



ANALYTICS FOR HOSPITAL'S HEALTH CARE DATA

A PROJECT REPORT

Submitted by

S J RUTHRA (621319106076)

M SHALINI (621319106087)

B THIRUVENI (621319106095)

S BHARATHI (621319106304)

in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

in

**ELECTRONICS AND COMMUNICATION
ENGINEERING**

**KONGUNADU COLLEGE OF ENGINEERING AND TECHNOLOGY
GY (AUTONOMOUS)**

ANNA UNIVERSITY :: CHENNAI 600025

MAY 2022

**KONGUNADUCOLLEGEOFENGINEERINGANDTECHNOLOGY(AUTO
NOMOUS)**

ANNAUNIVERSITY:CHENNAI600025

BONAFIDE CERTIFICATE

Certified that this project report "**ANALYTICS FOR HOSPITALS
HEALTH CARE DATA**" is the bonafide work of "**S J RUTHRA
(621319106076), M SHALINI (621319106087), THIRUVENI B
(621319106095),
BHARATHI
S(621319106304)**" who carried out the project work under my supervision.

SIGNATURE

HEAD OF THE DEPARTMENT

Dr.M.DHARMALINGAM,M.E.,(Ph.D.,)
Professor,
Department of Electronics and
communication Engineering
communication Engineering
Kongunadu College of Engineering and
Technology, Thottiam, Trichy-621215

SIGNATURE

SUPERVISOR

Dr.P.ELAYARAJA,M.E.,Ph.D.,
Professor,
Department of Electronics and

Kongunadu College of Engineering and
Technology, Thottiam, Trichy-621215

Submitted forth eproject viva-voce examination held on _____

INTERNAL EXAMINER

EXTERNAL EXAMINER

TABLE OF CONTENT

CHAPTER NO	TITLE	PAGE NO
1.	INTRODUCTION	1
1.1	Project Overview	2
1.2	Purpose	3
2.	LITERATURE SURVEY	6
2.1	Existing problem	6
2.2	References	8
2.3	Problem Statement Definition	14
3.	IDEATION & PROPOSED SOLUTION	15
3.1	Empathy Map Canvas	15
3.2	Ideation & Brainstorming	16
3.3	Proposed Solution	19
3.4	Problem Solution fit	20
4.	REQUIREMENT ANALYSIS	21
4.1	Functional requirement	21
4.2	Non-Functional requirements	21
5.	PROJECT DESIGN	22
5.1	Data Flow Diagrams	22
5.2	Solution & Technical Architecture	23
5.3	User Stories	24
6.	PROJECT PLANNING & SCHEDULING	25
6.1	Sprint Planning & Estimation	26
6.2	Sprint Delivery Schedule	26
6.3	Reports from JIRA	26

7.	CODING & SOLUTIONING	27
7.1	Feature 1	27
7.2	Feature 2	27
7.3	Database Schema (if Applicable)	27
8.	TESTING	30
8.1	Test Cases	30
8.2	User Acceptance Testing	30
9.	RESULTS	31
9.1	Performance Metrics	31
10.	ADVANTAGES & DISADVANTAGES	34
11.	CONCLUSION	35
12.	FUTURE SCOPE	36
13.	APPENDIX	37
13.1	Source Code	
13.2	GitHub & Project Demo Link	51

CHAPTER 1

1.INTRODUCTION

DATA ANALYTICS

Data analytics is the process of examining unprocessed datasets to find patterns, make inferences, and suggest areas for improvement. Analytics in the field of health care use data to generate insights that assist in business and patient decision-making. By enabling more accurate diagnoses, preventive interventions, individualised treatment plans, and informed decision-making, health data analytics are utilised to improve patient care. On a corporate level, it can lower costs, improve internal procedures, and do other things. Before we can discuss health data analytics and the role it plays in the healthcare sector, we must first understand the data that is being collected and processed. Data is being obtained about the activities and procedures on the business side.

1.1PROJECT OVERVIEW:

Every day, your consumers generate a huge amount of data. Each time a person opens your email, uses your mobile app, tags you on social media, enters your store, makes an online purchase, speaks to a customer service agent, or asks a virtual assistant about you, these technologies collect and process that data for your business. These are just a few of your clients. A tonne of data is generated every day by employees, supply networks, marketing programmes, finance divisions, and other factors. Big data is a very large volume of information and datasets that come from many different sources and are in a wide variety of forms. Many companies have come

to understand the advantages of amassing as much data as possible. Massive data collection and storage is necessary, but you also need to put the data into practise. organisations vital insights in light of how swiftly technology is evolving. Finding patterns, trends, and correlations in enormous amounts of raw data in order to assist data-driven decision-making is known as big data analytics. With the use of more modern tools, these approaches apply well-known statistical analysis techniques to larger datasets, such as clustering and regression. The phrase "big data" has gained popularity since the early 2000s, when improvements in technology and software allowed corporations to manage significant amounts of unstructured data. Since then, new innovations have further increased the vast amounts of data that businesses can now access, such as cellphones and Amazon. In reaction to the data explosion, early innovation projects like Hadoop, Spark, and NoSQL databases have arisen. This field of study continues to advance as data engineers look for ways to merge the large volumes of complicated data created by sensors, networks, transactions, smart devices, web traffic, and more. Big data analytics methods are still used in conjunction with cutting-edge technologies like machine learning to uncover and scale more sophisticated insights. Methods and techniques for data analytics have been automated into mechanical processes and algorithms that work with raw data for human consumption. Data analytics is significant since it aids in the performance optimization of enterprises. By finding more cost-effective ways to do business and retaining a lot of data, firms can help cut expenses by incorporating it into their business strategy. Additionally, a business can employ data analytics to generate better business choices.

