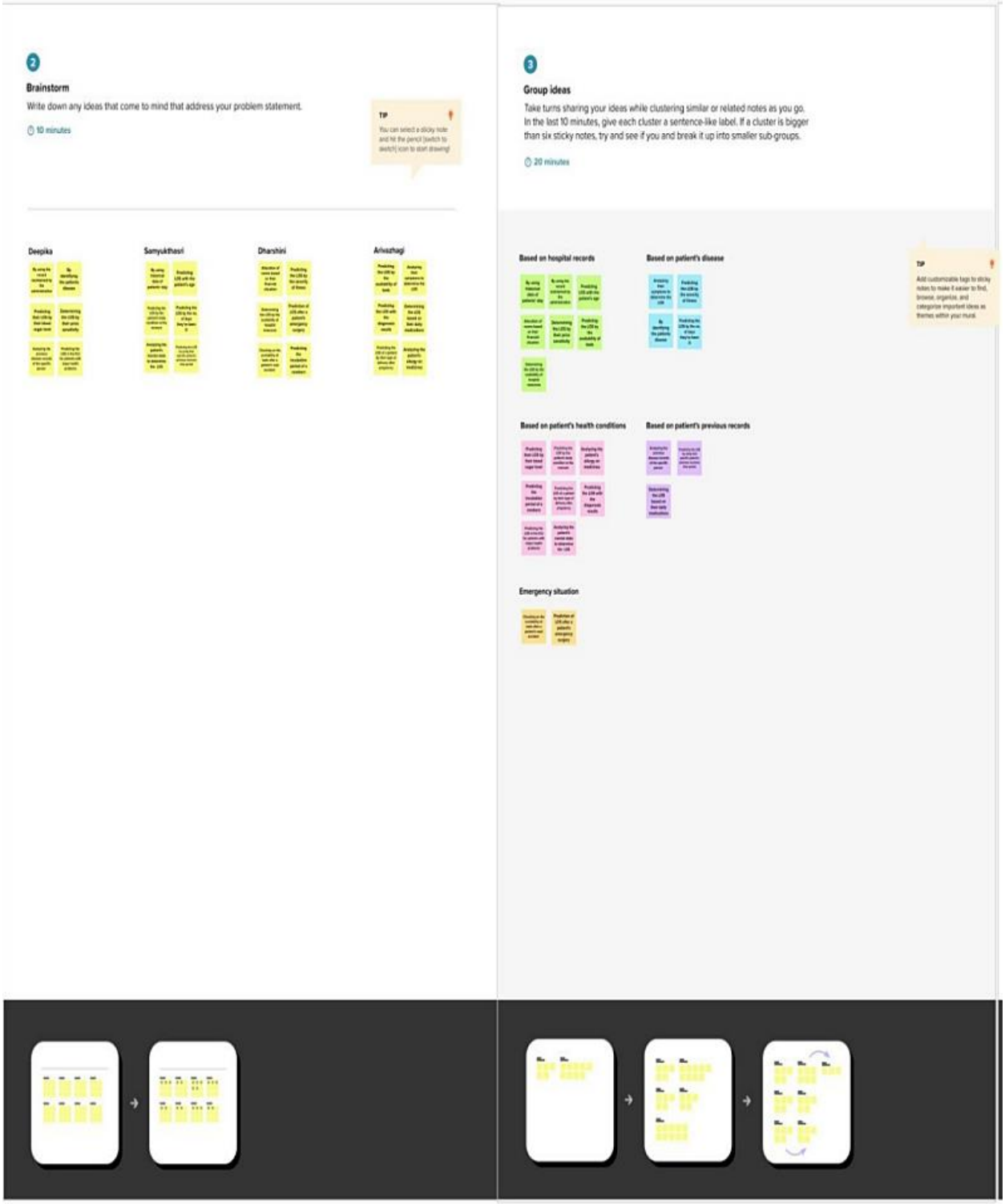


**Need some inspiration?**

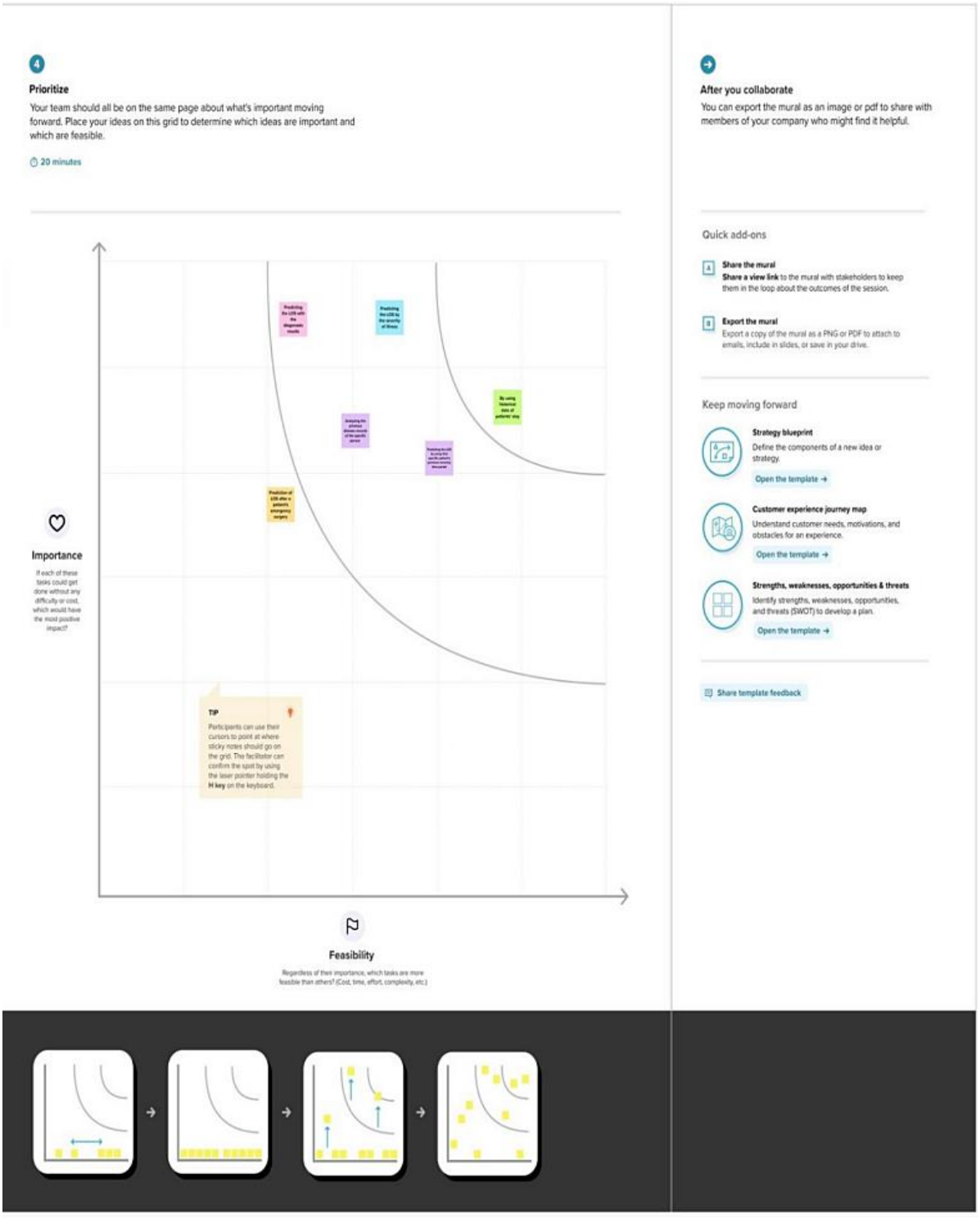
See a finished version of this template to kickstart your work.

Open example →

## Step-2: Brainstorm, Idea Listing and Grouping



# Step-3: Idea Prioritization

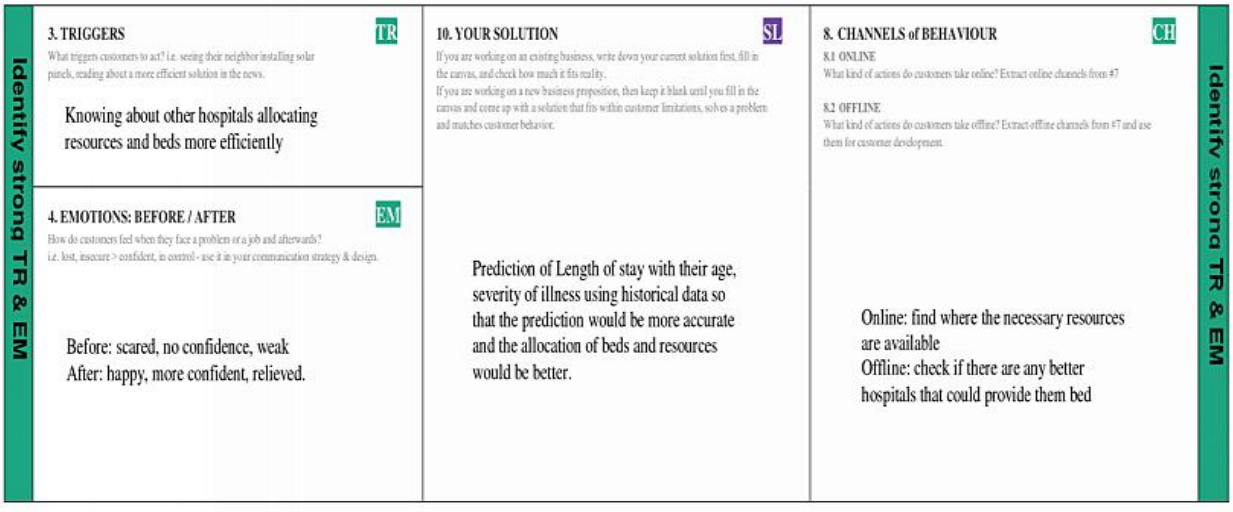


### 3.3 Proposed Solution

| S. No. | Parameter | Description |
|---|---|---|
| 1. | Problem Statement<br><br>(Problem to be solved) | To predict the Length of Stay (LOS) for each patient for the allocation of beds and resources. |
| 2. | Idea / Solution description | Predicting the Length of stay by the patients' severity of illness, Age and allocating the beds and resources by using Data visualization tools. |
| 3. | Novelty / Uniqueness | The traditional method's way of allocation of beds and resources by prediction of LOS are approximate and it might lead to insufficient resources. By our proposed solution with analysis of historical data we could predict a more accurate LOS. |
| 4. | Social Impact / Customer<br><br>Satisfaction | The prediction of a more accurate Length of Stay will result in the allocation of sufficient beds and resources for each patient that helps in their recovery. |

| | | |
|---|---|---|
| 5. | Business Model (Revenue Model) | The right Length of Stay prediction could help in allocation of only enough beds and resources and not more than enough. This would lessen the money both the hospital and the patient spent. |
| 6. | Scalability of the Solution | This advanced prediction method instead of the traditional methods makes the Hospital function better by more accurate allocation of beds and resources because it uses the historical data to analyse using visualization tools. |

## 3.4 Problem Solution fit:


# 4.REQUIREMENT ANALYSIS:

## 4.1 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 Gmail |
| FR-2 | User Confirmation | Confirmation via gmail |
| FR-3 | User Login | Login through Gmail |
| FR-4 | Uploading the data | Uploading into the IBM Cognos analytics |
| FR-5 | Preparing the data | Data module creation |
| FR-6 | Exploring the data | Performing predictive analysis |
| FR-7 | Visualizing the data | Creating dashboards |

### 4.2 Non-functional Requirements:

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

| FR No. | Non-Functional Requirement | Description |
|---|---|---|
| NFR-1 | **Usability** | The Dashboards are created using cognos analytics to display the results of predictive analysis on a patient's LOS that could be used for easy understanding. |
| NFR-2 | **Security** | The application helps in preventing unauthorized access. |
| NFR-3 | **Reliability** | The results will be reliable to the users and always consistent. |

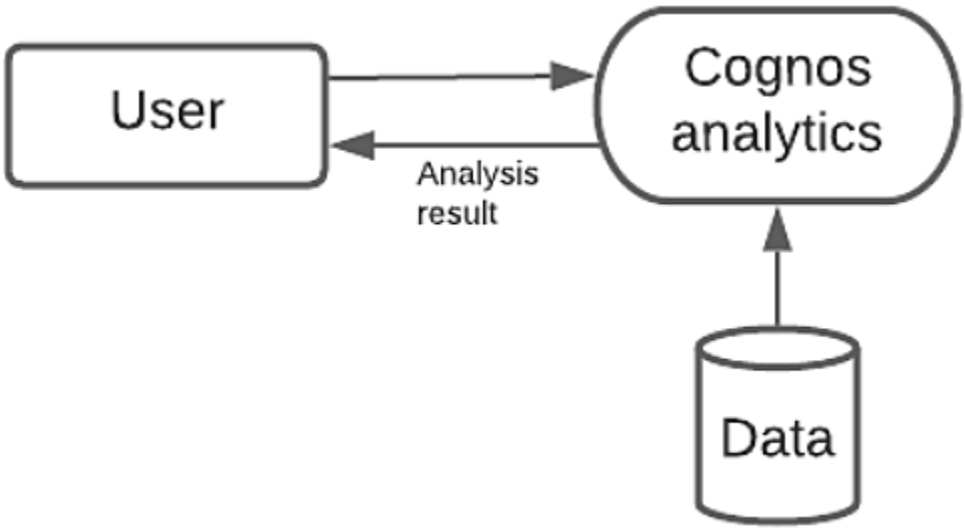
| | | |
|---|---|---|
| NFR-4 | **Performance** | The analysis results are fast to get. Visualizations are made in less time usually seconds |
| NFR-5 | **Availability** | The dashboards can be available always when there is a demand |
| NFR-6 | **Scalability** | The application can perform analysis and create visualizations on any patient's data. |

## 5. PROJECT DESIGN:

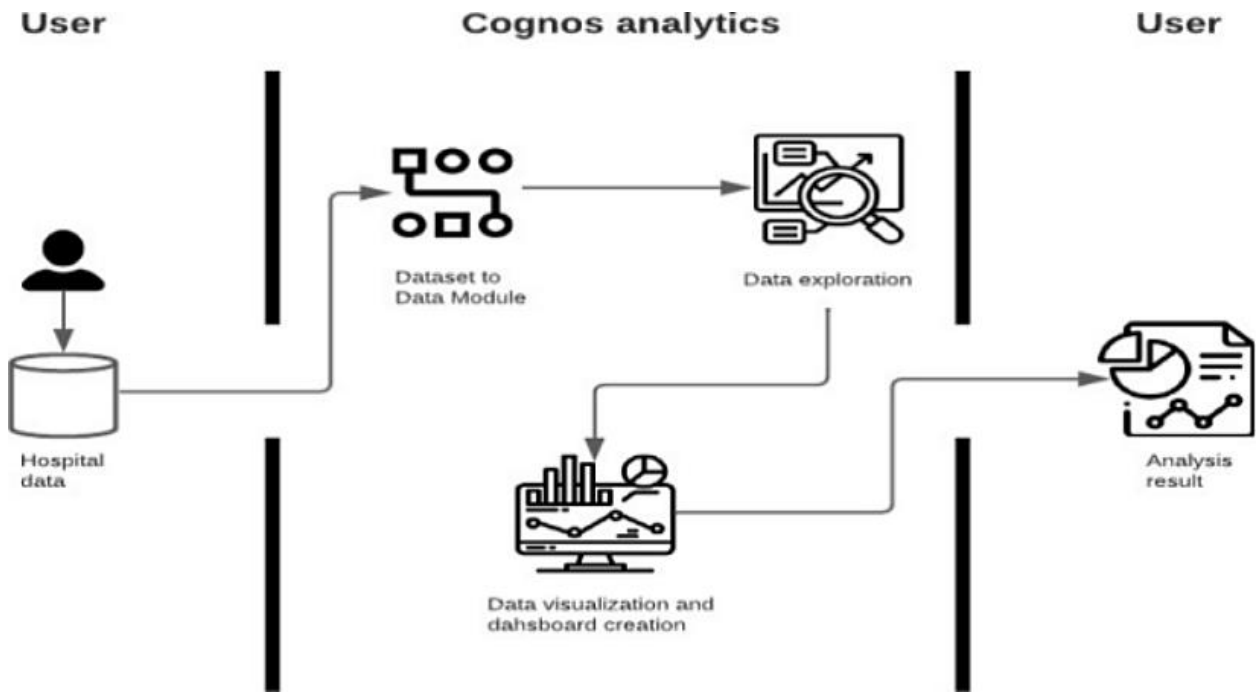
### 5.1 Data Flow Diagrams:

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.

