

PROJECT REPORT ON

Analytics for Hospitals' Health-Care Data

Submitted by:

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Team Members:

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1. INTRODUCTION

1.1 Project Overview

The COVID-19 pandemic has resulted in uncontrollable havoc. Since this was an unexpected circumstance, many local hospitals were not prepared to handle this crisis. The proper allocation of resources has become a tough challenge for hospitals. There is a possibility that many patients may not get proper treatment. It created an urgent need for data analytics in the healthcare industry for Analysis of the current situation in terms of patient condition and hospital resources can help in the organized planning of any future waves of the pandemic.

Analytics for hospital health care data provides a deep analysis on the research field of healthcare data analytics and it improves healthcare performance in many areas such as medical operations, reports, decision making, prediction and prevention system. Healthcare analytics refers to the use of vast amounts of collected data to provide organizations with actionable insights. These insights are developed through analytical disciplines to drive fact-based decision making using IBM cognos analytics and building visualizations of healthCare to create meaningful dashboards. In turn, these decisions improve planning, management, measurement and learning. The final dashboard helps healthcare organizations around the world to reduce costs, improves coordination.

1.2 Purpose

Today's healthcare industries are moving from volume-based business into value-based business, which requires an overwork from doctors and nurses to be more productive and efficient. This will improve healthcare practice, changing individual life style and driving them into longer life, prevent diseases, illnesses and infections. Over the last few years, healthcare data has become more complex for the reason that large amount of data are being available lately, along with the rapid change of technologies and mobile applications and new diseases have discovered. Therefore, healthcare sectors have believed that healthcare data analytics tools are really important subject in order to manage a large amount of complex data, which can lead to improve healthcare industries and help medical practice to reach a high level of efficiency and work flow accuracy

2. LITERATURE SURVEY

2.1 Existing Solutions

Some websites provide analytic healthcare monitoring dashboard to provide solutions to the hospitals.

Some of them are:

<https://www.boldbi.com/dashboard-examples/healthcare>

2.2 References

- https://www.researchgate.net/publication/348834045_Development_of_the_Health_Information_Analytics_Dashboard_Using_Big_Data_Analytics
- Al-Azzawi, H. 2014. "Caradigm healthcare analytics."
<http://www.caradigm.com/media/68911/Caradigm-WP-HealthcareAnalytics-Jan-2014-US-EN.PDF>
Retrieved 09 August, 2015.
- Abbott, PA & Coenen, A 2008, 'Globalization and advances in information and communication technologies: The impact on nursing and health', Nursing Outlook, vol. 56, no. 5, pp 238- 246.
- <https://aisel.aisnet.org/acis2015/34/>

2.3 Problem Statement Definition

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.

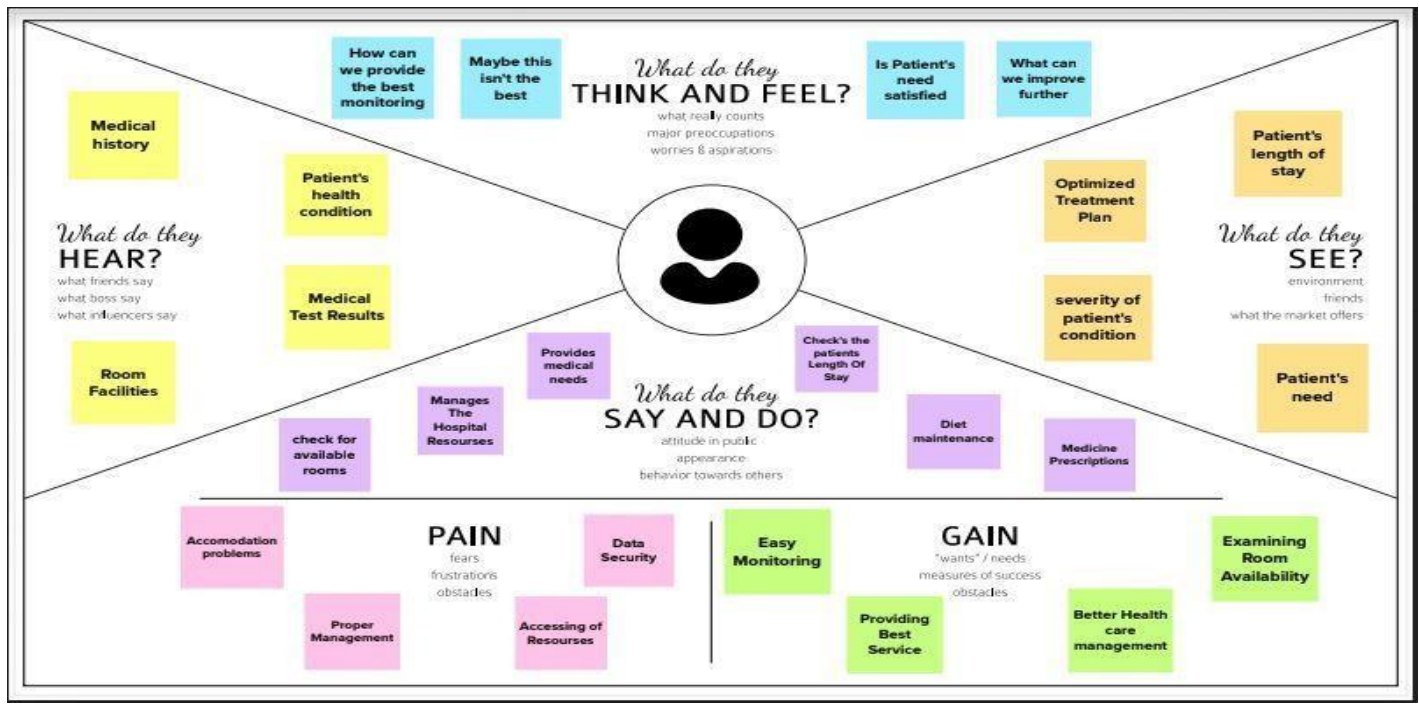
Suppose you have been hired as Data Scientist of Health Man – a not for profit organization dedicated to manage the functioning of Hospitals in a professional and optimal manner.