1.2 PURPOSE

1. Transportation

Data analytics can be utilised to improve the intelligence of the environment and transportation systems. The predictive model used in the research makes it easier to pinpoint transportation problems like network or traffic congestion. There are consequently fewer mishaps and accidents. It assists in synchronising the enormous volume of data, which is then used to create plans and strategies to prepare alternative routes, lower traffic, and ease congestion. Data analytics may help to enhance the travel experience of the buyer by gathering information from social media. The information acquired reportedly helps travel agencies enhance their offerings and customise the trip experience.

2. Logistics and Delivery

Many logistical companies, including DHL, FedEx, and others, use data analytics to manage their overall operations. Using GPS trackers and data analytics tools, they can choose the best shipping routes, predict delivery times, and monitor the status of delivered goods. Demand for online shopping has increased and been made easier by data analytics.

3. Web Search or Internet Web Results

Web search engines like Yahoo, Bing, DuckDuckGo, and Google will provide results when you search a set of data. The search engines use data analytics algorithms every time you click the search button to instantly provide the most pertinent results. The set of data that is displayed whenever we conduct an information search is obtained through data analytics.

4. Manufacturing

Data analytics helps the industrial sectors maintain their overall productivity by using techniques like budgeting, regression analysis, and prediction analysis. Based on information acquired and analysed from demand samples, the unit may decide how many things need to be produced. It can also do the same in many other operations, increasing operating capacity and profitability.

5. Security

Data analysts offer the highest level of security to the company, and security analytics is a method of handling internet defence that is focused on the analysis of data to supply proactive safety measures. No company can predict the future, especially when it comes to security risks. However, by sending security investigation tools that can analyse security incidents, it is possible to spot danger before it has a chance to negatively impact your system and primary concern.

6. Education

Currently, applications using data analytics in education are in particular need of data analysts. It is most frequently used in adaptive learning, new technologies, adaptive content, etc. is the assessment, gathering, looking over, and describing information on students and their particular circumstances in order to comprehend and make easier the environments in which learning takes place.

7. Healthcare

Applications of data analytics in healthcare can be used to quickly channel massive volumes of information to find remedies or therapies for a range of illnesses. This will not only allow for exact decision-making based on gathered data, but it may also allow for precise responses to particular patient-specific problems.

8. Military

The military integrates a range of specialised and application-specific use cases with data analytics. It enables managers and engineers to link data analysis to fields like psychology and augmented reality that are boosting military partnerships around the world.

CHAPTER 2

2. LITERATURE SURVEY

TITLE:A SURVEY ON BIG DATA IN HEALTHCARE 2022

AUTHOR: JAVIER NIETO LEON

YEAR OF PUBLICATION: 2022

In the healthcare sector, "big data" refers to the use of consumer, patient, physiological, and medical data that is too large or complex to be understood by conventional data processing techniques. Instead, processing massive amounts of data typically involves using data analysts and machine learning techniques.

Benefits of Big Data in Healthcare

Create a thorough, 360-degree view of the clients, patients, and doctors. A greater level of personalized, efficient care with complete patient reporting. Find geographical markets that have a lot of potential. Healthcare promotion initiatives can be made more effective with knowledge of consumer, patient, and doctor needs and preferences. To identify health outcomes, patient satisfaction, and hospital progress, offer simple to comprehend patterns. Medical records have transitioned to digital format as a result of the rapid growth of virtual data health systems. In addition to EHRs, wearable technologies, smartphone apps, digital marketing activities, social media, and numerous more channels are used to collect a lot of data. Big data systems and technologies for acquiring, analysing, and utilising knowledge are made possible by all of this and can be utilised in health systems. The expense of healthcare in America has steadily risen over the past 20 years.

TITLE:BIG DATA ANALYTICS IN HEALTH CARE

AUTHOR:PRABLEEN KAUR

YEAR OF PUBLICATION: 2021

Chandigarh University's math department is in Punjab, India. Prableen Kaur. Numerous global sectors have generated vast amounts of organised, unstructured, and semi-structured data in recent years, none of which is homogeneous. Big data refers to this enormous amount of data. Data is a reliable source that is being produced at an increasing rate every day. This new data must be saved somewhere in order to get the greatest value from it. Its construction is aided by a variety of sources, including mobile phones, social media, search engine data, healthcare data, and many more. Our traditional database systems cannot handle the vast variety of

data that is arriving at an erratic rate. As a result, the term "big data," which refers to the massive datasets created and rising rapidly over time, was coined. Value extraction from the dataset is made possible through analysis of this data using recently developed technologies and distributed architecture. The New York Stock Exchange, for example, generates about one terabyte of new transaction data each day. One of the key industries where big data analytics is bringing about change is healthcare. In terms of obtaining, analysing, and utilising consumer, patient, physiological, and medical data that is too large or complex to be understood by conventional data processing techniques, the healthcare industry is producing big data. The proliferation of big data in the healthcare industry was facilitated by the rise of value-based healthcare and the digitization of medical records.