**Data flow diagram level 0:**




### 5.2 Solution & Technical Architecture:




### 5.3 User Stories:

The below template list all the user stories for the product.

| User Type | Functional Requirement(Epic) | User Story Number | User Story / Task | Acceptance criteria | Priority | Release |
|---|---|---|---|---|---|---|
| User (Data analyst) | Registration | USN-1 | As a user, I can register for the Cognos analytics account by entering my gmail, password, and confirming my password. | I can access my account / dashboard | High | Sprint-1 |
| | | USN-2 | As a user, I will receive | I can receive confirmation email & | High | Sprint-1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | confirmation gmail once I have registered for the application | click confirm | | |
| | Login | USN-3 | As a user, I can log into the application by entering gmail & password | I can receive confirmation gmail & click confirm | High | Sprint-1 |
| | Application dashboard | USN-4 | Uploading the data through the quick launch | The data gets uploaded | High | Sprint-1 |
| | | USN-5 | Uploading the data through the hamburger menu | The data gets uploaded | High | Sprint-1 |
| | | USN-6 | Preparing the data by creating a data module | The data gets cleaned. | High | Sprint-2 |
| | | USN-7 | Exploration of data for the prediction of LOS<br>Data visualizationw ith the creation ofdashboards | The data is analysed | High | Sprint-3 |
| | | USN-8 | | The data is presented | High | Sprint -4 |

## 6.PROJECT PLANNING & SCHEDULING:

### 6.1 Sprint Planning & Estimation:

The below template shows the Sprint Planning & Estimation:

| 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 cognos analytics application by entering my email, password, and confirming my password. | 10 | High | Rohini<br>Neena<br>Shamna<br>Siva sankari |
| Sprint-1 | Data uploading | USN-2 | As a user, I will be uploading my data into the cognos analytics | 10 | High | Rohini<br>Siva sankari<br>Shamna<br>Sowndharya |
| Sprint-2 | Data preparation | USN-3 | As a user, I will be cleaning the data for analysis and creating a data module | 5 | High | Shamna<br>Neena |
| Sprint-2 | Data Analysis | USN-4 | As a user, I will be performing analysis on the data for making predictions | 5 | High | Rohini<br>Siva sankari |
| Sprint-2 | Dashboards | USN-5 | As a user, I will be making visualizations and interactive dashboards from the data | 10 | High | Neena<br>Sowndharya |
| Sprint-3 | Story | USN-6 | As a user, I will be making stories from the data and the dashboards | 20 | High | Shamna<br>Siva sankari |

| | | | | | | |
|---|---|---|---|---|---|---|
| Sprint-4 | Report | USN-7 | As a user, I will be making a report from the analysis and dashboards | 20 | High | Siva sankari Rohini |

### 6.2 Sprint Delivery schedule:

| 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:**

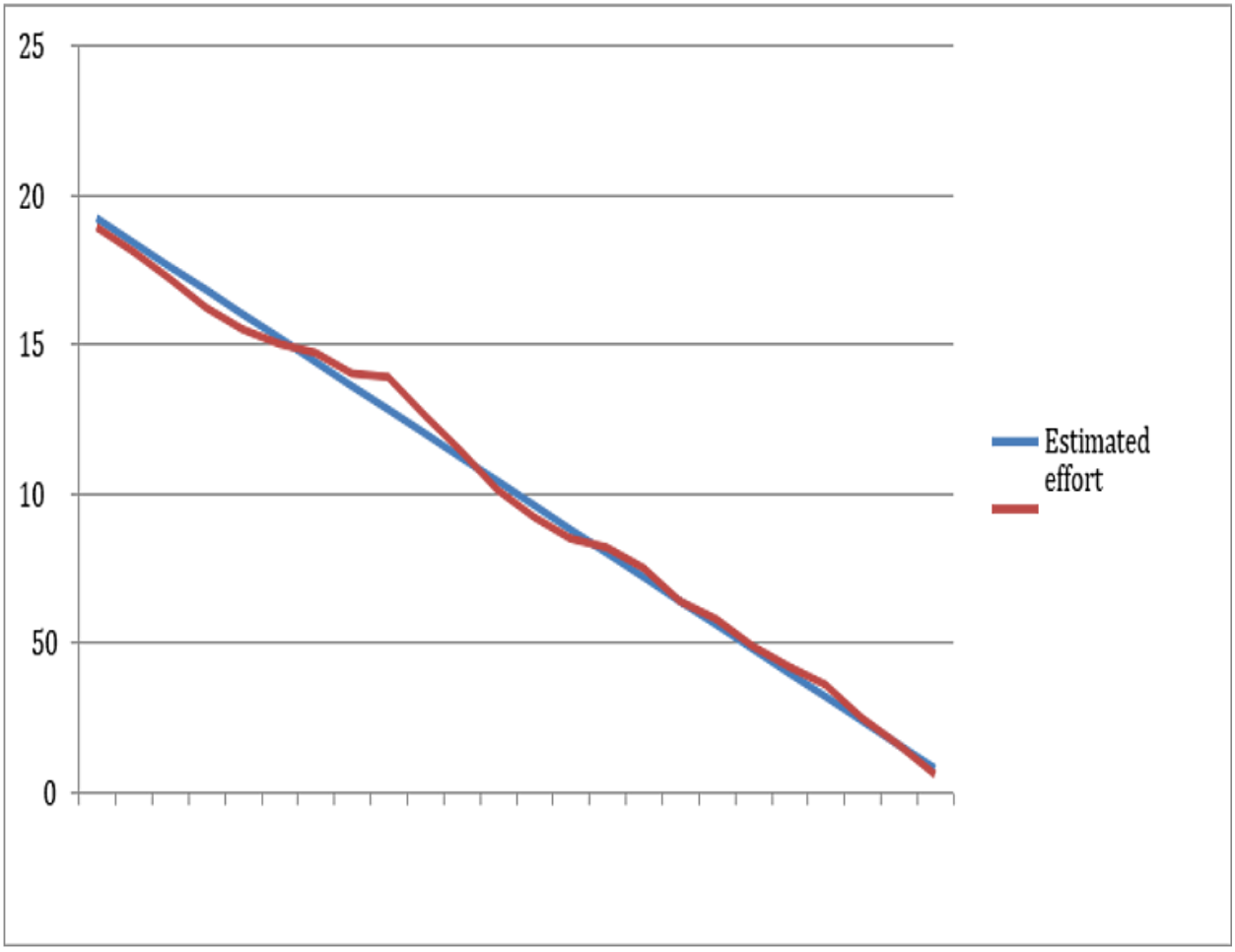
Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day).

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

## 6.3 Reports from JIRA:

### Burndown Chart:

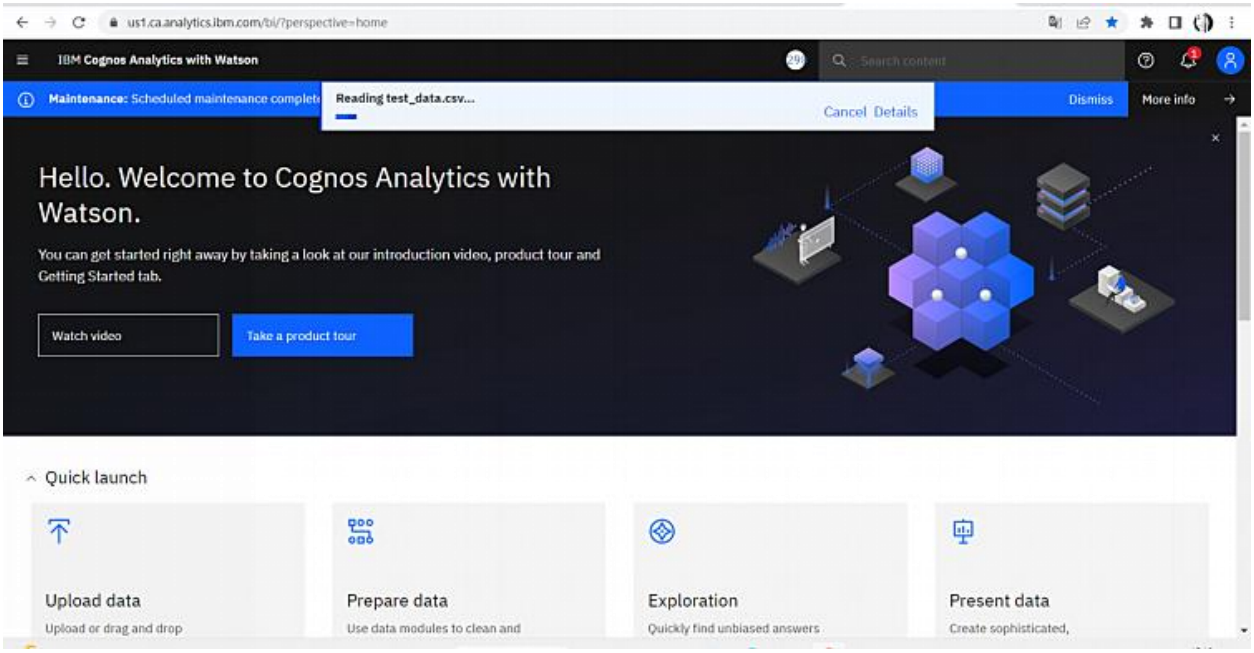
A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.

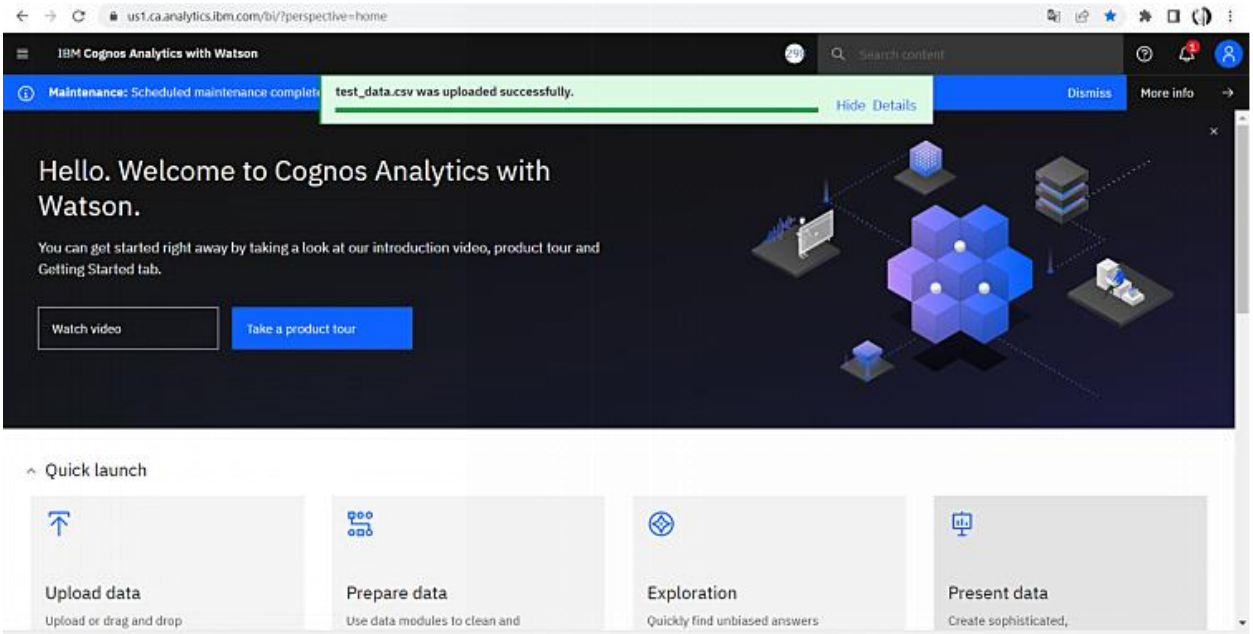


# 7. CODING & SOLUTIONING:

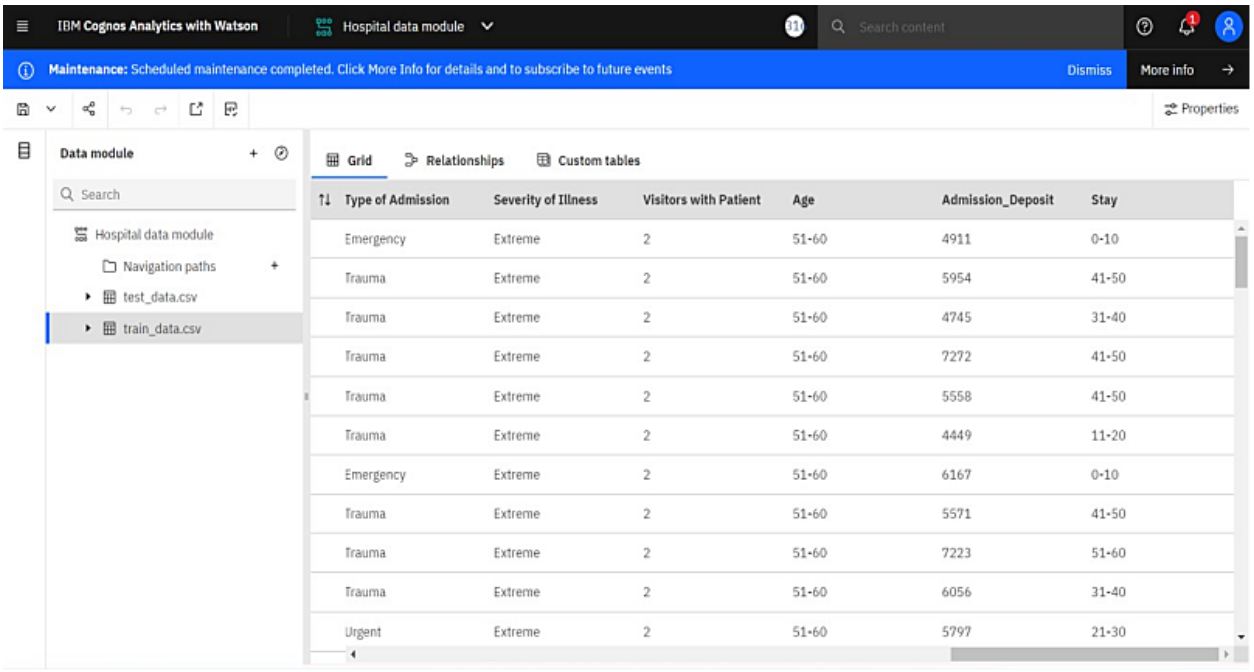
## 7.1 Feature 1:

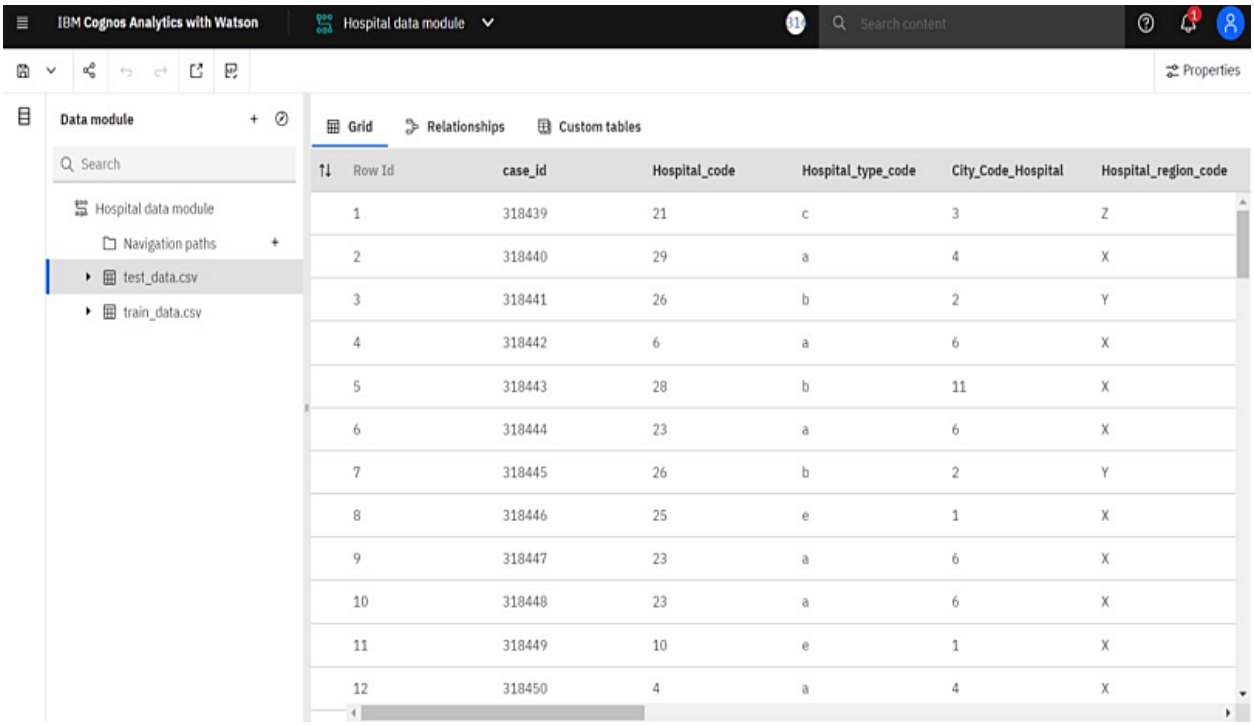
- Uploading the data in the IBM cognos analytics.