The purpose 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

3.1 Empathy Map Canvas

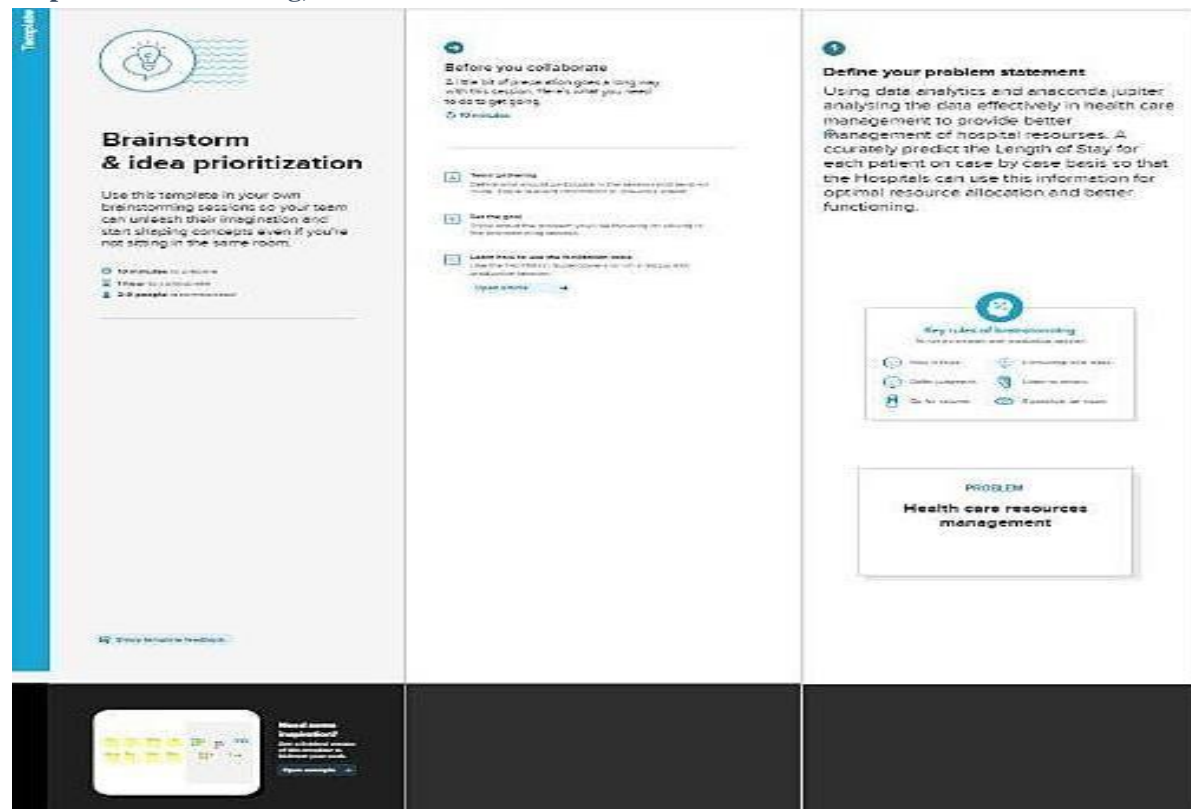
An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes. It is a useful tool to help teams better understand their users. Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges



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.

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



Step-2: Brainstorm, Idea Listing and Grouping

2 Brainstorm

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

10 minutes

Amudhadevi

- data clear
- right amount of resource
- patients details
- patient unique id

Ishwarya

- length of stay
- Treatment plan
- Identify Higher LOS at the time of admission
- reduce the length of stay

Diwya Dharshini

- length of stay
- Treatment
- Department wise patients
- Room availability

Loggaa Sri Agitha

- Severity of illness
- Room availability
- data analysis perfect
- Case Study

3 Group ideas

Take turns sharing your ideas while clustering similar or related notes to you go. Once all group notes have been grouped, 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

Flowchart:

```

graph TD
    A[Collection of Data(Patient Name,Severity)] --> B[Cleaning of Data]
    B --> C[Subdividing into Patient Id, Age, Department, Length of Stay]
    C --> D[Identifying high length of stay]
    D --> E[Optimizing the treatment plan]
    E --> F[Minimizing the length of stay]
    F --> G[Bed and Room Allocation]
    G --> H[Analyzing the data and Visualising it]
    H --> I[Managing Resources]
    
```

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

Feasibility

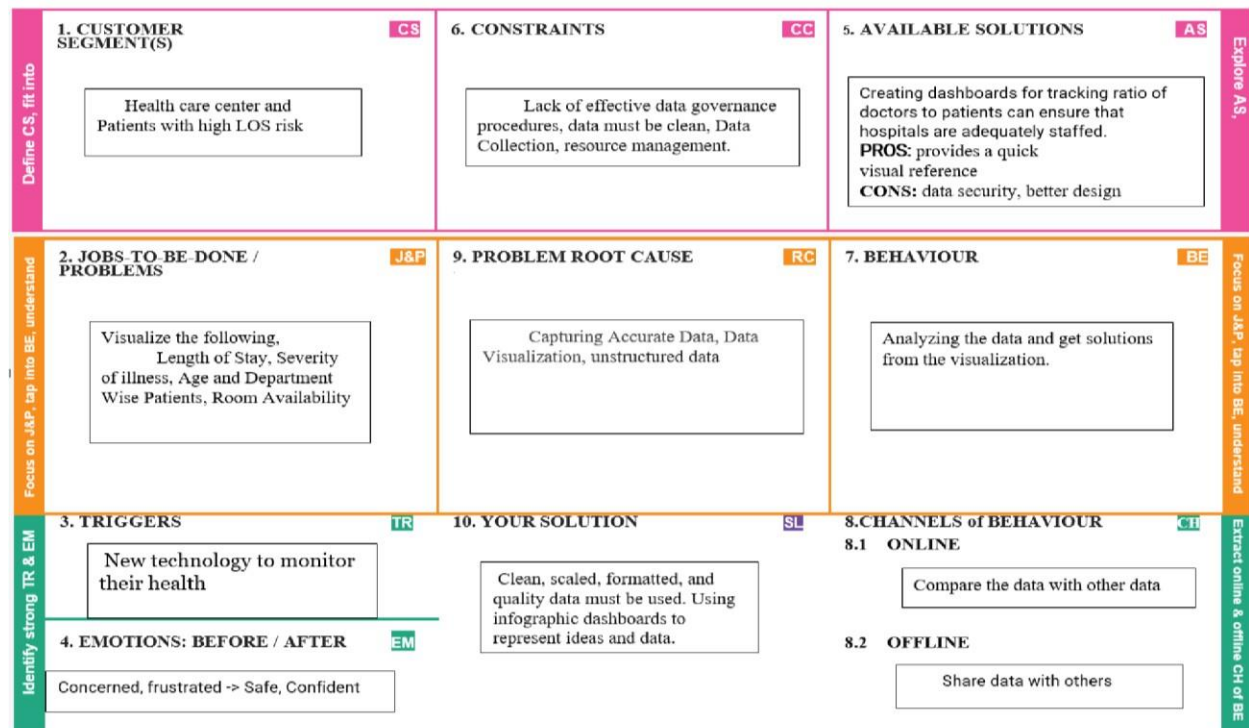
Ideas in grid:

- Top-Left (Important & Feasible):** Patients details, Severity of illness, Analysis of data.
- Top-Right (Important & Not Feasible):** Room Availability, Resource Management.
- Bottom-Right (Not Important & Not Feasible):** Length of Stay.