TITLE:DATA ANALYSIS OF COVID-19 HOSPITAL RECORDS

AUTHOR:VRUSHABH GADA

YEAR OF PUBLICATION: 2022

One of the most severe pandemics to have ever afflicted humanity is the coronavirus disease of 2019. (COVID-19). Despite the fact that contemporary medicine has advanced significantly as a result of cutting-edge technology, the COVID-19 pandemic still had a huge influence on humanity. The rapid spread of the virus has led to an increase in the number of patients being admitted to hospitals. We propose a contextual patient classification method to enhance the comprehension of the data from the discharge summary of the research hospital. The data were divided into categories using the Knuth-Morris-Pratt technique. Additionally, we looked at patient data both with and without COVID-19. As part of the analysis, studies on age and gender effects overall, pharmaceutical effects, medical procedures and examinations, pulse rate, core body temperature, and other factors were undertaken. The COVID-19

positive patients' life-to-death decision ratio. The achieved classification accuracy for the contextual patient categorization system was 97.4%. The use of contextual patient classification together with data analysis will help all industries better prepare for upcoming COVID-19 pandemic wavesThe COVID-19 outbreak has caused unspeakable devastation in India. Because this calamity wasn't foreseen, many local hospitals weren't equipped to handle it. COVID-19 has caused an alarming increase in patient admissions, putting strain on hospital resources including ventilators, beds, pharmaceuticals (drugs), ICU beds, oxygen supply, etc.

TITLE:INTEGRATIVE ANALYSIS FOR COVID-19 PATIENT OUTCOME PREDICTION

AUTHOR:CHAO H,FANG X,ZHANG J.

YEAR OF PUBLICATION: 2021

Abstract One of the most severe pandemics to have ever afflicted humanity is the coronavirus disease of 2019. (COVID-19). Despite the fact that contemporary medicine has advanced significantly as a result of cutting-edge technology, the COVID-19 pandemic still had a huge influence on humanity. The rapid spread of the virus has led to an increase in the number of patients being admitted to hospitals. We propose a contextual patient classification method to enhance the comprehension of the data from the discharge summary of the research hospital.The data were divided into categories using the Knuth-Morris-Pratt technique. Additionally, we looked at patient data both with and without COVID-19. As part of the analysis, studies on age and gender effects overall, pharmaceutical effects, medical procedures and examinations, pulse rate, core body temperature, and other factors were undertaken. The mortality vs. survival ratio for COVID-19 positive patients has also been studied. The achieved classification accuracy for the

contextual patient categorization system was 97.4%.The use of contextual patient classification together with data analysis will help all industries better prepare for upcoming COVID-19 pandemic waves. The mortality vs. survival ratio of COVID-19 patients was computed based on gender and age disparities. This classification and comparison will help in developing an early forecast for the resource allocation and treatment process for COVID-19 patients using the data from the discharge summary section of the structured data.

TITLE:BIG DATA ANALYTICS IN HEALTHCARE

AUTHOR:J. N. UNDAVIA , A. M. PATEL.

YEAR OF PUBLICATION: 2020

Technology advancements have also opened up new possibilities for automated data collection. One such technology collects vast amounts of data without any additional maintenance or human participation. The health industry sector has had to deal with the requirement to manage the big data being created by multiple sources, which are well known for producing vast amounts of heterogeneous data. One sector that has accepted high degrees of sophistication is healthcare. The essay explains how the massive amount of data produced in the healthcare sector is neither uniform nor a simple type of data. The various data sources and objectives are then highlighted and discussed. Because they come from so many different sources, data must be adaptive in every aspect. Therefore, it is acknowledged that big data analytics has had a legitimate and considerable impact on the healthcare industry.

2.1 EXISTINGSYSTEM:

The potential of enormous volumes of information in the healthcare industry is incredible. Over the past 20 years, it has drawn a lot of attention because of the immense potential it possesses. Numerous public and private sector industries produce, store, and analyse big data in order to improve the services they provide. Some of the big data sources used in the healthcare industry include hospital records, patient medical records, test results, and internet of things-enabled devices. The field of biomedical research also produces a significant amount of big data that is relevant to public healthcare. Effective administration and analysis are required to extract information that is meaningful from this data. If not, using big data analysis to identify a solution soon becomes like looking for a needle in a haystack. Adopting cutting-edge computing technologies for big data analysis is the only way to overcome the specific challenges that each phase of processing big data presents. In order to deliver relevant solutions for improving public health, healthcare providers must be fully furnished with the infrastructure required to consistently collect and analyse big data. Effective big data administration, analysis, and interpretation can radically change the game by opening new doors for modern healthcare. Exactly for this reason, a number of industries, including the healthcare industry, are making active efforts to turn this potential into better services and financial advantages. With a robust integration of biomedical and healthcare data, contemporary healthcare facilities may enhance medical therapy and individualised medicine.