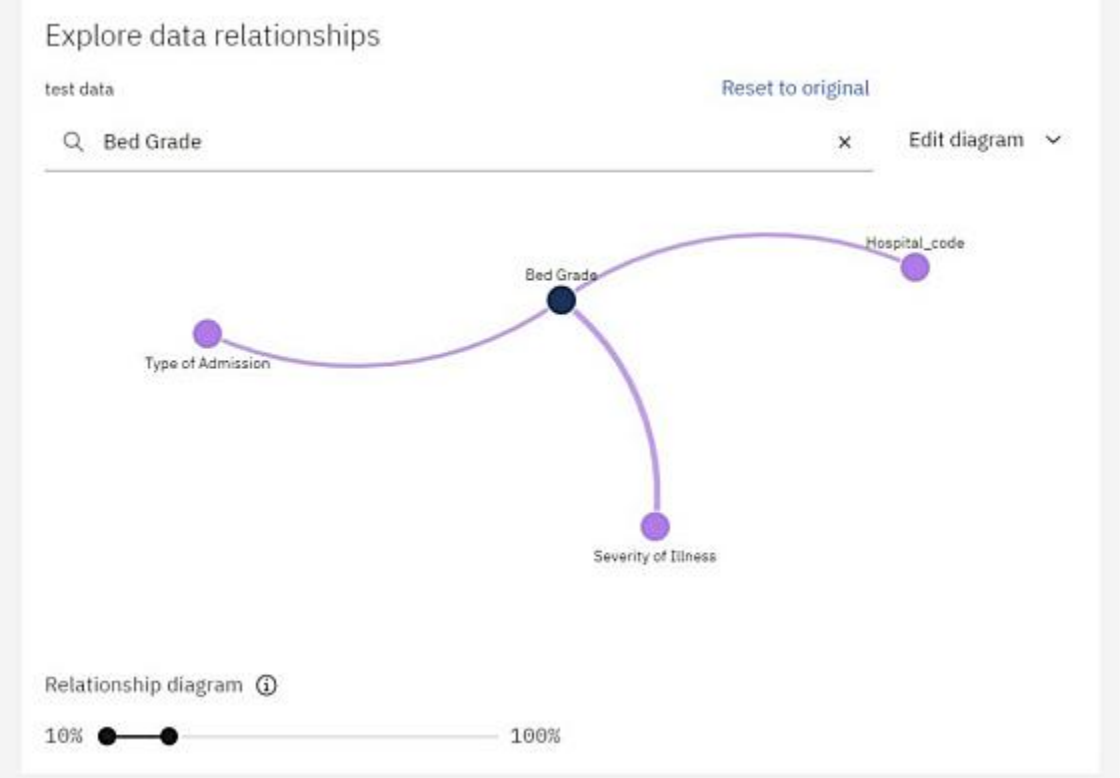



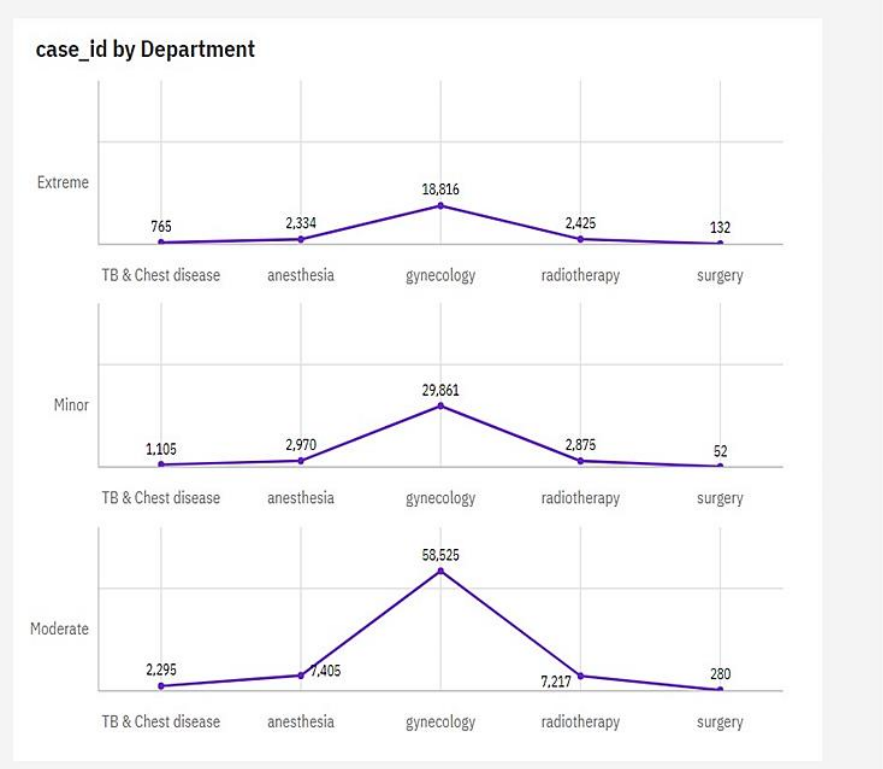
- *Creating the data module.*



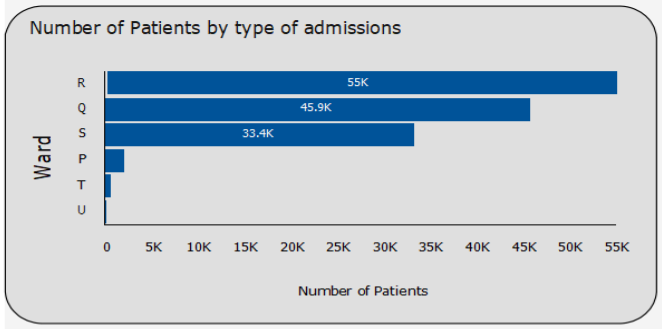
- Exploring the data by using data module.

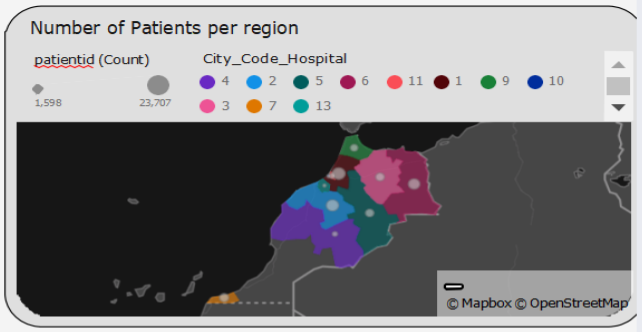


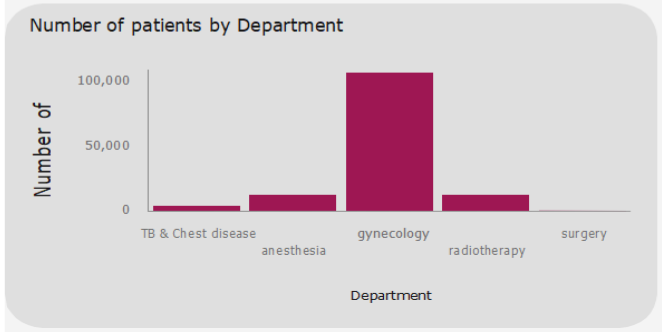


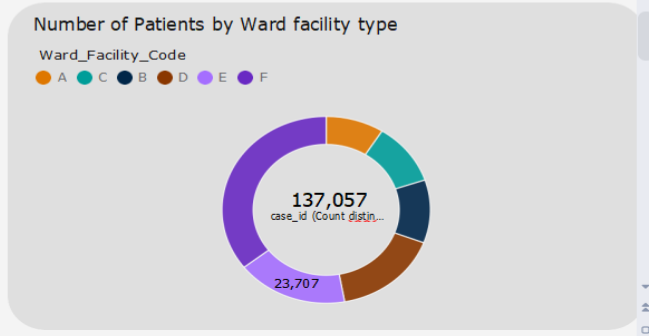

- Creation of interactive dashboards.