3.3 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	To provide a deep analysis on the research field of healthcare data analytics and to improve healthcare performance in many areas such as medical operations, reports, decision making, prediction and prevention system.
2.	Idea / Solution description	Create app-based solution to 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.	Novelty / Uniqueness	Hospital Resource Management using Cognos Analytics and Anaconda Navigator
4.	Social Impact / Customer Satisfaction	Easy access to hospital resources, proper treatment, Timely service for patients
5.	Business Model (Revenue Model)	This project minimise the labor cost. This project can be made with minimum cost.
6.	Scalability of the Solution	In this project we analysis the dataset of the hospital and required dashboard are built. This helps the patient to know the availability of rooms using the patient id. We can know about the patient's previous illness. We can also verify the admission rates.

3.4 Problem Solution Fit



4. REQUIREMENT ANALYSIS

4.1 Functional Requirements

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	Analytics	Because raw data is imperfect, Cognos analytics is used to clean and analyse it.
FR-4	Check out	Deleting Patient ID from the dashboard during patient's checkout and then make the bed empty so the beds are visible in the dashboard
FR-5	Report	Preparing reports on current patients, number of beds, Patient's needs.
FR-6	Visualizations	Build the visualizations for length of stay, severity of illness age, department wise patient, room availability, case study

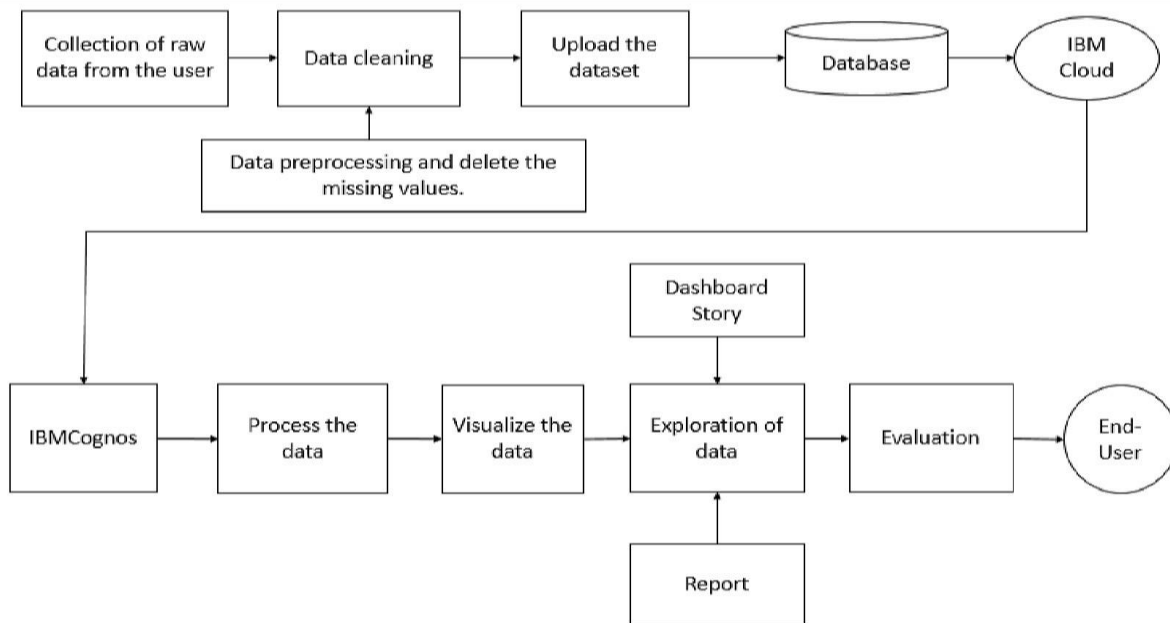
4.2 Non-Functional Requirements

NFR No.	Non-Functional Requirement	Description
NFR-1	Usability	The designed dashboard provides the Patient's LOS and Severity of illness through graphs, pie chart, cross tab and other tools
NFR-2	Security	The dashboard provides login ID that is any users who make use of the dashboard needs to hold a login ID and password.
NFR-3	Reliability	Users will find this dashboard to be constant and dependable, assisting them in using it effectively, efficiently, and dependably.
NFR-4	Performance	This dashboard operates quickly, offers high levels of interactive data, and has a large capacity for data. And datas are frequently updated.
NFR-5	Availability	This dashboard is always accessible
NFR-6	Scalability	This dashboard will be able to accommodate a larger user base in the future and will satisfy the customer's future needs.

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

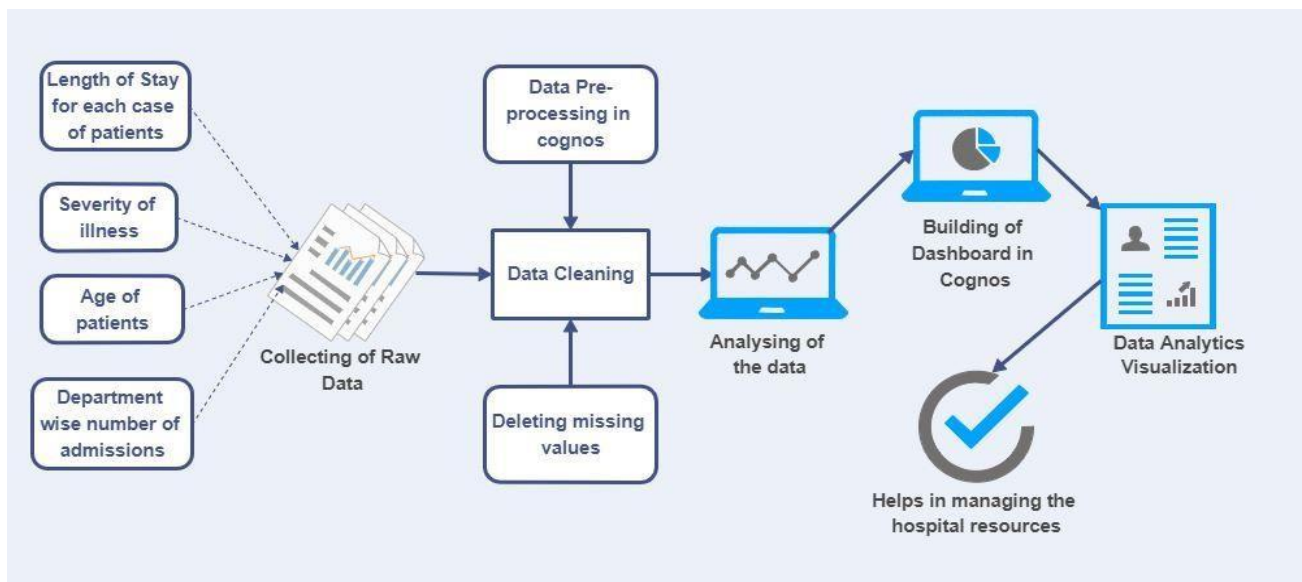


Figure 1: Solution Architecture and data flow of the Analytics for Health-Care Data