Technical breakthroughs have enabled us to generate ever-increasing amounts of data, to the point that it is now beyond the capacity of currently available technologies. As a result, the phrase "big data" was created to describe enormous and useless volumes of data. In order to extract meaningful information from this data and satisfy our present and foreseeable social demands, we must develop new techniques

for organising data. One of these particular societal needs is healthcare.

Like many other sectors, the healthcare industry is producing data at a high rate, which has both many advantages and challenges. This introduction covers the principles of big data, such as its management, analysis, and potential applications in the future, notably in the healthcare industry.

In fact, healthcare analytics can help patients avoid preventable diseases, cut the cost of care, predict epidemic outbreaks, and generally improve their quality of life.

ADVANTAGES:

Utilizing electronic health records is the first step in modernising healthcare (EHRs). Electronic health records have many benefits, including improved patient care through better safety, efficacy, patient-centeredness, communication, education, timeliness, efficiency, and equity.

2.2 REFERENCES

1. COVID-19 at a designated infectious diseases hospital outside Hubei Province, China, by Cai Q, Huang D, Ou P, Yu H, Zhu Z, Xia Z, Su Y et al. Cham Springer.
2. GB Harerimana, J Jang, W Kim, and H K Park. A technology survey on health big data analytics, IEEE Access 2020.
3. Alban A, Chick SE, Dongelmans DA, Vlaar APJ, and Sent (2020) Using a process simulation to manage ICU capacity during the COVID-19 pandemic Cham Springer.
4. Lin MC, Kung CT, Lan KC, Lee CT, Lee IK, Wang CC. How to effectively put an end to a coronavirus outbreak in a medical facility in 2019 (COVID-19). 2020 J Hosp Infect.

- 5.Corsi A, Pagani RN, de Souza FF, et al. A thorough analysis of the literature on using big data analytics to combat pandemics. 2021, J Ambient Intell Hum Comput.
6. Vrushabh Gada, Madhura Shegaonkar, Madhura Inamdar, Sharath Dinesh, Darsha Sapariya, and Vendant Node (2020), Springer, "Data Analysis of COVID-19 Hospital Records."
- 7.Luo F, Liu X, Cai Q, Chen F, Wang T, Wu Q, He Q, Wang Z, Liu Y, Liu L, and others COVID-19 severity at a specific Shenzhen, China, hospital, Research Gate.
- 8.A. M. Patel and J. N. Undavia (2020). Healthcare Big Data Analytics, Springer

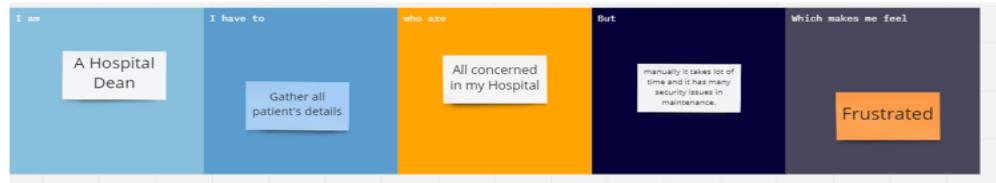
2.3 PROBLEM STATEMENT DEFINITION

Ideation Phase

Define the Problem Statements

Date	24 September 2022
Team ID	PNT2022TMID13523
Project Name	Analytics For Hospitals Healthcare Data
Maximum Marks	2 Marks

Example:



Problem Statement (PS)	I am	I have to	Who are	Because	Which makes me feel
PS-1	A Hospital Dean	Gather all patient's details	All concerned in my Hospital	manually it takes lot of time and it has many security issues in maintenance	Frustrated

CHAPTER 3

IDEATION & PROPOSED SOLUTION

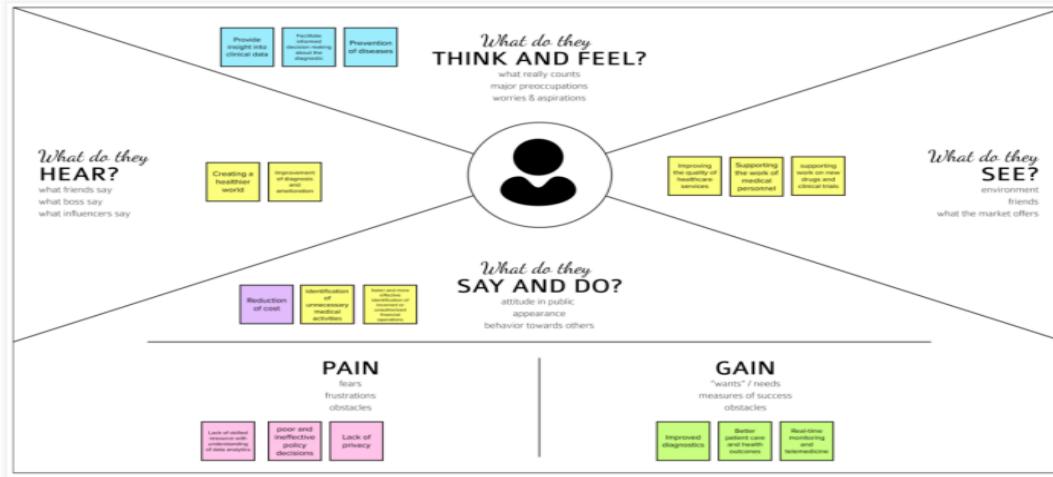
3.1 EMPATHY MAP CANVAS

Empathy Map Canvas

Gain insight and understanding on solving customer problems.