Dashboard to show Number of Patients

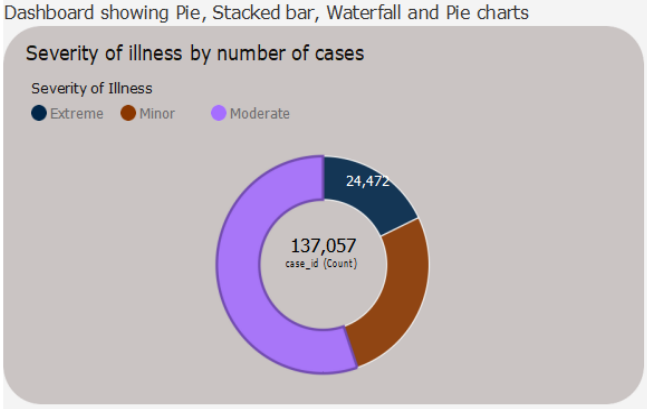


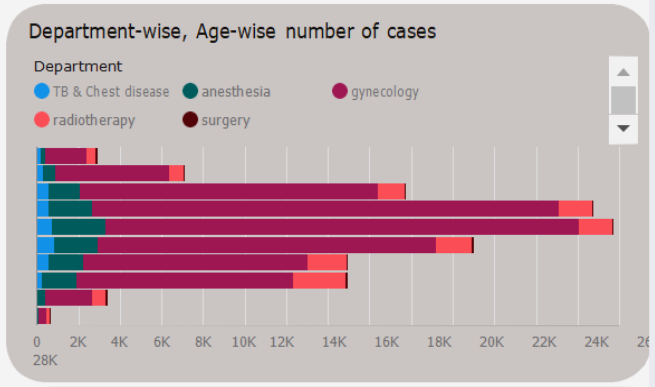



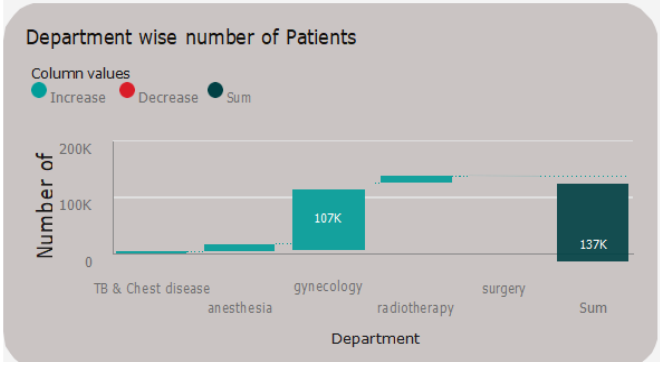



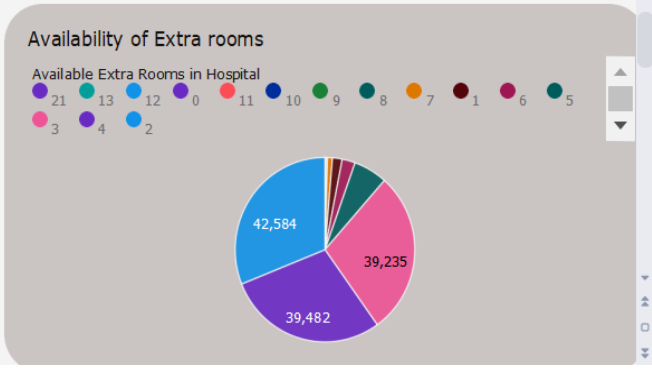




Dashboard showing Pie, Stacked bar, Waterfall and Pie charts



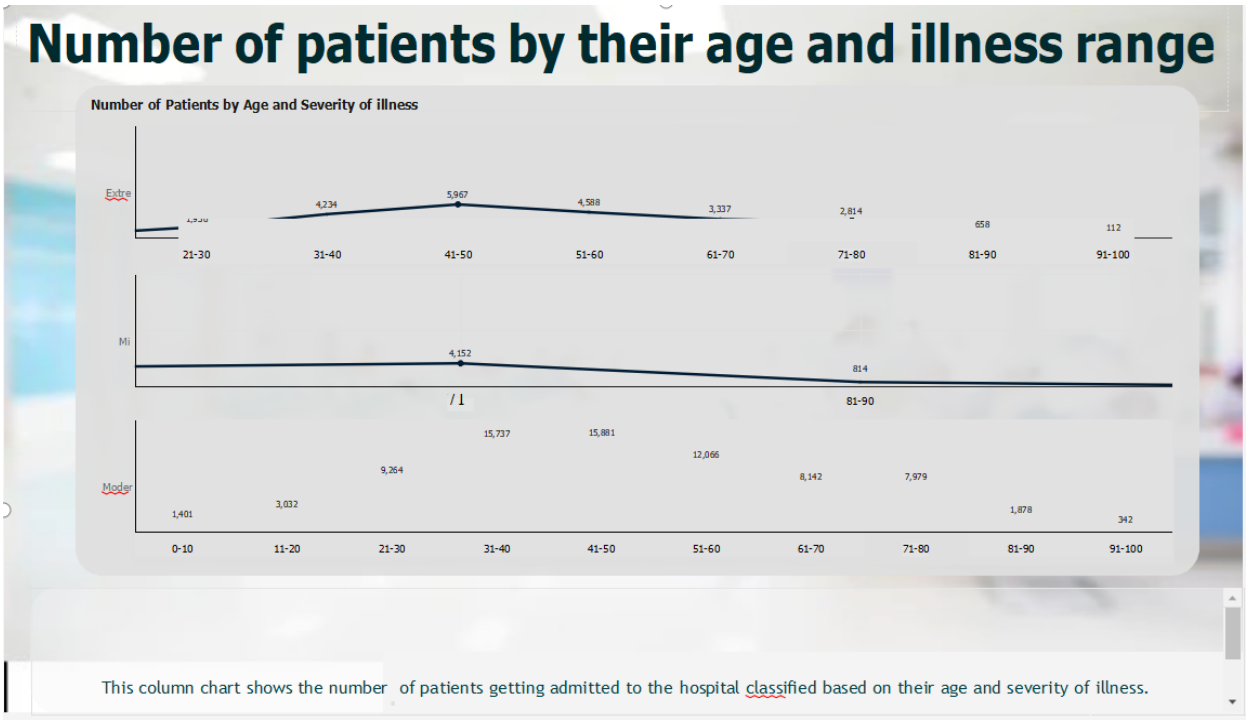



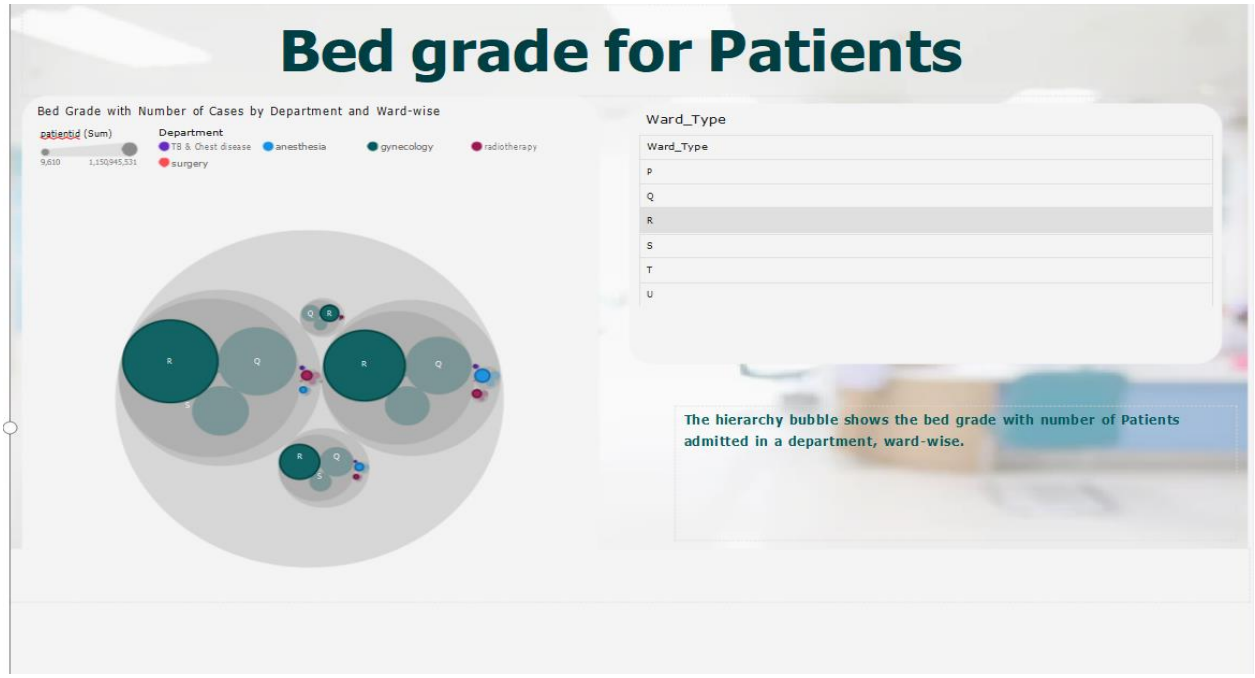



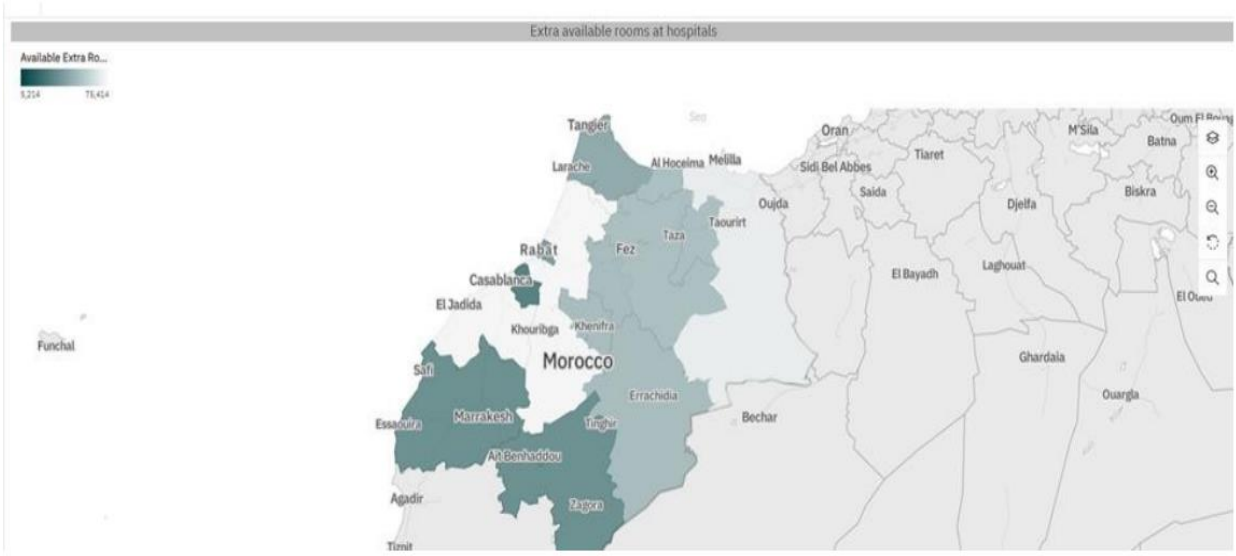
## 7.2 Feature 2:

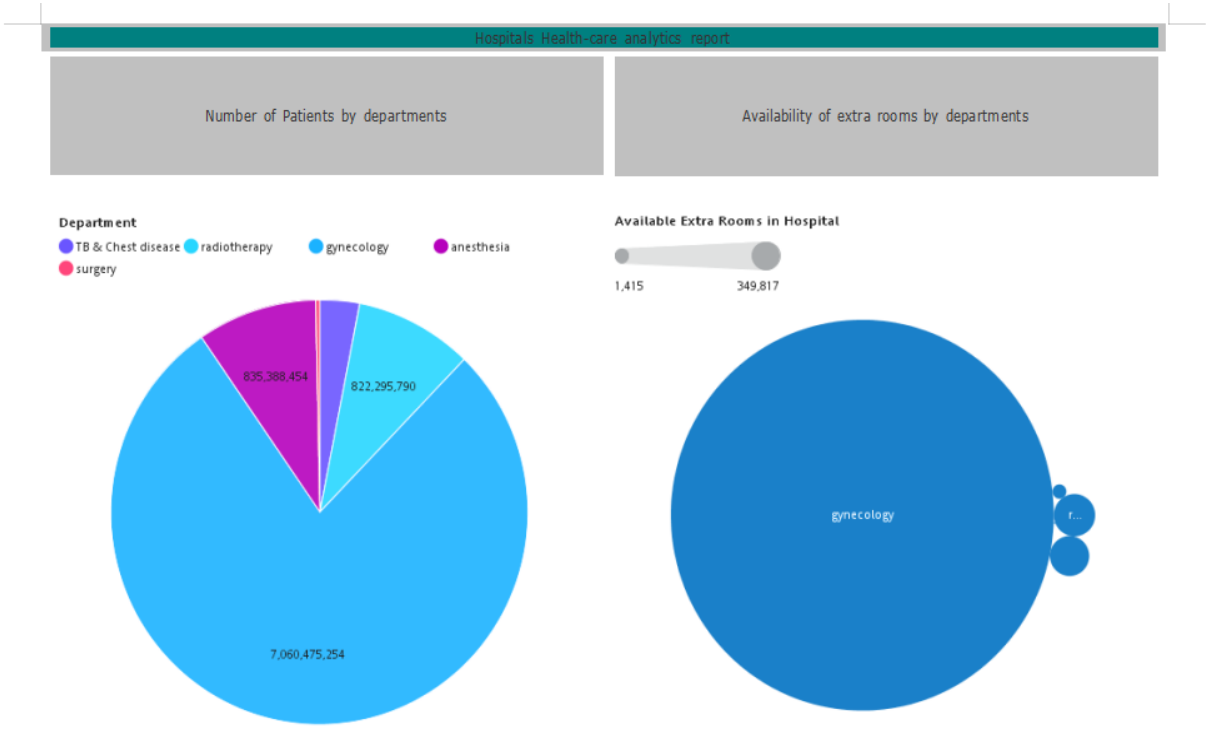
- To present the analytics and visualization results by creating a story.



- To submit the results of analytics and visualization create a report.



### 7.3 Database Schema:

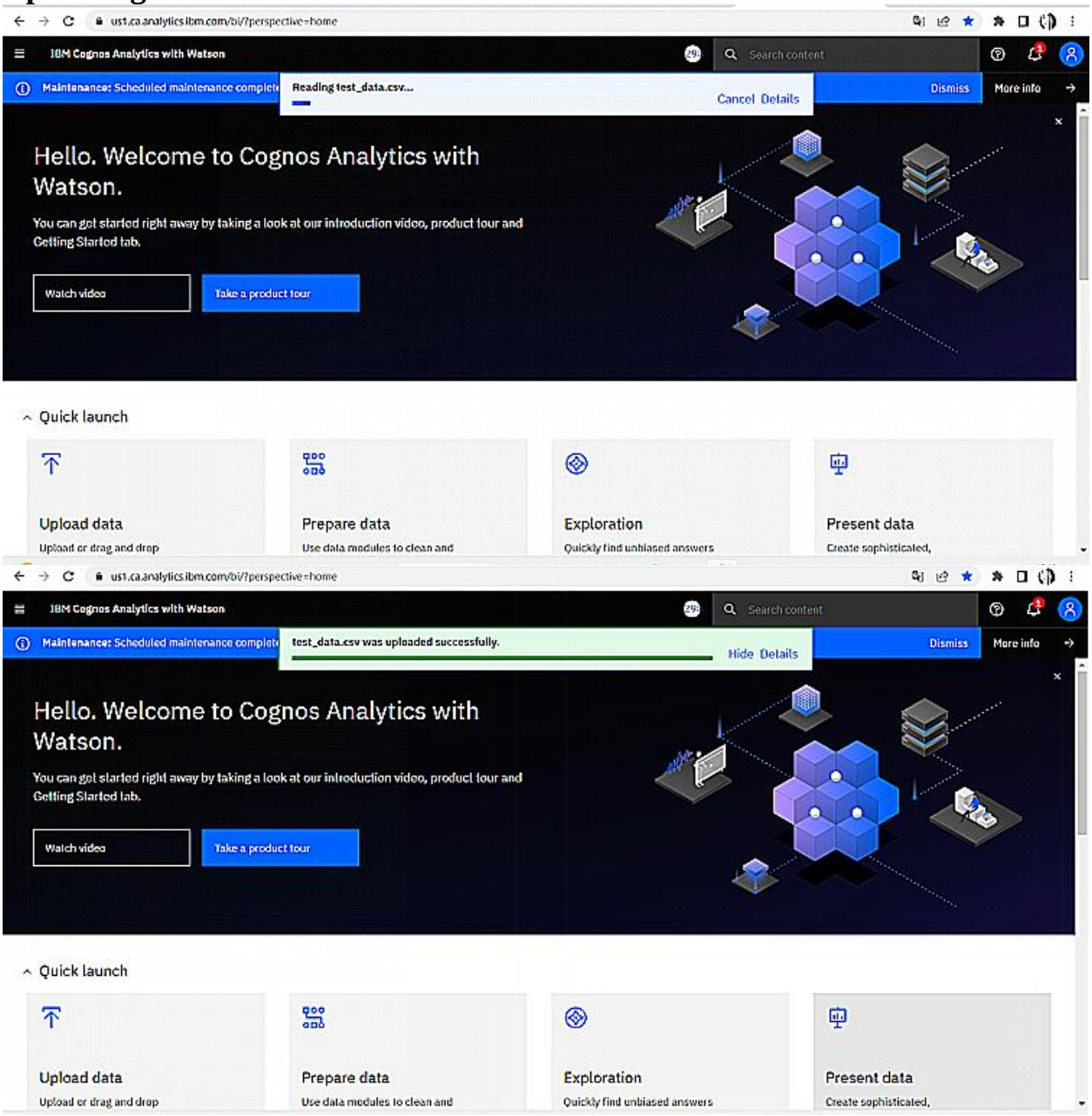
- case_id
- Hospital_code
- Hospital_type_ code
- City_Code_Hospital
- Hospital_region_code
- Available Extra Rooms in Hospital
- Department
- Ward_Type
- Ward_Facility_Code
- Bed Grade
- patientid
- City_Code_Patient
- Type of Admission
- Severity of Illness
- Visitors with Patient
- Age
- Admission_Deposit
- Stay

## 8. TESTING:

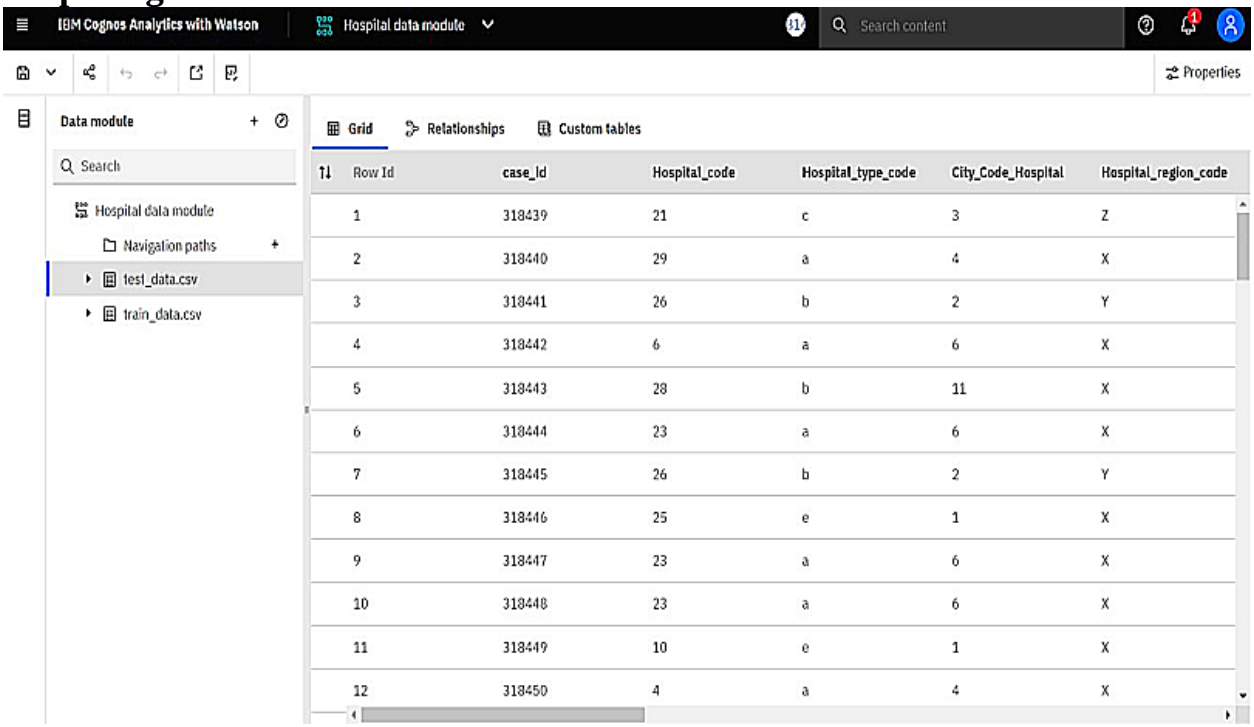
### 8.1 Test Cases:

- Verify user is able to upload the data
- Verify user is able to prepare the data by creating a data module
- Verify user is able to explore the data
- Verify user is able to make dashboards
- Verify user is able to create a story
- Verify user is able to create a report

## Uploading the dataset:



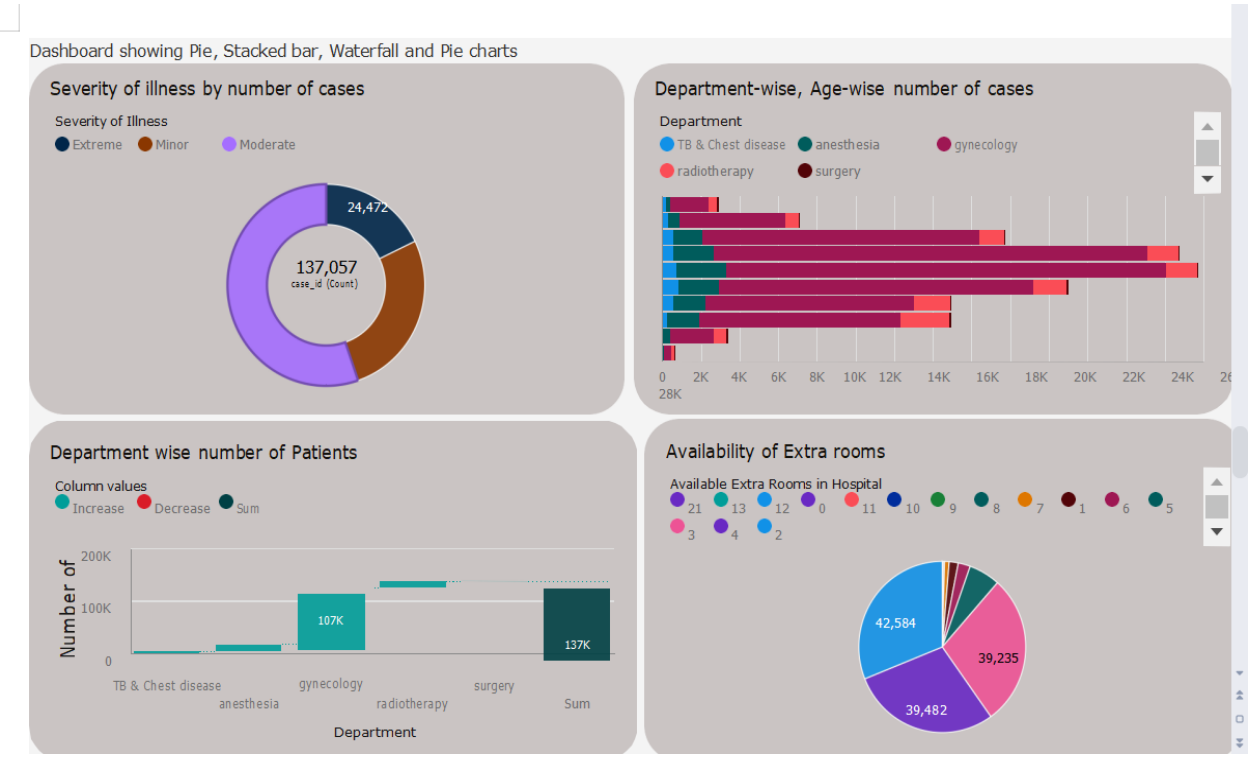
## Preparing the data:



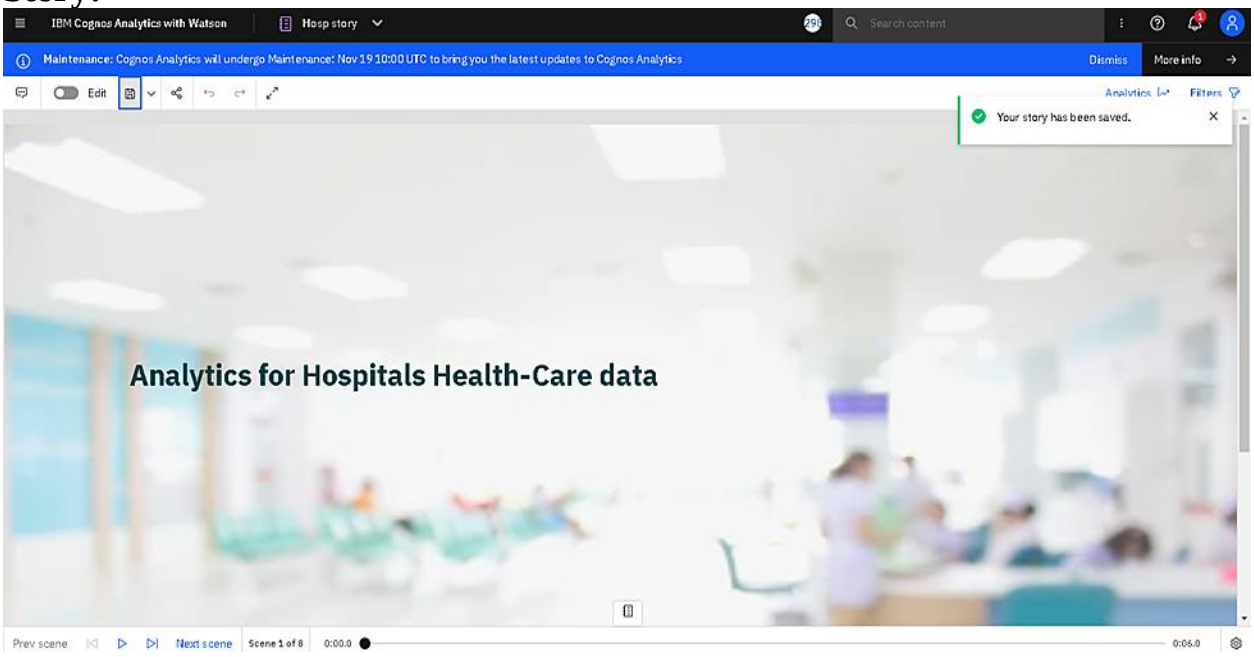

## Exploration of data:


case_id by Department
Extreme
765
2,334
18,816
2,425
132
TB & Chest disease
anesthesia
gynecology
radiotherapy
surgery
Minor
1,105
2,970
29,861
2,875
52
Moderate
2,295
7,405
58,525
7,217
280
Fields
x-axis*
Required field
Department
Click or drag data here
Color
Click or drag data here
y-axis*
Required field
case_id
Click or drag data here
Repeat (column)
Click or drag data here

# Dashboard:


Dashboard showing Pie, Stacked bar, Waterfall and Pie charts
Severity of illness by number of cases
Severity of Illness
Extreme
Minor
Moderate
24,472
137,057
case_id (Count)
Department-wise, Age-wise number of cases
Department
TB & Chest disease
anesthesia
gynecology
radiotherapy
surgery
0
2K
4K
6K
8K
10K
12K
14K
16K
18K
20K
22K
24K
28K
Department wise number of Patients
Column values
Increase
Decrease
Sum
Number of
200K
100K
0
107K
137K
TB & Chest disease
anesthesia
gynecology
radiotherapy
surgery
Sum
Department
Availability of Extra rooms
Available Extra Rooms in Hospital
21
13
12
0
11
10
9
8
7
1
6
5
3
4
2
42,584
39,235
39,482

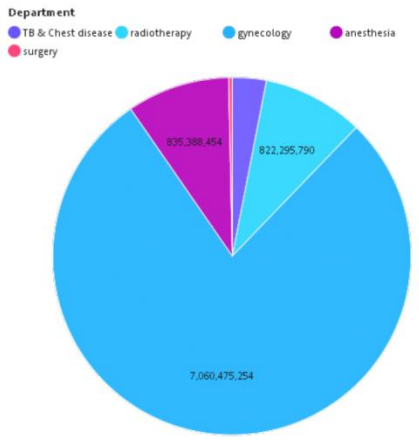
## Story:



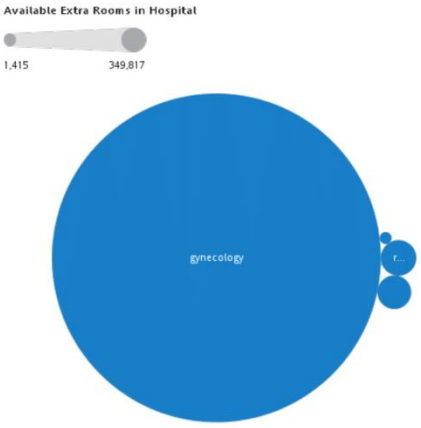

## Report (Run as PDF) :

# Hospitals Health-care analytics report

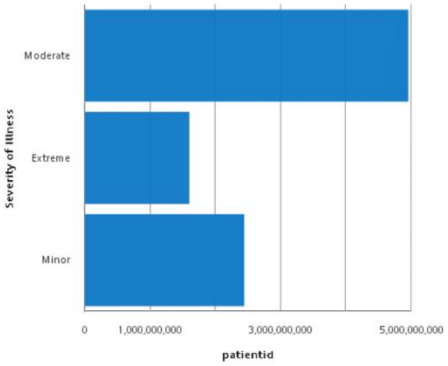
## Number of Patients by departments



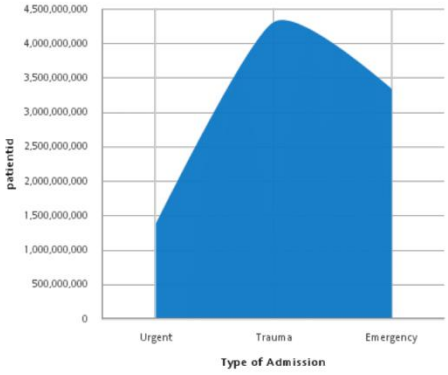

## Availability of extra rooms by departments




## Number of patients by Severity of illness




## Number of patients by type of admission



## 8.2 User Acceptance Testing:

### Purpose of Document:

The purpose of this document is to briefly explain the test coverage and open issuesof the Analysis of the hospitals health-care data project at the time of the release to User Acceptance Testing (UAT).

### Defect Analysis:

This reportshows the numberof resolved or closed bugs at each severity level, and how they were resolved

| Resolution | Severity 1 | Severity 2 | Severity 3 | Severity 4 | Subtotal |
|---|---|---|---|---|---|
| By Design | 1 | 1 | 1 | 0 | 3 |
| Duplicate | 0 | 0 | 0 | 0 | 0 |
| External | 1 | 1 | 0 | 0 | 2 |
| Fixed | 1 | 0 | 0 | 0 | 1 |
| Not Reproduced | 0 | 0 | 0 | 0 | 0 |
| Skipped | 1 | 1 | 1 | 1 | 4 |
| Won't Fix | 0 | 0 | 0 | 0 | 0 |
| Totals | 4 | 3 | 2 | 1 | 0 |

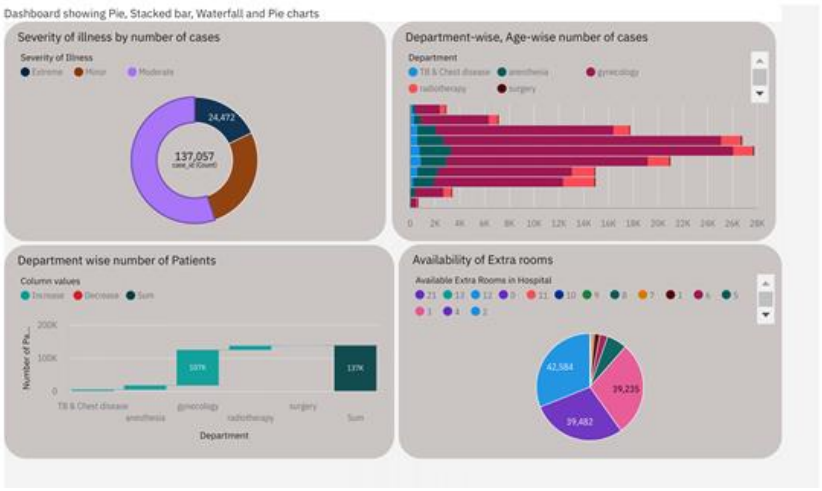
### Test Case Analysis:

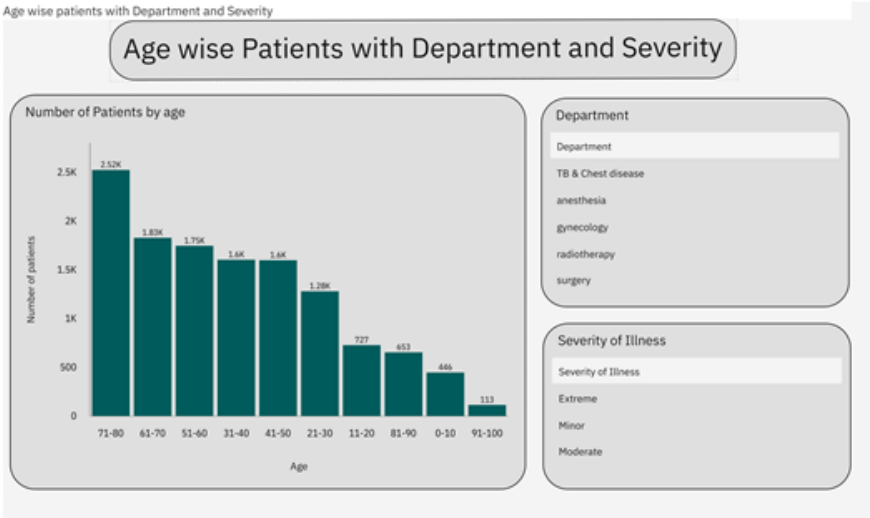
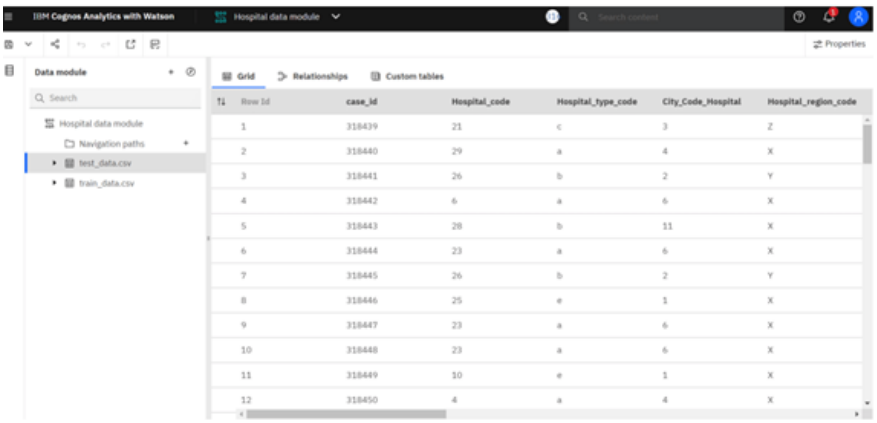
This report shows the number of test cases that have passed, failed, and untested

| Section | Total Cases | Not Tested | Fail | Pass |
|---|---|---|---|---|
| Uploading the data | 5 | 0 | 0 | 5 |
| Preparing the data | 5 | 0 | 0 | 5 |
| Exploring the data | 5 | 0 | 0 | 5 |
| Dashboard creation | 7 | 0 | 0 | 7 |
| Creating a story | 7 | 0 | 0 | 7 |
| Creating a report | 4 | 0 | 0 | 4 |

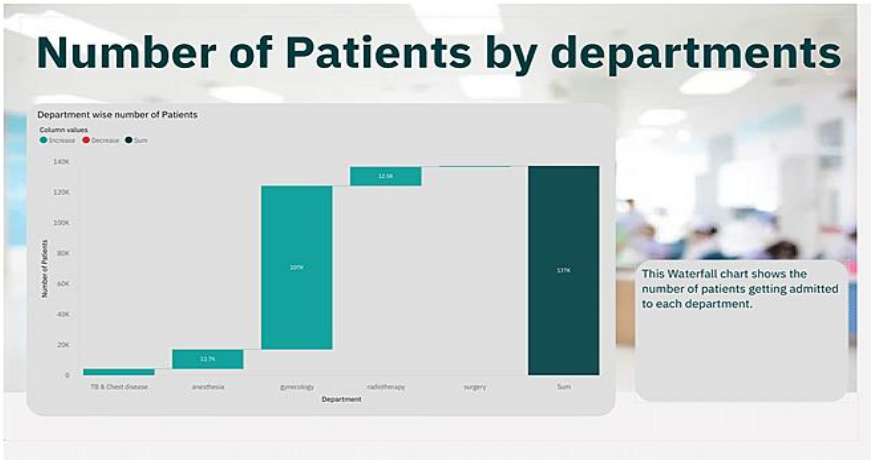
## 9.RESULTS:

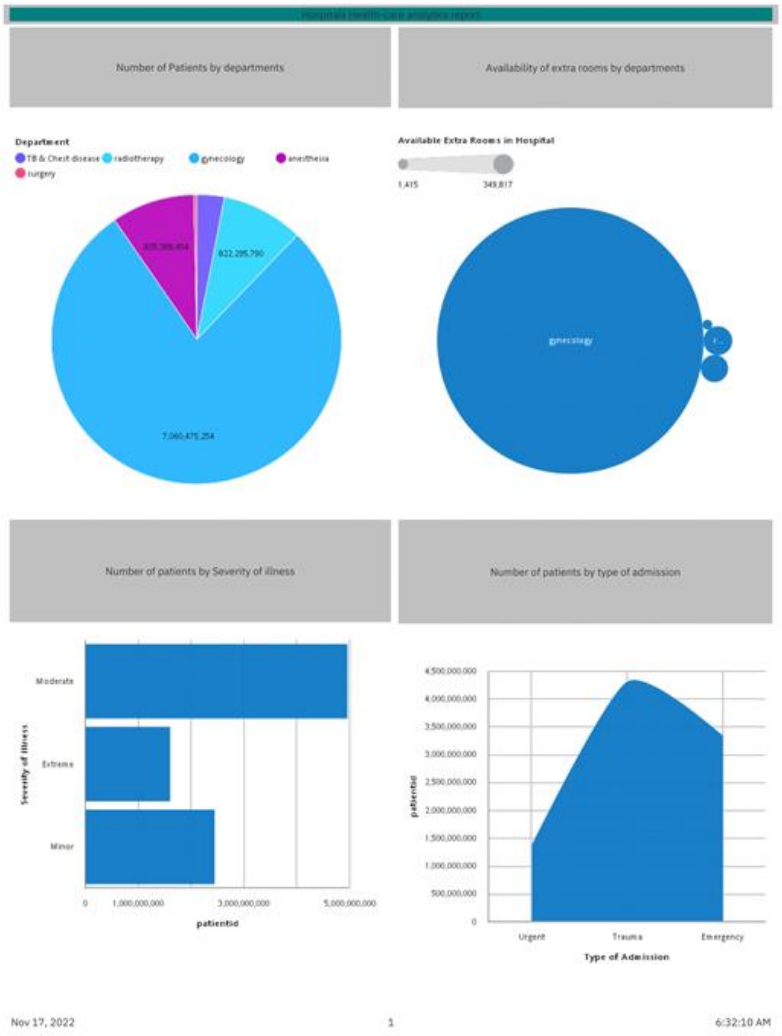
### 9.1 Performance Matrics:

| S.No. | Parameter | Screenshot / Values |
|---|---|---|
| 1. | Dashboard design | No of Visualizations / Graphs – Fourteen visualizations were created using Cognos Analytics   |
| 2. | Data Responsiveness | The visualizations can be created from the data in a fast and easy manner. |

| | | |
|---|---|---|
| | |  |
| 3. | Amount Data to Rendered (DB2 Metrics) | A data set with 137508 rows and 17 columns is used to analyze and create visualizations and dashboards.<br>  |
| 4. | Utilization of Data Filters | Data filtering options were used while analyzing the data and making visualizations. |
| 5. | Effecive User Story | No of Scene Added – Eight scenes were added to the story to present the visualizations. |


Analytics for Hospitals Health-Care data
x: 6.7 % y: 7.3 %
by Deepika G.
Samyukthasri R.M.
Arivazhagi R.
Dharshini J.