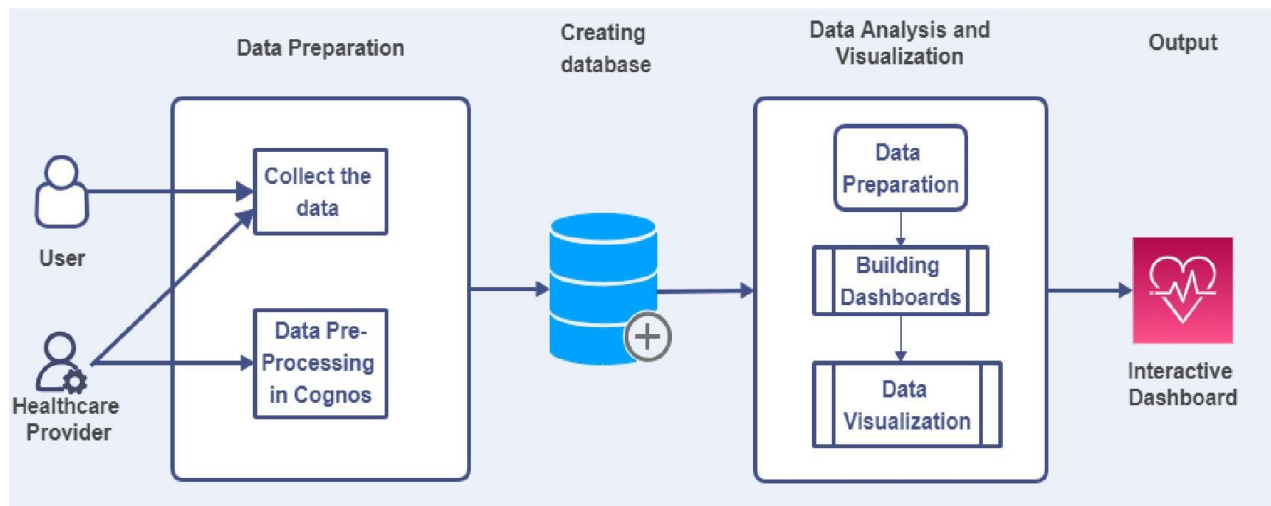


Figure 2: Technical Architecture of the Analytics for Health-Care Data

5.3 User Stories

User Type	Functional Requirement (Epic)	User Story No.	User Story / Task	Acceptance criteria	Priority	Release
Customer	Registration	USN-1	As a health care provider, I can create account in IBM cloud and the data are collected.	I can create an account and collect data.	High	Sprint-1
		USN-2	As a health care provider all the data that are collected is cleaned and uploaded in the database or IBM cloud	I can access the cleaned and uploaded data.	Low	Sprint-2
	Login	USN-3	As a health care provider I can log into the dashboard by entering email & password	I can login to the account in my email login.	High	Sprint-2
	Dashboard	USN-4	As a health care provider I can use my account in my dashboard for uploading dataset.	I can login to the account for uploading dataset.	Medum	Sprint-3
Customer (Web user)	Website	USN-5	As a health care provider I can create the database and process the data.	I can create the database and process the data	Medum	Sprint-3
Visualization	Dashboard	USN-6	As a health care provider I can prepare data for Visualization.	I can prepare data for Visualization.	High	Sprint-3
Presentation	Dashboard	USN-7	As a health care provider I can Present data in my dashboard.	I can present data by using my account in dashboard.	High	Sprint-4
Exploration	Dashboard	USN-8	As a health care provider I can explore Dashboard Story and Report.	I can explore dashboard story and report.	High	Sprint-4

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story No.	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a health care provider I can create account in IBM cloud and the data are collected.	20	High	Team Lead, Team Member-1
Sprint-2	Analyze	USN-2	As a health care provider all the data that are collected is cleaned and uploaded in the database or IBM cloud.	20	Medium	Team Member-2,3
Sprint-3	Dashboard	USN-3	As a health care provider I can use my account in my dashboard for uploading dataset.	10	Medium	Team Member-1,3
Sprint-3	Visualization	USN-4	As a health care provider I can prepare data for Visualization.	10	High	Team Member-1,2
Sprint-4	Visualization	USN-5	As a health care provider I can present data in my dashboard.	10	High	Team Lead, Team Member-2
Sprint-4	Prediction	USN-6	As a health care provider I can predict the length of stay	10	High	Team Lead, Team Member-3

6.2 Sprint Delivery Schedule

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

6.3 Reports from JIRA

Does your team need more from Jira? Get a free trial of our Standard plan.

Projects / Analytics for Hospital's Health-Care Data

AFHHCD Sprint 1

0 days remaining [Complete sprint](#)

GROUP BY: None [Insights](#)