1

Build empathy and keep your focus on the user by putting yourself in their shoes.



Reference:

<https://app.mural.co/t/thiruveni6684/m/thiruveni6684/1663828333678/ce886a6d32bcc1fc84d3b43be38c9fcd59b6a7a0?sender=uae83de0b6881a8b180d75529>

3.2 IDEATION AND BRAIN STORMING

Ideation Phase Brainstorm & Idea Prioritization Template

Date	24 September 2022
Team ID	PNT2022TMID13523
Project Name	Analytics For Hospitals Healthcare Data
Maximum Marks	4 Marks

Step-1: Team Gathering, Collaboration and Select th

template

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

Team gathering

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

Set the goal

Identify what the problem you'll be focusing on solving in the brainstorming session.

Learn how to use the facilitation tools

Use the facilitation Superpowers to run a happy and productive session.

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

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? Download a PDF version of this template to start your work.

Open resource

Step-2: Brainstorm, Idea Listing and Grouping

2 Brainstorm

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

⌚ 10 minutes

3 Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky 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

Step-3: Idea Prioritization

4 Prioritize

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

⌚ 20 minutes

After you collaborate

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

Quick add-ons

- Share the mural: Share the link to the mural with stakeholders to keep them in the loop about the outcomes of the session.
- Export the mural: Export the mural as a PNG or PDF to attach to emails, include in slides, or save on your drive.

Keep moving forward

- Brainstorm template: Define the components of a new idea or strategy. [Open this template](#)
- Customer experience journey map: Document customer needs, motivations, and obstacles for an experience. [Open this template](#)
- Open the template: [Open this template](#)
- Strengths, weaknesses, opportunities & threats: SWOT analysis for strengths, weaknesses, opportunities, and threats (SWOT) to developing a plan. [Open this template](#)

Share template feedback

3.3 PROPOSED SOLUTION

Project team shall fill the following information in proposed solution template.

Proposed Solution Template:

Project team shall fill the following information in proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	To propose a solution to analyse the healthcare data and derive the useful insights to patient and doctor to help them , it is very necessary to keep track of patient data for future references and treatment. It is used to predict the length-of-stay for each patient at time of admission
2.	Idea / Solution description	We propose a solution to build a simple web application which takes input as patient-data and returns us output with the useful analysis with the help of the IBM Cognos analytical tool. The results will be displayed to the end user in the form of interactive dashboard, story and in report format.
3.	Novelty / Uniqueness	The innovative and additional perk to make this solution stronger and the results more reliable, we use machine learning algorithms to develop a predictive analysis model which will be used to make predictions either on the patient healthstatus or the necessary input data.
4.	Social Impact / Customer Satisfaction	The solution can never go unnoticed, though it is new to the society, because it is in a proactive way of analysis and prediction. It will address the concern of the key stakeholders, so it will create the impact in the customer as well as the social side.
5.	Business Model (Revenue Model)	The take-away of this project in a business scope of manner is mean to be plenty, it can be beneficial for the users (Patients and Doctors) more intriguing way. It is in need for the community of people, where it comes to handy in day-to-day life. It is a part of the live saving analysis and insights.
6.	Scalability of the Solution	Scalability is the measure of the system performance against the increase or decrease in user demand. The system can handle the user request and return the results on time. It does not require much of the Graphical processor unit.

3.4 PROBLEM SOLUTION FIT

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	To propose a solution to analyse the healthcare data and derive the useful insights to patient and doctor to help them , it is very necessary to keep track of patient data for future references and treatment. It is used to predict the length-of-stay for each patient at time of admission
2.	Idea / Solution description	We propose a solution to build a simple web application which takes input as patient-data and returns us output with the useful analysis with the help of the IBM Cognos analytical tool. The results will be displayed to the end user in the form of interactive dashboard, story and in report format.
3.	Novelty / Uniqueness	The innovative and additional perk to make this solution stronger and the results more reliable, we use machine learning algorithms to develop a predictive analysis model which will be used to make predictions either on the patient healthstatus or the necessary input data.
4.	Social Impact / Customer Satisfaction	The solution can never go unnoticed, though it is new to the society, because it is in a proactive way of analysis and prediction. It will address the concern of the key stakeholders, so it will create the impact in the customer as well as the social side.
5.	Business Model (Revenue Model)	The take-away of this project in a business scope of manner is mean to be plenty, it can be beneficial for the users (Patients and Doctors) more intriguing way. It is in need for the community of people, where it comes to handy in day-to-day life. It is a part of the live saving analysis and insights.
6.	Scalability of the Solution	Scalability is the measure of the system performance against the increase or decrease in user demand. The system can handle the user request and return the results on time. It does not require much of the Graphical processor unit.