Number of Patients by departments
Department wise number of Patients
Column values
Increase
Decrease
Sum
140K
120K
100K
80K
60K
40K
20K
0
Number of Patients
12.7K
100K
12.5K
137K
TB & Chest disease
anesthesia
gynecology
radiotherapy
surgery
Sum
Department
This Waterfall chart shows the number of patients getting admitted to each department.

| | | |
|---|---|---|
| 6. | Descriptive Reports | No of Visualizations / Graphs – Five visualizations are added to the report.   |

## 10.ADVANTAGES & DISADVANTAGES:

### Advantages:

- Allows for better resource planning.
- Can help identify patients at-risk.
- Allows for earlier interventions .
- Reduces the hospital expenditures.
- No excess usage of resources from hosptitals.

### Disadvantage:

- The result might be less accurate sometimes.
- It may lead to over or under-treatment.

## 11.CONCLUSION:

This project shows that reductions in hospital costs and an improvement in quality patient care are possible. We prove that estimating the length of stay is possible at the hospital level. This means that it is possible to assess which departments are a better choice to save costs. The improvement in the success rates when predicting the LOS in some hospital departments is interesting.This helps avoid unnecessary effort and provides a contextualised vision to hospitals about which departments are susceptible to cost and resource-saving options.Also, it would be interesting to analyse the length of stay after suffering a big pandemic as COVID-19 to check how it affects to this feature (LOS) and to find out how this fact affects to hospital departments.

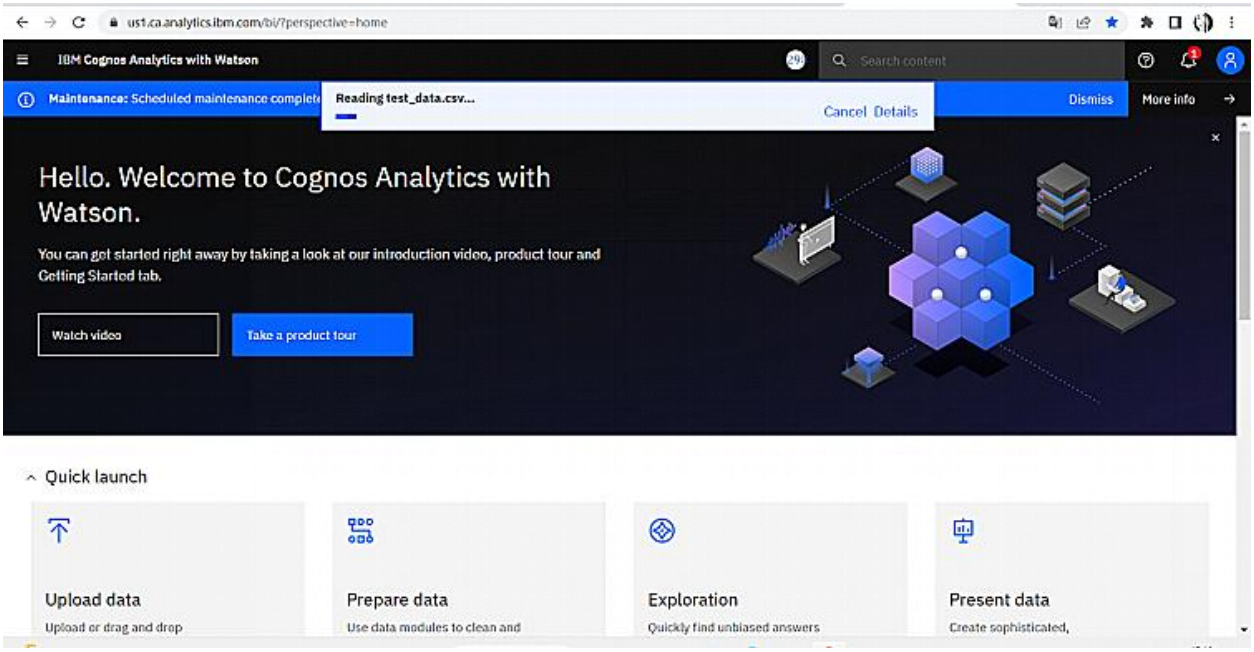
## 12.FUTURE SCOPE:

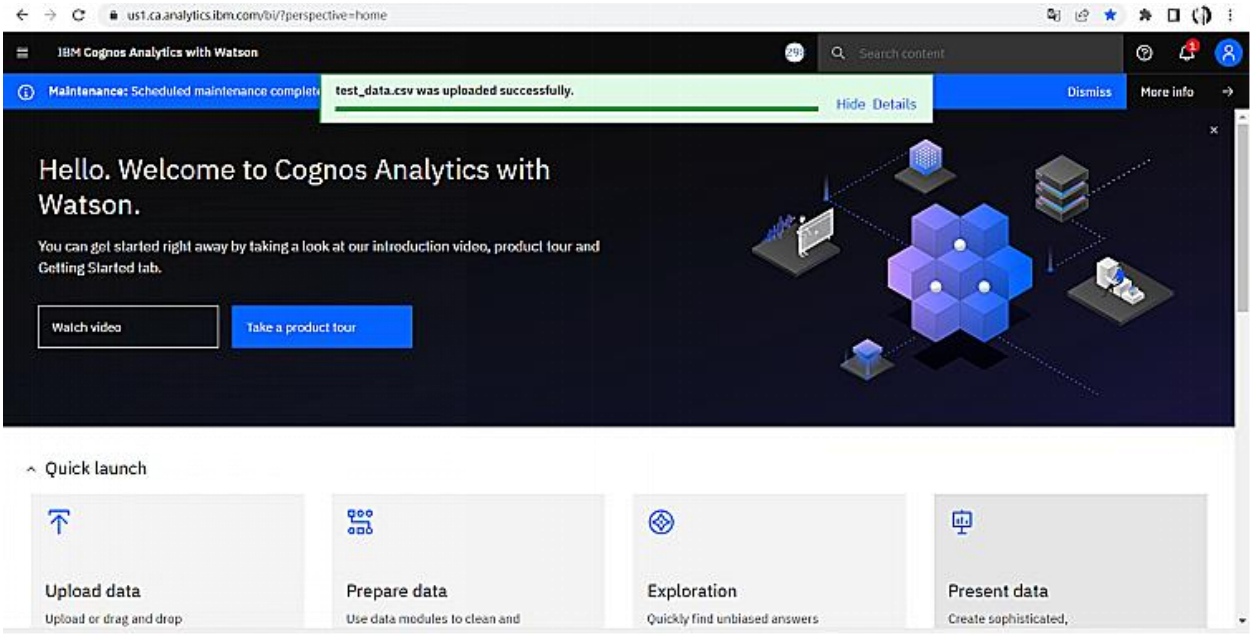
The future scope of data analytics is very promising. With the advent of new technologies and the increasing demand for data-driven decision making, organization will require more sophisticated data analytics tools and techniques.Our analysis also offers directions to future research in those hospital departments which are the most appropriate ones to predict LOS.

# 13.APPENDIX:

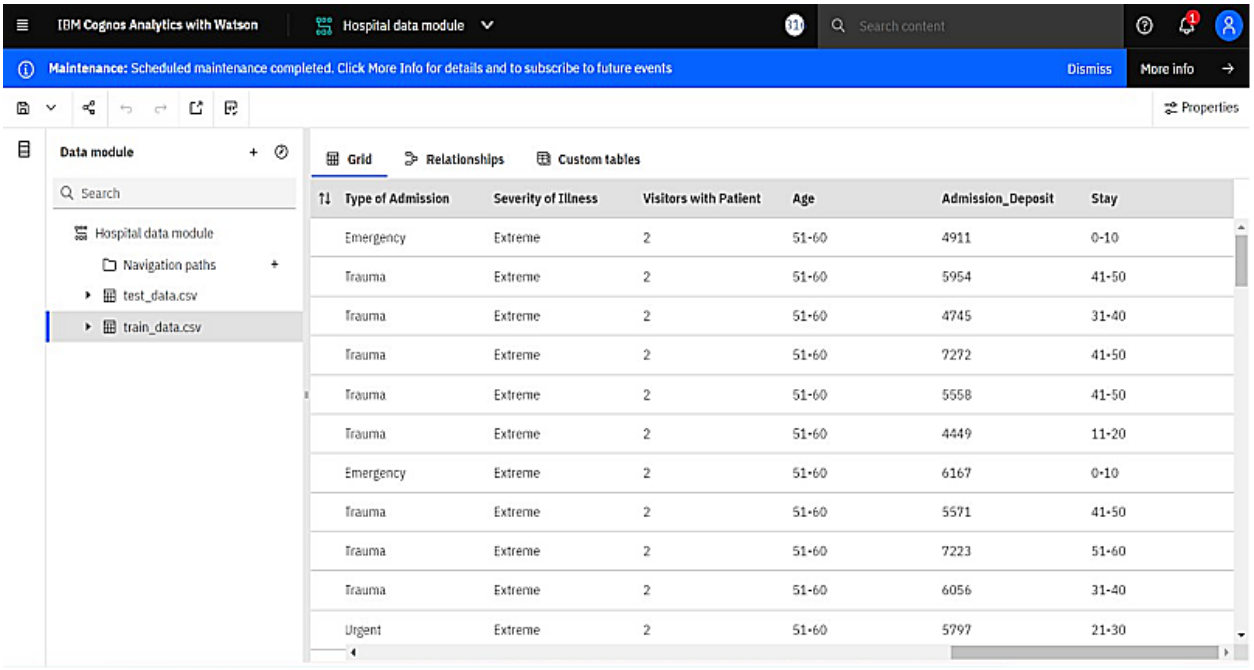
## 13.1 Source Code:

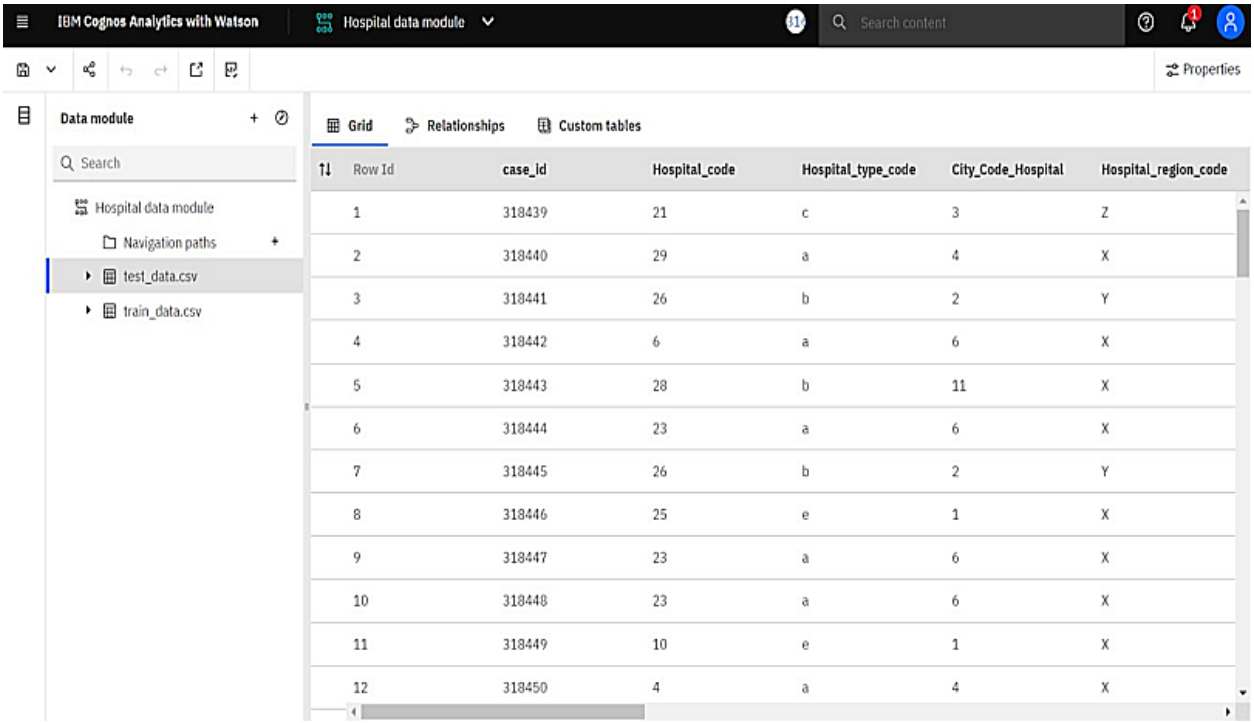
## Uploading dataset in Cognos:



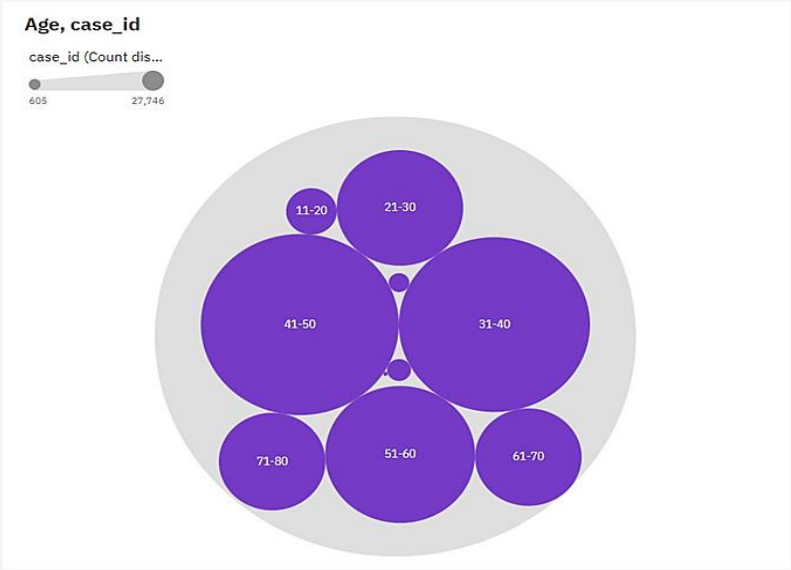



# Preparing the Data:



## Exploration of Data:




Fields

**Bubbles*** Required field

Age

Click or drag data here

Size

case_id

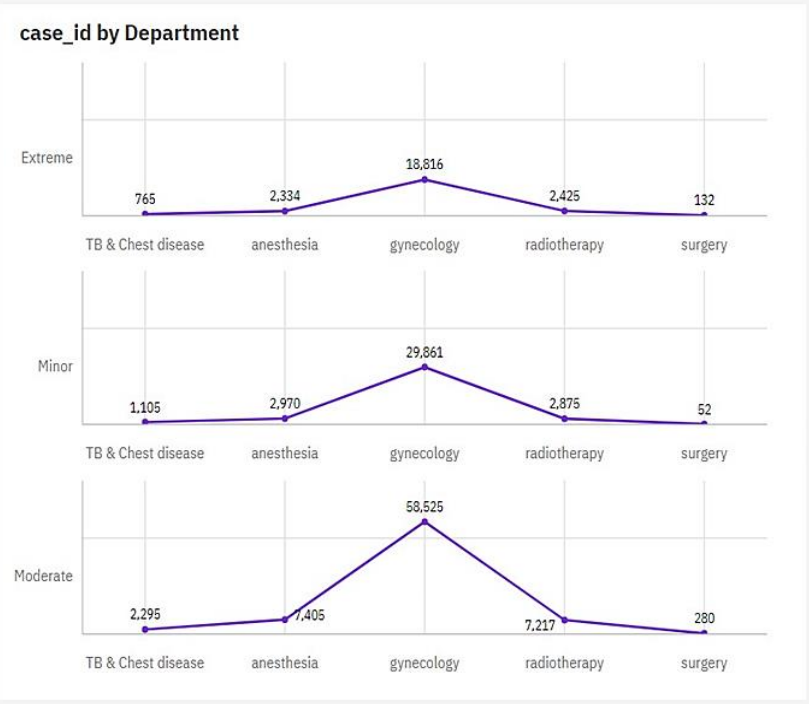
Color

Click or drag data here

Repeat (column)

Click or drag data here

Repeat (row)