TO DO IN PROGRESS REVIEW

Sprint progress 100% done

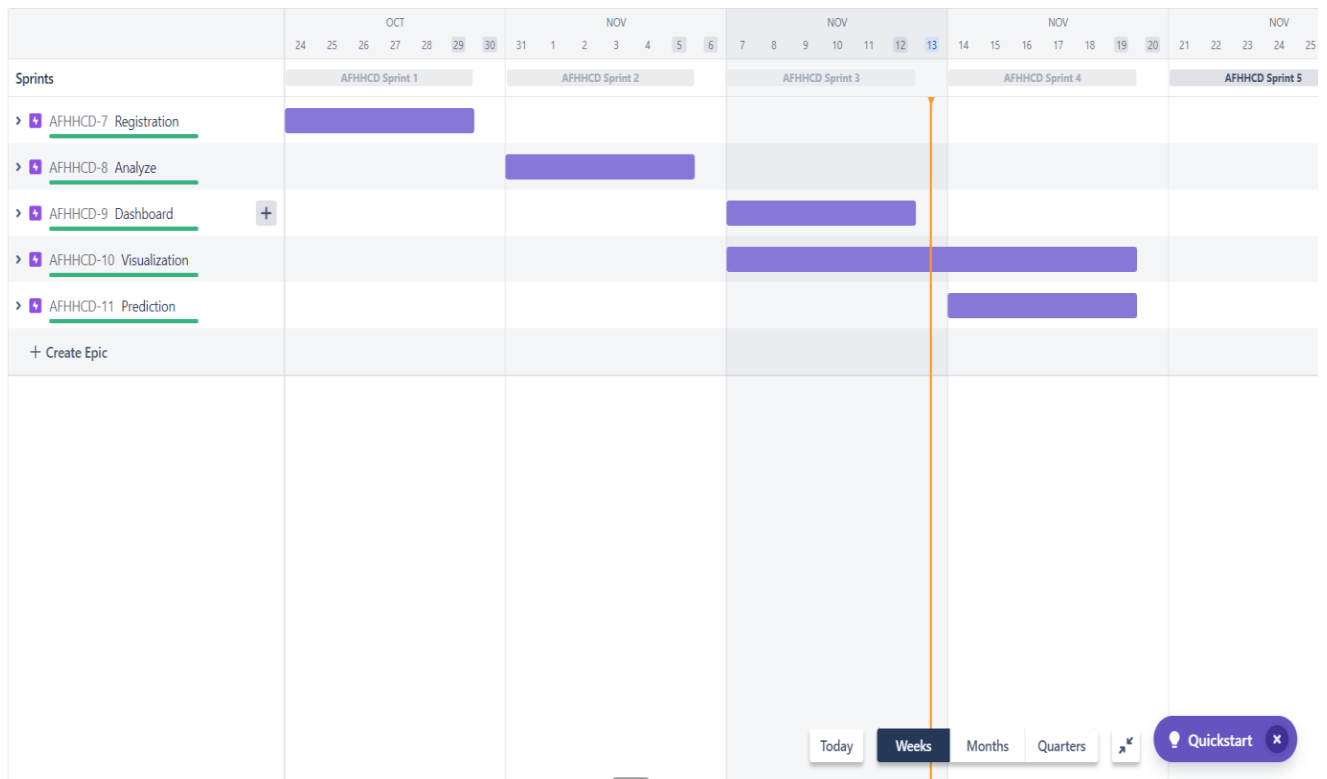
Done 100% In progress 0% Not started 0%

Sprint burndown
Add estimates to manage and maintain scope
This insight helps you compare planned worked against completed work, so you can track scope and pivot as needed. [Learn more](#)

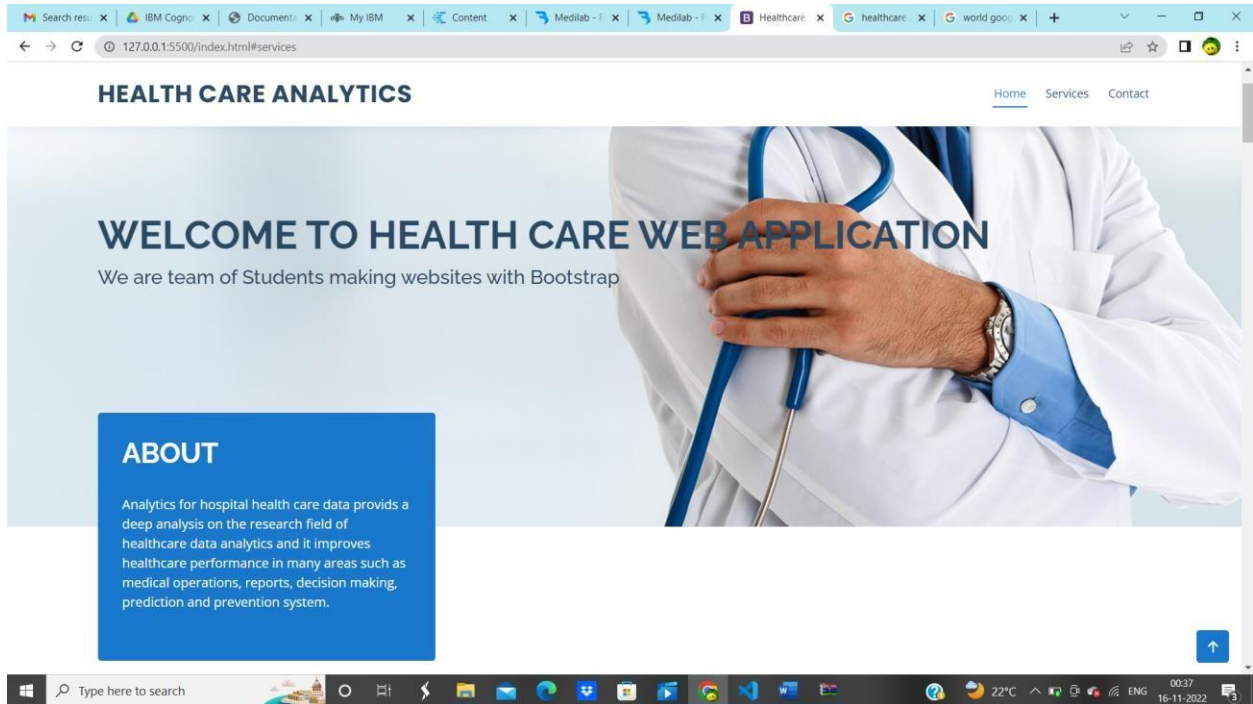
Epic progress
This sprint is working towards 1 epic
AFHHCD-7 Registration 100% done

[Give feedback](#)

RoadMap From Jira



7. RESULTS



DASHBOARDS

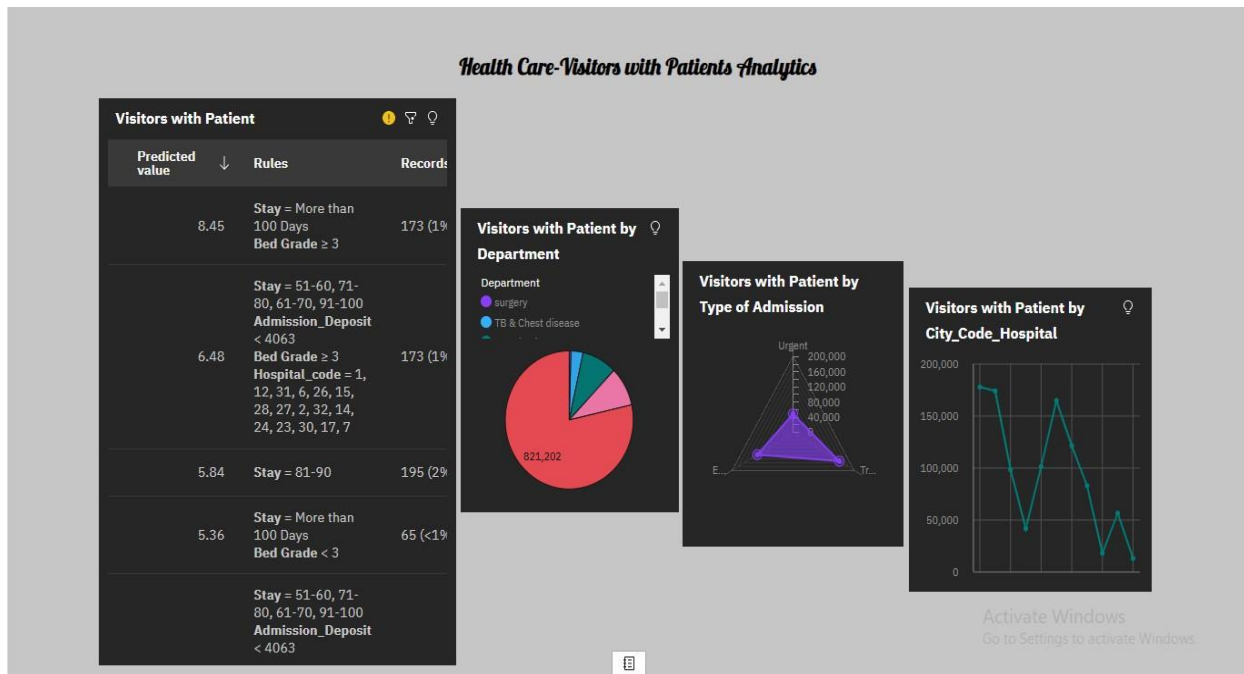
HEALTH CARE - DEPARTMENT ANALYTICS:



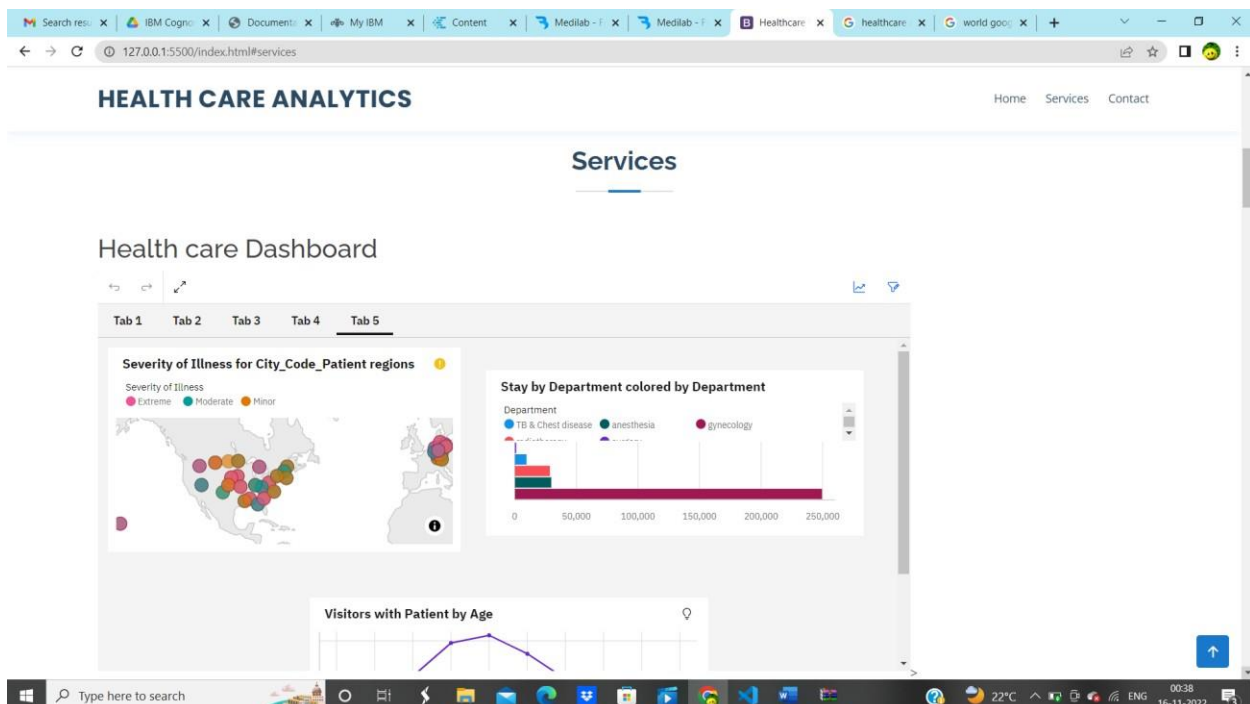
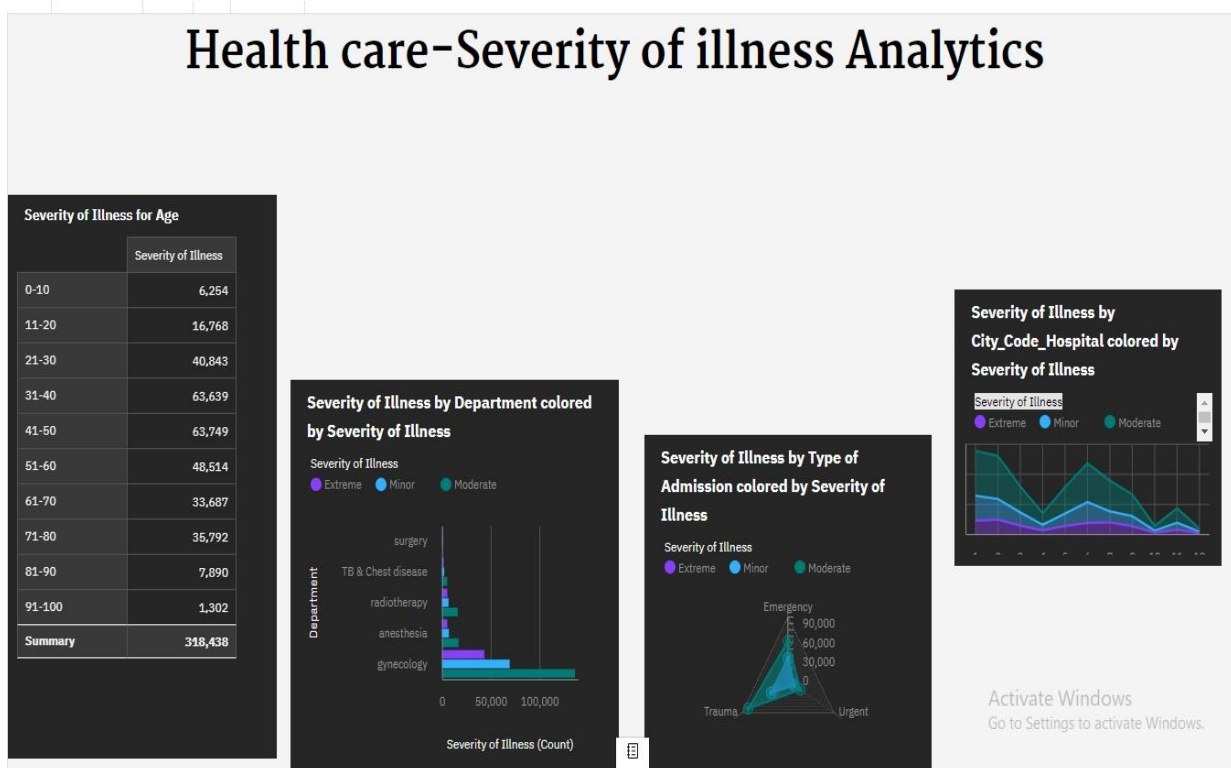
HEALTH CARE – AVAILABILITY OF EXTRA ROOMS ANALYTICS:



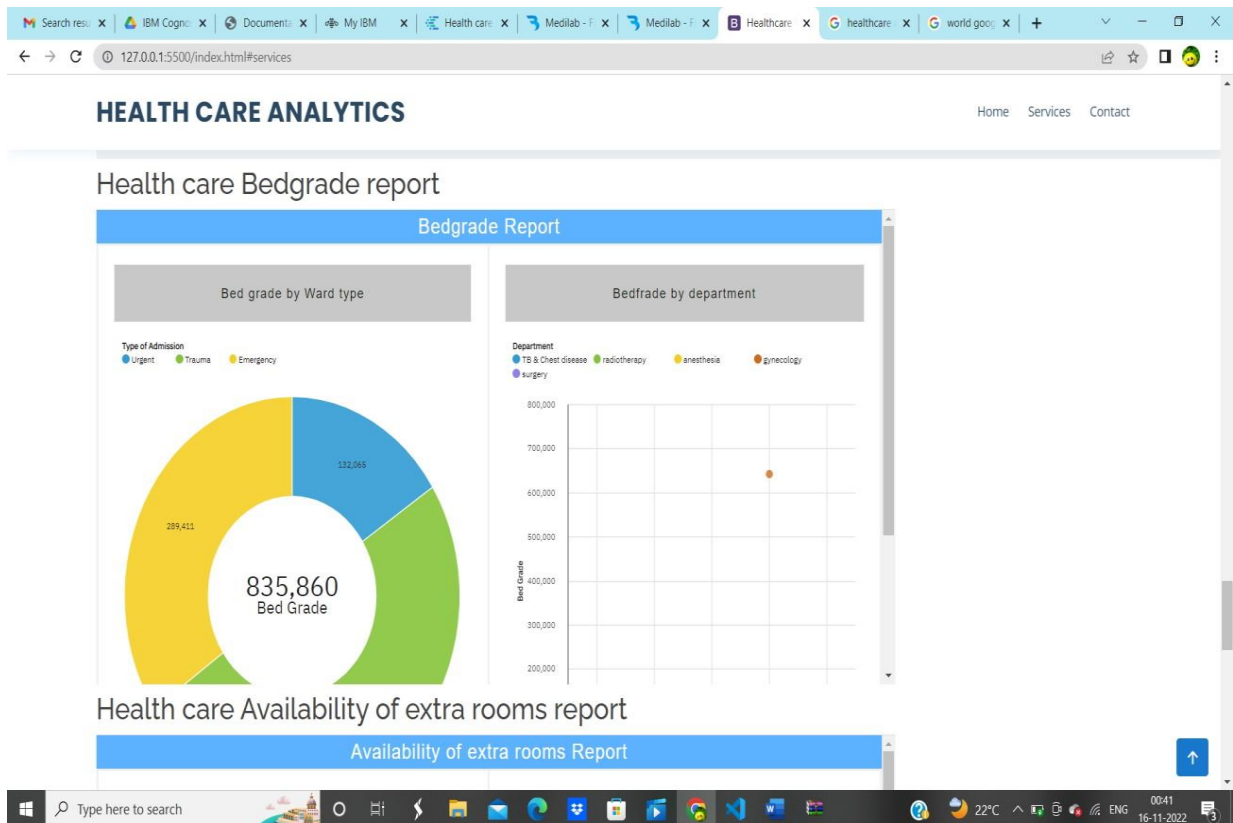
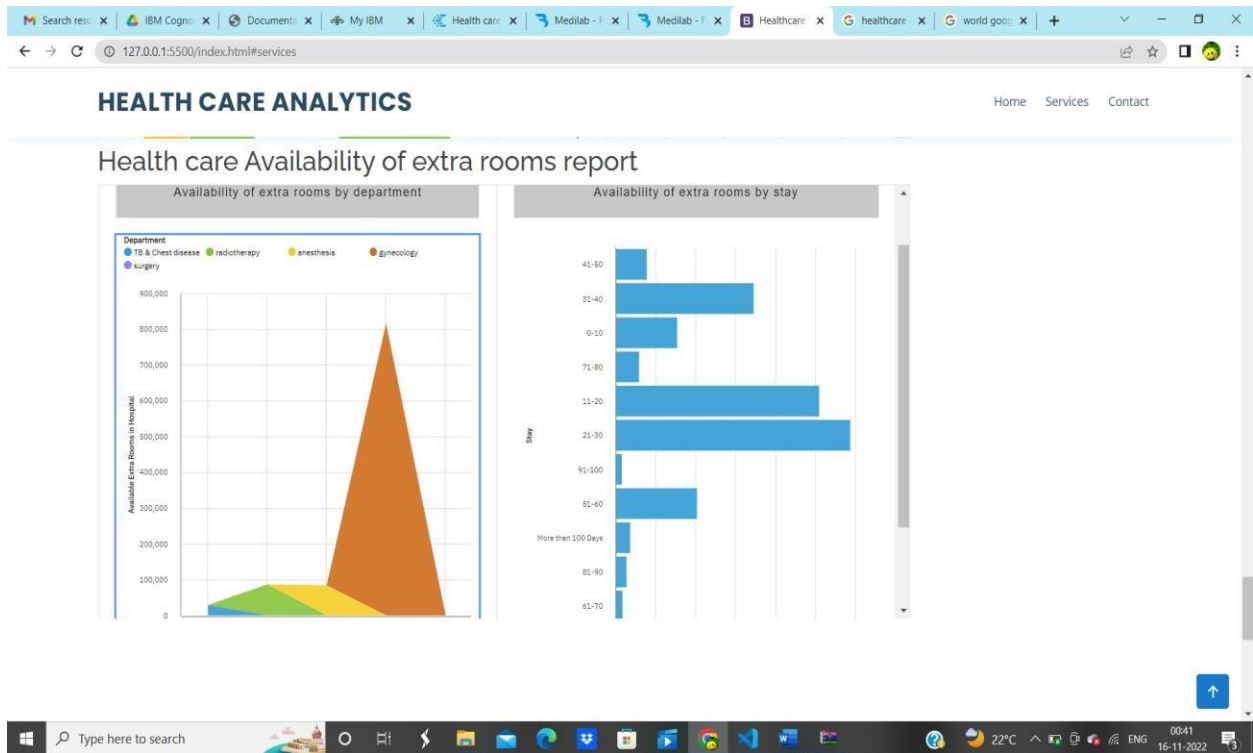
HEALTH CARE -VISITORS WITH PATIENTS ANALYTICS:

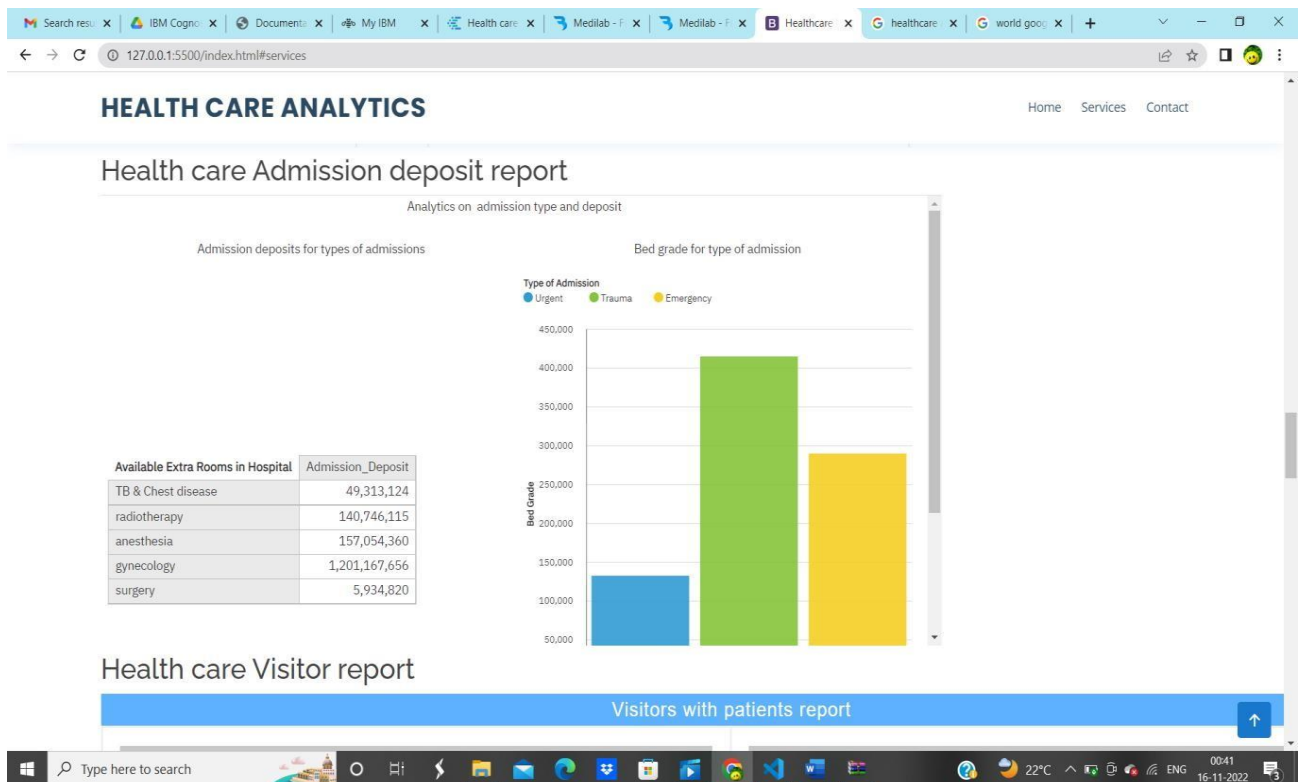
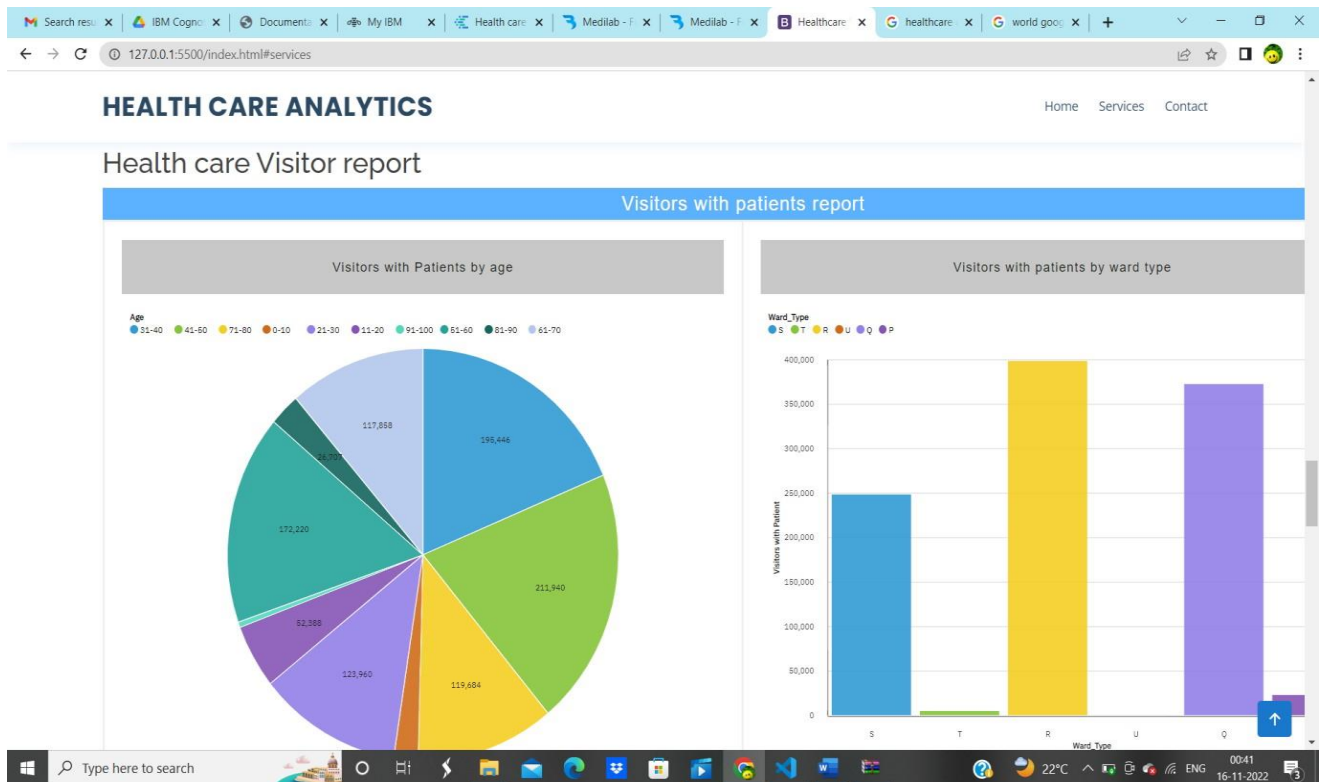


HEALTH CARE -SEVERITY OF ILLNESS ANALYTICS:



REPORTS





8. ADVANTAGES

- Better real-time data and other essential information that allows managers and other respected personnel in order to make better decisions.
- Our Dashboard enables healthcare professionals to access important patient statistics in real-time to increase the overall hospital performance and patient satisfaction.
- it helps us in Better allocation of resources, Easy Monitoring, Service Enhancement, Time Management.

DISADVANTAGES

- Missing small incidents that have a negative impact
- Frequent updation is required.
- Internet connectivity is important.

9. CONCLUSION

- By combining data from various sources into one perspective, healthcare dashboards are analytics software tools that enable healthcare workers to make real-time, data-driven choices.
- Data quality improved significantly.

10. FUTURE SCOPE

- Pharmacy companies will sell their medical products to generate more revenue.
- Insurance companies will sell their health policies to needed people.
- In future, it can be extended to pharmacy management.
- Interconnecting the data among different hospitals.

DEMO LINK

<https://drive.google.com/file/d/101WKk9dFlvrrKhEx7xzfEr0JFq3UsWkb/view?usp=sharing>