CHAPTER 4

REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

Processor	:2.4GHz processor
Ram:2.00GB	
HardDisk	:100GB
Monitor	:CRT Monitor 1.5 inch
Keyboard	:Multimedia keyboard
Mouse	:Optical mouse

4.2 NON-FUNCTIONAL REQUIREMENTS

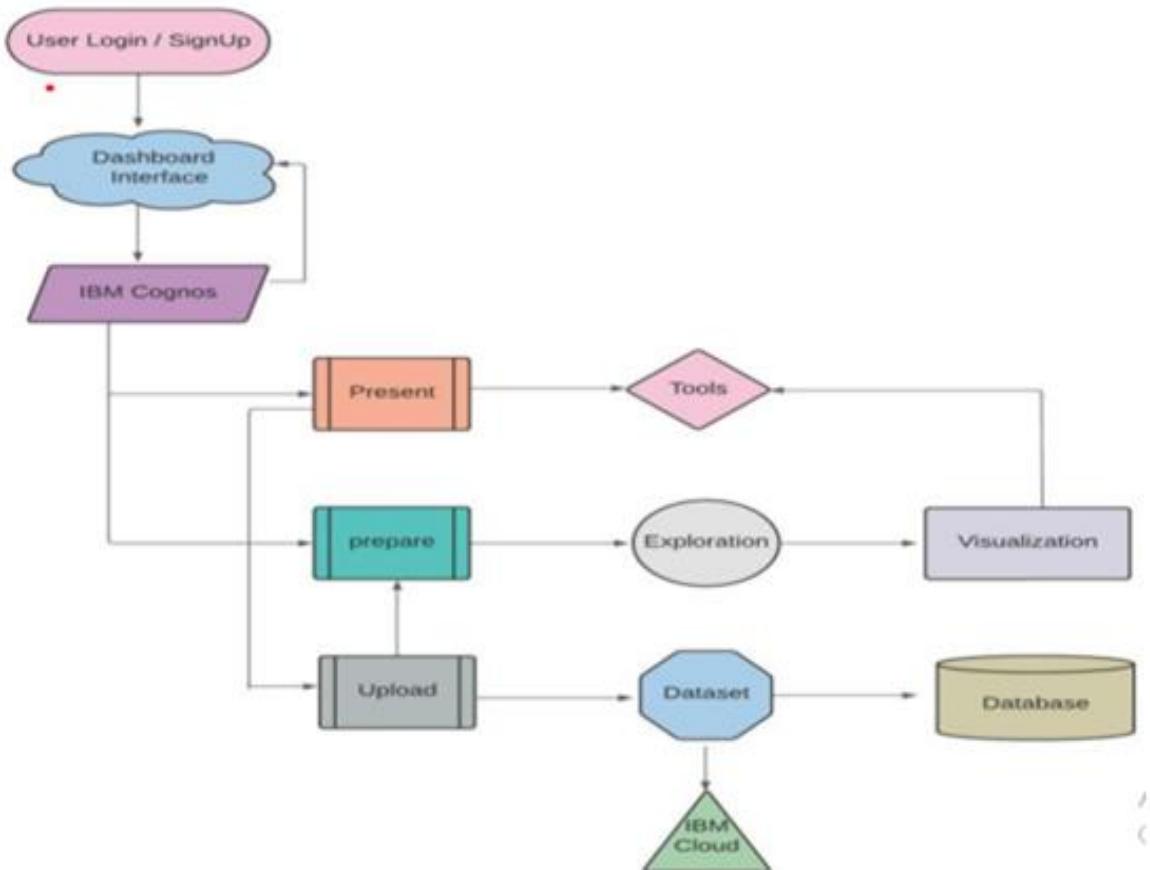
Operating System	:Windows 7
Tools	:IBMCognos Analytics.
Cloud	:IBM Cloud
Browser	:Any Browser