Fields

**x-axis*** Required field

Department

Click or drag data here

Color

Click or drag data here

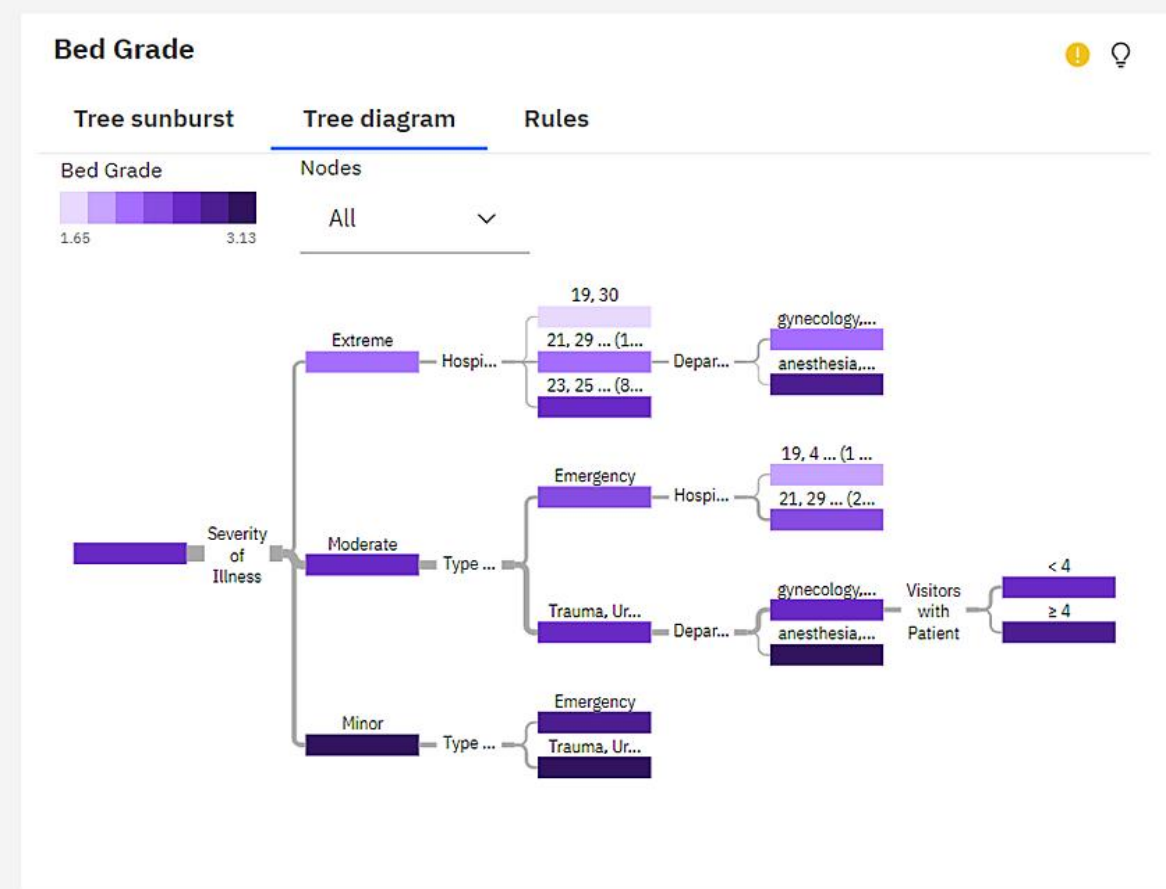
**y-axis*** Required field

case_id

Click or drag data here

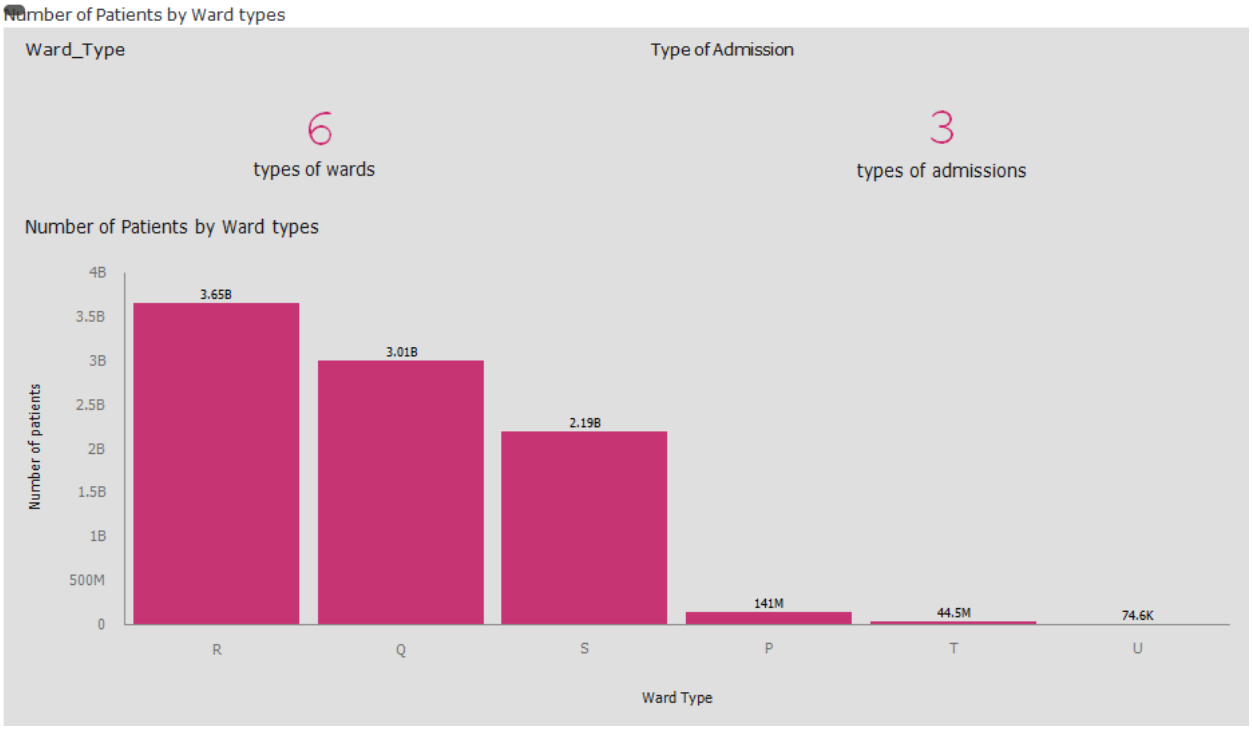
Repeat (column)

Click or drag data here

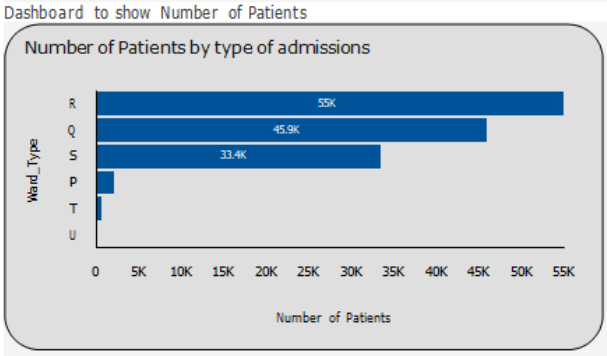

Bed Grade
Tree sunburst
Tree diagram
Rules
Bed Grade
1.65
3.13
Nodes
All
Severity of Illness
Extreme
Hospi...
19, 30
21, 29 ... (1...
23, 25 ... (8...
Depar...
gynecology,...
anesthesia,...
Moderate
Type ...
Emergency
Hospi...
19, 4 ... (1 ...
21, 29 ... (2...
Trauma, Ur...
Depar...
gynecology,...
anesthesia,...
Visitors with Patient
< 4
≥ 4
Minor
Type ...
Emergency
Trauma, Ur...

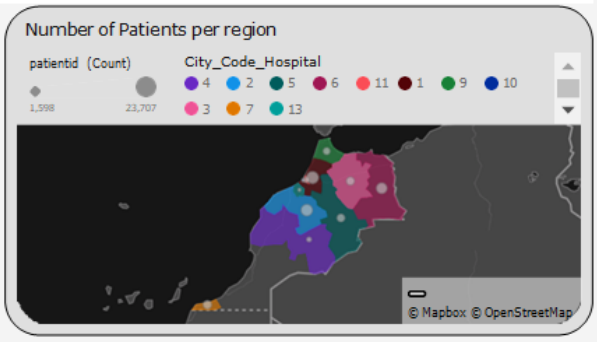
## Dashboard:

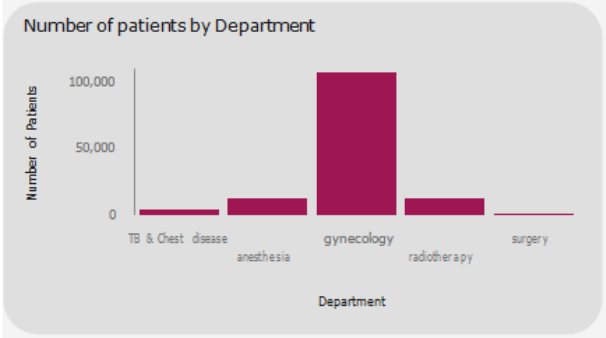
Number of Patients by Ward types

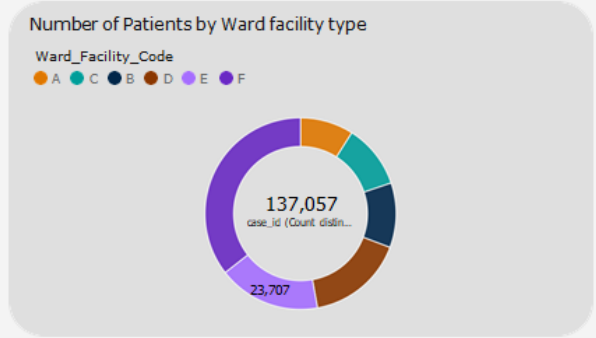



Dashboard to show Number of Patients

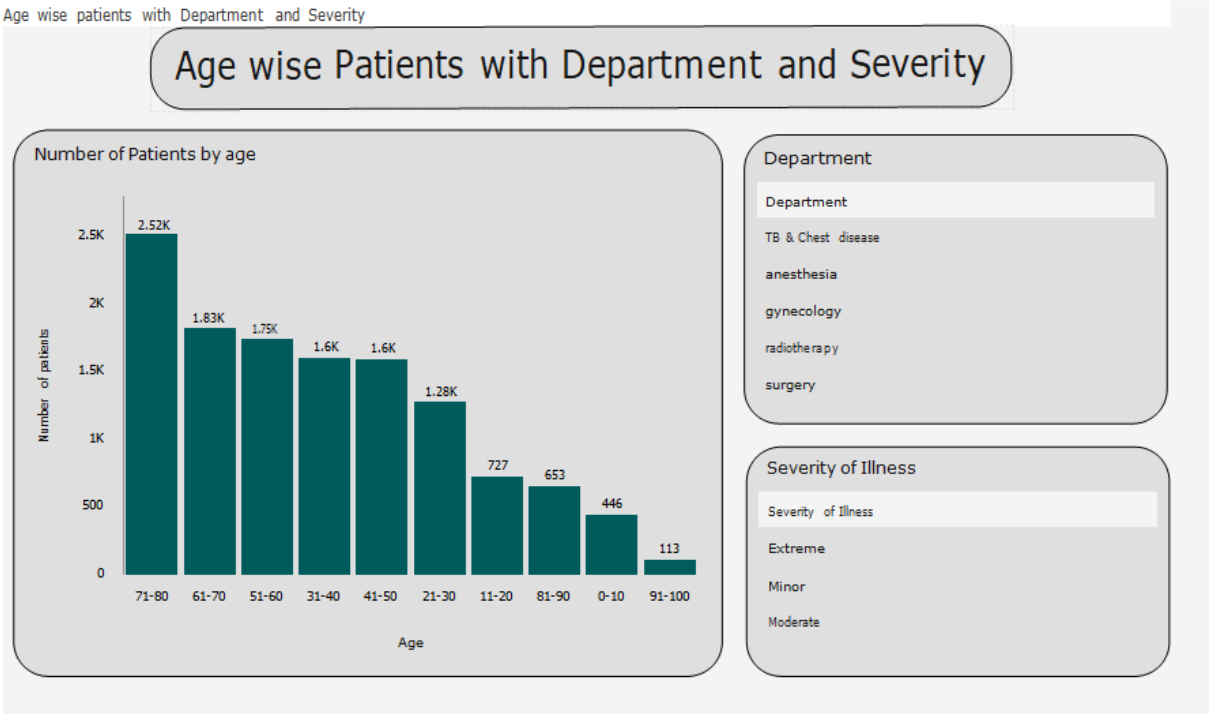


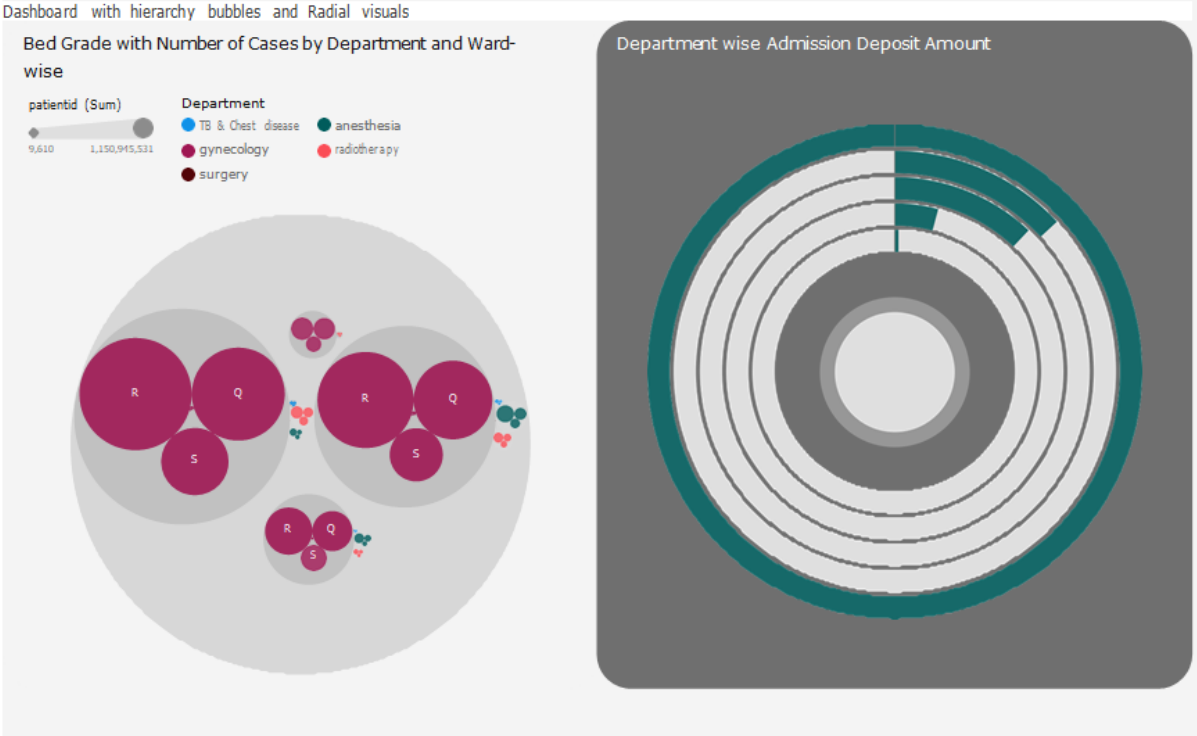



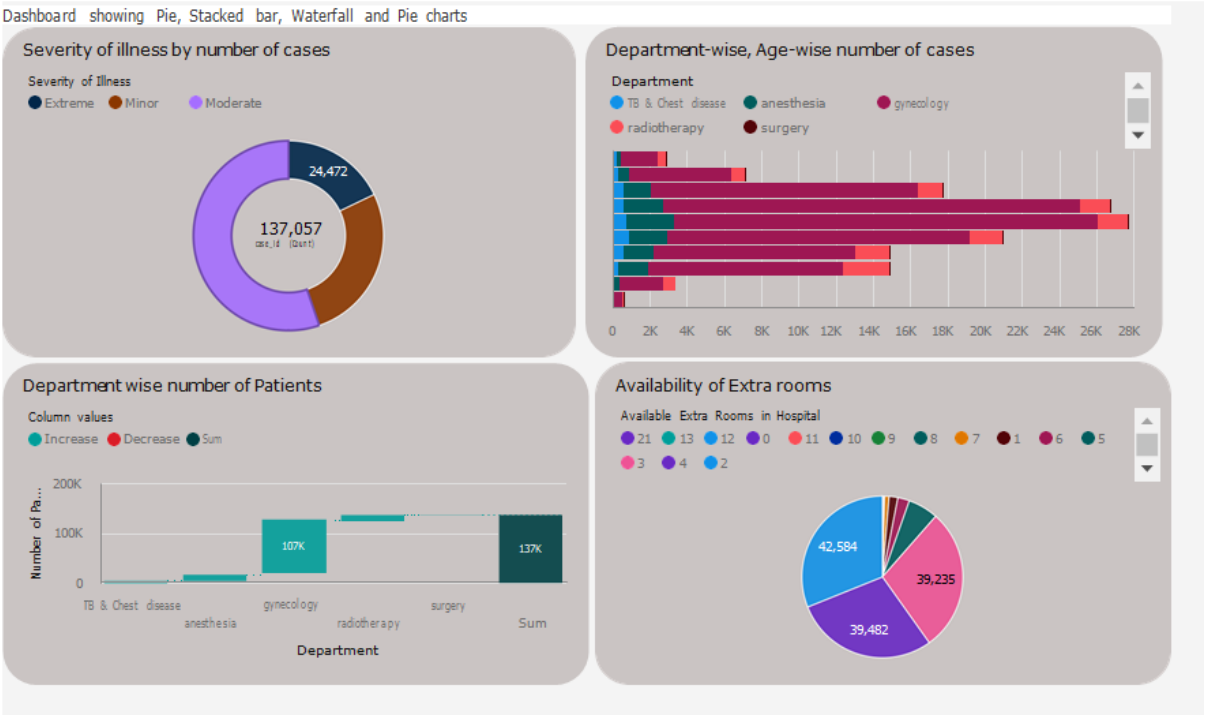



Age wise patients with Department and Severity

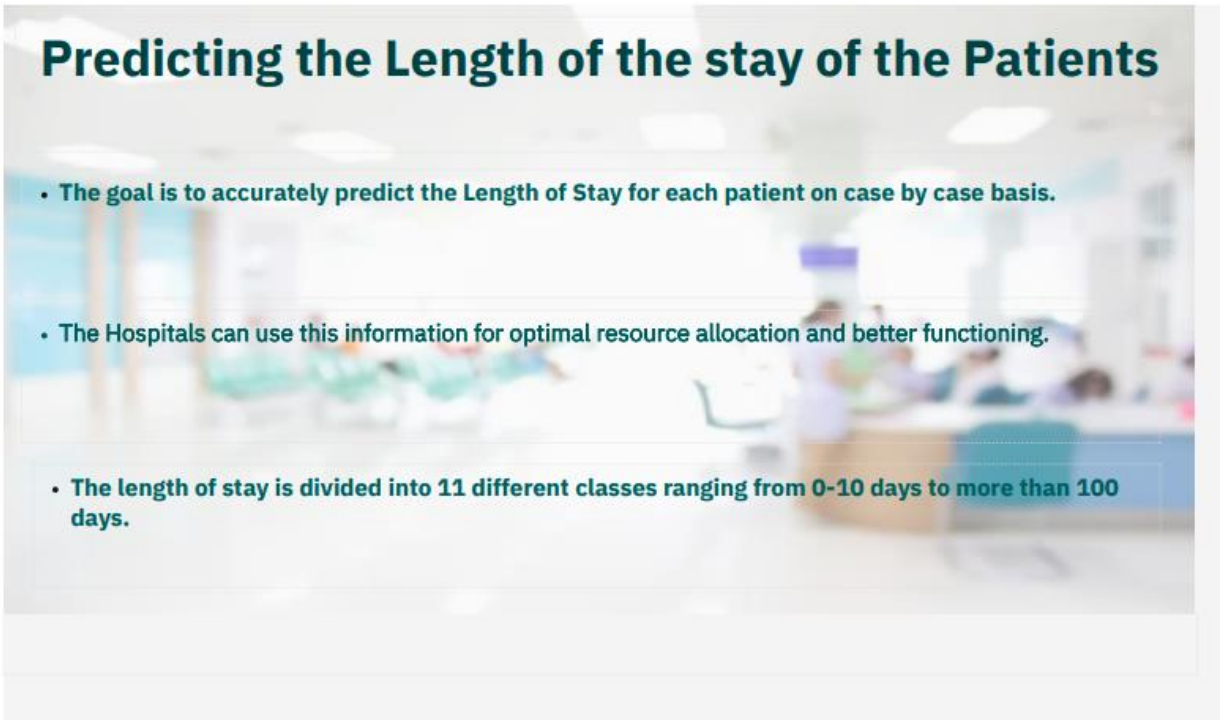



Dashboard with hierarchy bubbles and Radial visuals

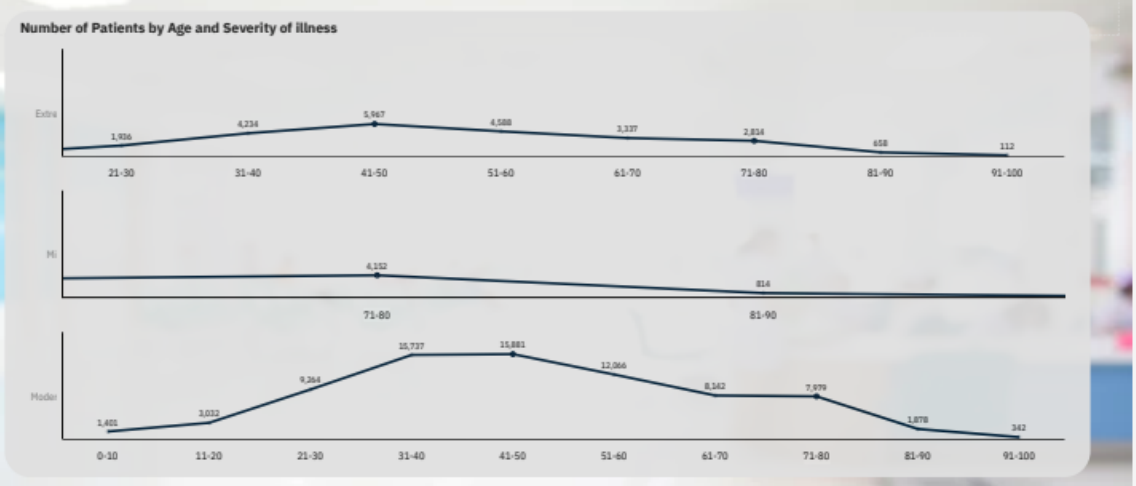



Dashboard showing Pie, Stacked bar, Waterfall and Pie charts
Severity of illness by number of cases
Severity of Illness
Extreme
Minor
Moderate
24,472
137,057
Department-wise, Age-wise number of cases
Department
TB & Chest disease
anesthesia
gynecology
radiotherapy
surgery
0
2K
4K
6K
8K
10K
12K
14K
16K
18K
20K
22K
24K
26K
28K
Department wise number of Patients
Column values
Increase
Decrease
Sum
200K
100K
0
107K
137K
TB & Chest disease
anesthesia
gynecology
radiotherapy
surgery
Sum
Department
Availability of Extra rooms
Available Extra Rooms in Hospital
21
13
12
0
11
10
9
8
7
1
6
5
3
4
2
42,584
39,235
39,482

## Story:

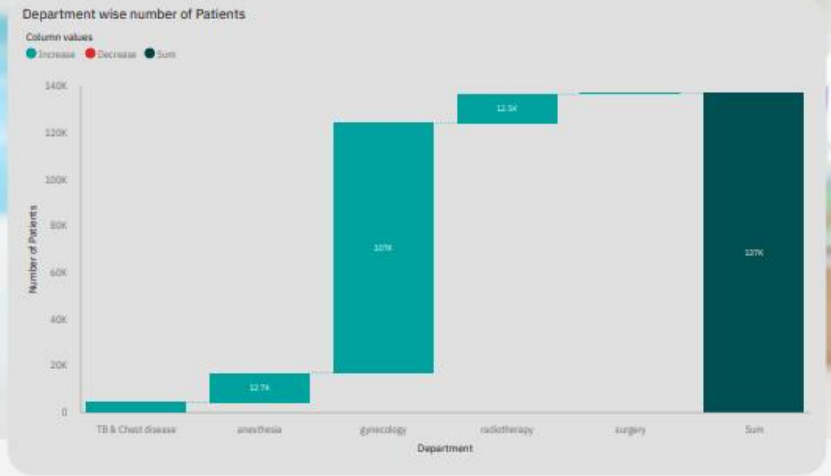

Predicting the Length of the stay of the Patients
• The goal is to accurately predict the Length of Stay for each patient on case by case basis.
• The Hospitals can use this information for optimal resource allocation and better functioning.
• The length of stay is divided into 11 different classes ranging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

# Number of patients by their age and illness range



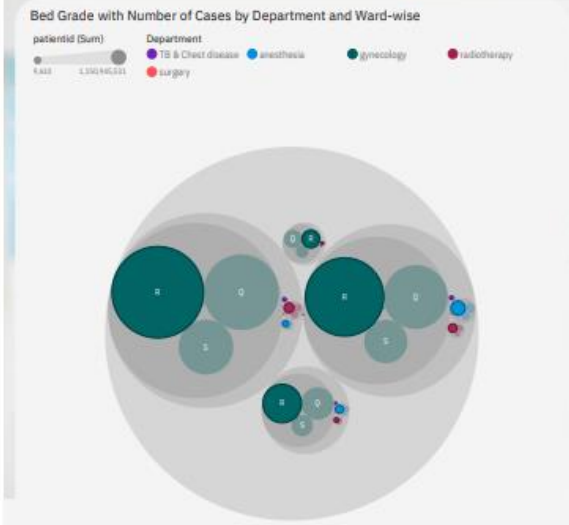

This column chart shows the number of patients getting admitted to the hospital classified based on their age and severity of illness.

# Number of Patients by departments




This Waterfall chart shows the number of patients getting admitted to each department.

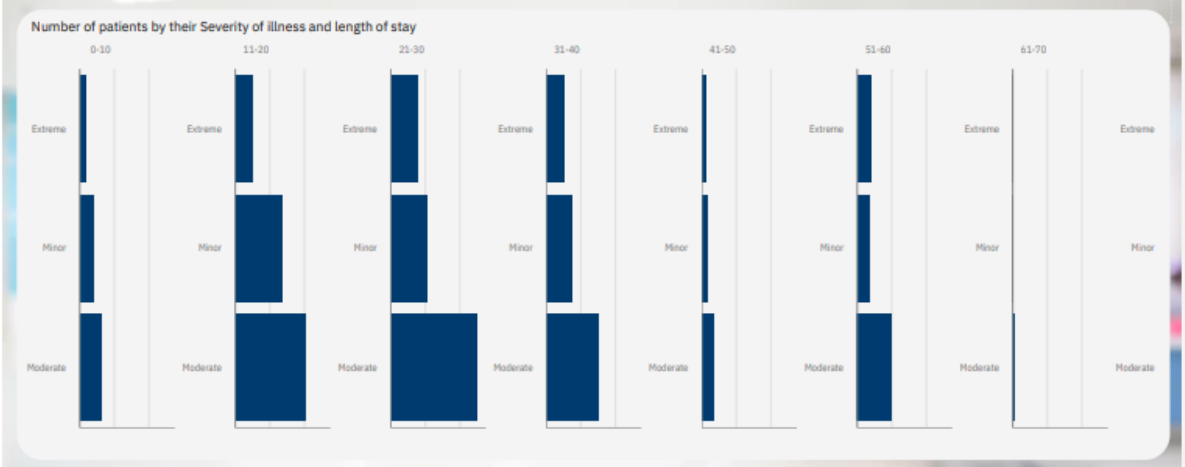
# Bed grade for Patients




| Ward_Type |
|---|
| P |
| Q |
| R |
| S |
| T |
| U |

The hierarchy bubble shows the bed grade with number of Patients admitted in a department, ward-wise.

# Length of stay of Patients by their illness range

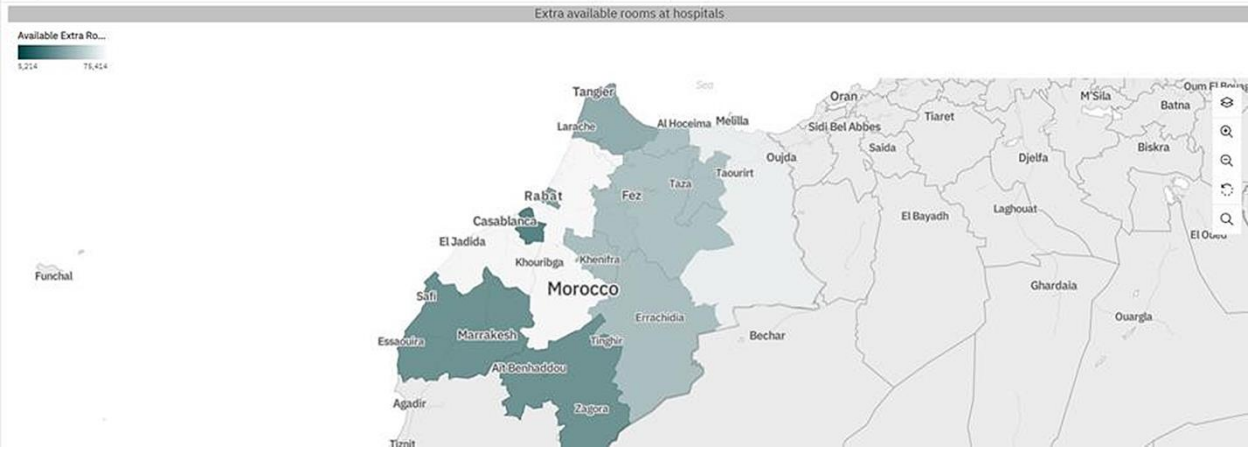



This bar charts depicts the number of patients by their Severity of illness and their Length of stay.


Conclusion
• Based on these, the Length of Stay of Patients is identified. Once identified, beds and resources could be allocated to the departments and wards.
• Patients with high LOS risk can have their treatment plan optimized to minimize LOS and lower the chance of staff/visitor infection.

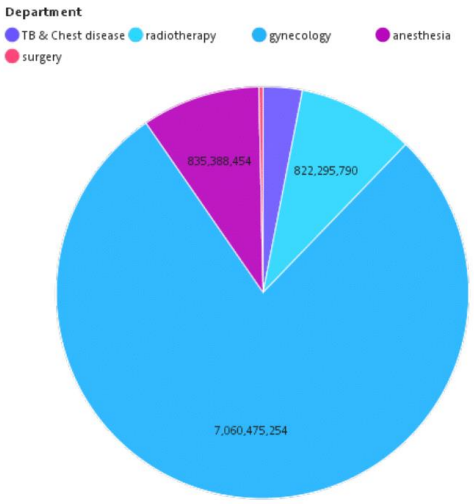

THANK YOU !

# Report (Run as pdf):

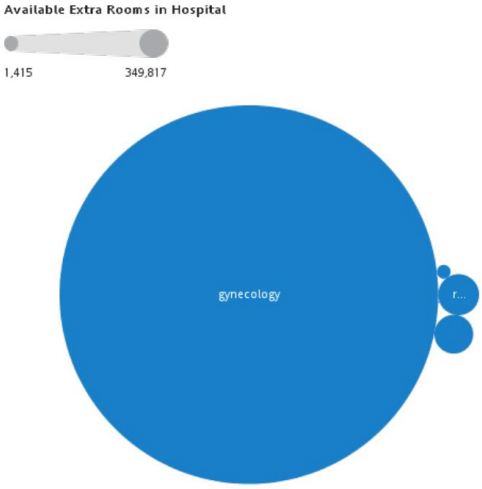


# Hospitals Health-care analytics report

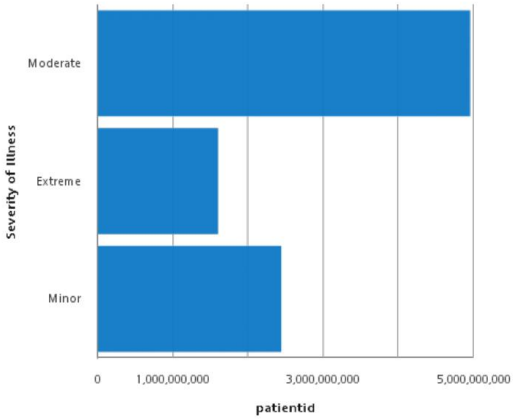
## Number of Patients by departments



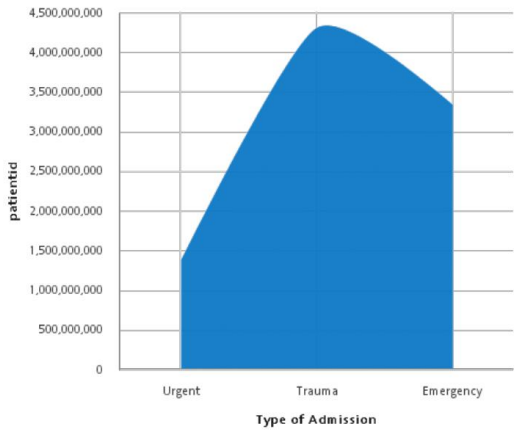

## Availability of extra rooms by departments




## Number of patients by Severity of illness




## Number of patients by type of admission



**Link:13.2 GitHub & Project Demo**

**GitHub link:**

**https://github.com/IBM-EPBL/IBM-Project-47980-1660803720**

**Project Demo Link:**

https://player.vimeo.com/video/772467402