CHAPTER 5

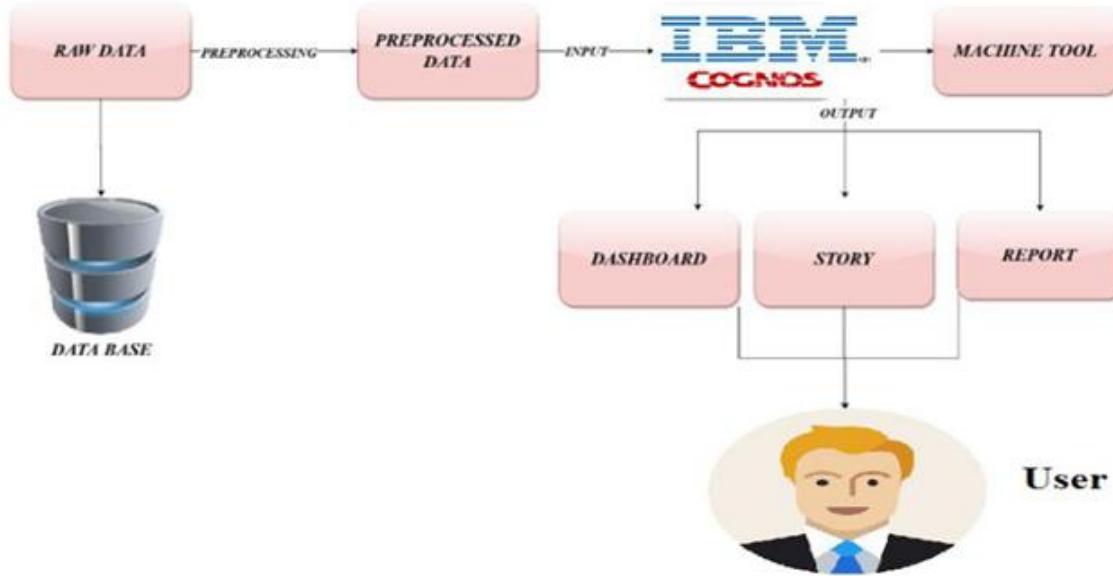
5. PROJECT DESIGN

An information flow diagram can depict how data moves throughout a process. This covers data input/output, data storage, and the various data-moving supporting processes. Standardized symbols and notations are used to generate DFDs in order to characterise diverse entities and their relationships.

5.1 DATA FLOW DIAGRAM



5.2 SOLUTION&TECHNICAL ARCHITECTURE



SOLUTION AND TECHNICAL ARCHITECTURE

IBM Cognos Analytics provides visualizations, exploration, dashboard report and stories to communicate and analysis. You can assemble a view that contains visualizations such as a graph, chart, plot, table, map, or any other visual representation of data. Explore powerful visualizations of your data in IBM Cognos Analytics and discover patterns and relationships that impact your business. A dashboard helps you to monitor events or activities at a glance by providing key insights and analysis about your data on one or more pages or screens.

5.4 USER STORIES

An informal, generalised explanation of a software feature written from the client's or end user's point of view is known as a "user narrative." In a user story, the value that a piece of work will provide the client is explained.

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	I can register & access the dashboard.	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
Customer (Web user)	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
Administrator	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
Exploration	Dashboard	USN-9	As a user ,I can contact administrator for my queries.	I can contact administrator for solving my queries.	High	Sprint-4
Presentation	Dashboard	USN-10	As a user, I can prepare data by using Exploration Techniques.	I can prepare data by using Exploration Techniques.	High	Sprint-4
Visualization	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
		USN-12	As a user, I can Prepare Data by using Visualization Techniques.	I can prepare data by using Visualization Techniques.	High	Sprint-4

CHAPTER 6

PROJECT PLANNING & SCHEDULING

6.1 SPRINT PLANNING & ESTIMATION

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

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	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	Thiruveni B
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	Shalini M
Sprint-3	Dashboard	USN-3	As a health care provider I can use my account in my dashboard for uploading dataset.	10	Medium	Ruthra S.J
Sprint-3	Visualization	USN-4	As a health care provider I can prepare data for Visualization.	10	High	Bharathi S
Sprint-4	Visualization	USN-5	As a health care provider I can present data in my dashboard.	10	High	Thiruveni B
Sprint-4	Prediction	USN-6	As a health care provider I can predict the length of stay	10	High	Ruthra S.J

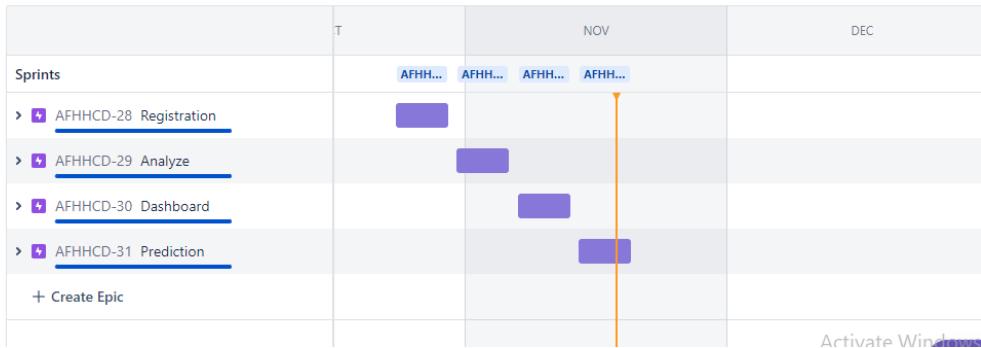
6.2 SPRINT DELIVERY SCHEDULE

Project Tracker, Velocity & Burndown Chart: (4 Marks)

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

6.3 REPORTS FROM JIRA

Jira brings teams together for everything from agile software development and customer service to start-ups and companies. Jira assists teams in planning, assigning, tracking, reporting, and managing work.



CHAPTER 7

CODING & SOLUTION

7.1 FEATURE 1

To present your insights and analysis, IBM Cognos Analytics offers dashboards and stories. A view that includes visualisations, such as a graph, chart, plot, table, map, or any other type of visual representation of data, can be put together.

7.2 FEATURE 2

Discover trends and correlations that have an influence on your business by exploring stunning data visualisations in IBM Cognos Analytics. By presenting critical insights and analyses about your data on one or more pages or screens, a dashboard enables you to keep track of events or actions at a glance.

The modules in our work are as follows:

Utilizing The Dataset

Charts for Data Visualization

Establishing The Dashboard

7.3 DATABASE SCHEMA

You regularly use databases, which are specialised collections of data elements. The dashboards, stories, or explorations that use that data collection are updated as you make changes to it the next time you run them.

Need to first comprehend the database and the platform used to load it into the cloud.

Build the necessary visualizations to offer a range of visual analytic solutions.

Understanding The Database is a task for working with a dataset.

Column	Description
case_id	Case_ID registered in Hospital
Hospital_code	Unique code for the Hospital
Hospital_type_code	Unique code for the type of Hospital
City_Code_Hospital	City Code of the Hospital
Hospital_region_code	Region Code of the Hospital
Available Extra Rooms in Hospital	Number of Extra rooms available in the Hospital
Department	Department overlooking the case
Ward_Type	Code for the Ward type
Ward_Facility_Code	Code for the Ward Facility
Bed Grade	Condition of Bed in the Ward
Patientid	Unique Patient Id
City_Code_Patient	City Code for the patient
Type of Admission	Admission Type registered by the Hospital

Severity of Illness	Severity of the illness recorded at the time of admission
Visitors with Patient	Number of Visitors with the patient
Age	Age of the patient
Admission_Deposit	Deposit at the Admission Time
Stay	Stay Days by the patient

Database

i. Loading The Database

- Before you can build a view and analyze your data, you must first connect the data to IBM Cognos.
- Cognos supports connecting to a wide variety of data, stored in a variety of places.
- The data might be stored on your computer in a spreadsheet or a text file

CHAPTER 8

TESTING

8.1 TEST CASES

Testing is done to look for mistakes. Testing is the process of looking for any flaws or weaknesses in a piece of work. It offers a means of testing whether parts, sub-assemblies, assemblies, and/or a finished product perform properly. It is the process of testing software to make sure that it satisfies user expectations and meets requirements without failing in an unacceptable way. Different test types exist. Every test type responds to a certain testing requirement.

8.2 USER ACCEPTANCE TESTING

Acceptance by users Any project's testing phase is crucial and necessitates the end user's active involvement. Additionally, it makes sure the system satisfies the functional specifications. At this step, all test cases are executed to make sure the software is accurate and complete.

Before the customer will accept the programme, the test must be successfully done.

After customer personnel have verified that the preliminary production statistics load is accurate and that the test suite has been completed flawlessly, the customer formally accepts the delivery of this system.

CHAPTER 9

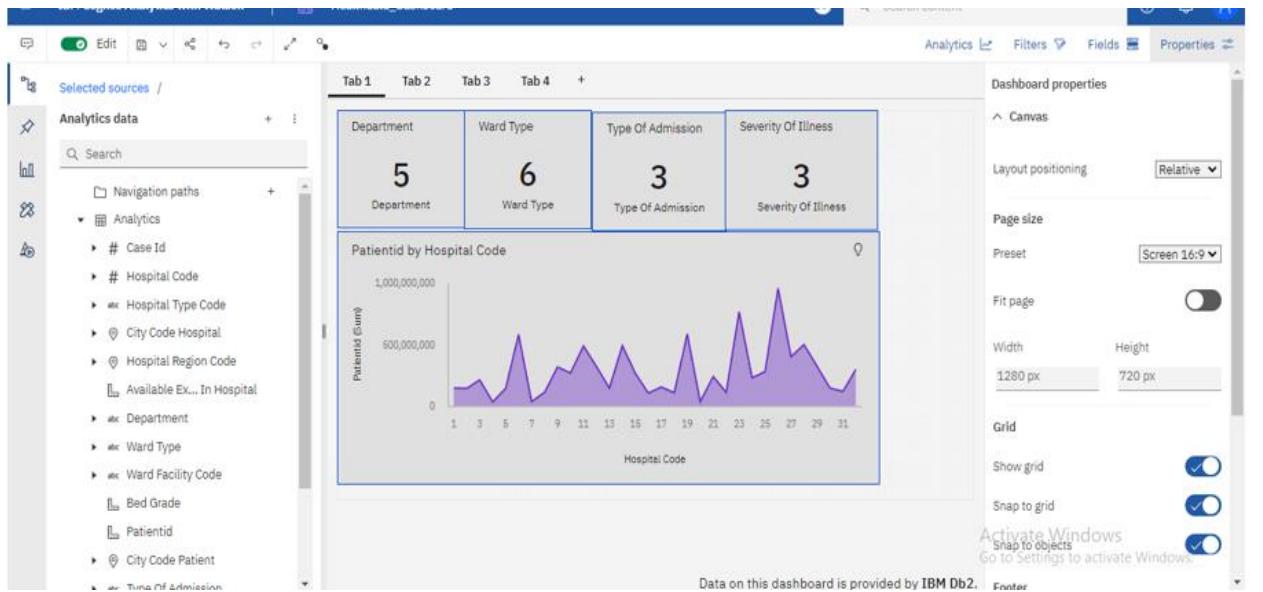
RESULTS

9.1 PERFORMANCE METRICS

We intend to generate a variety of graphs and charts to emphasise the insights and visualisations using the Hospital's health care management dataset.

9.1.1.Case_id by Number of Patients by Ward Types

Create a case id by patient count by ward type visualisation.



9.1.2. Dashboard To Show Number Of Patients

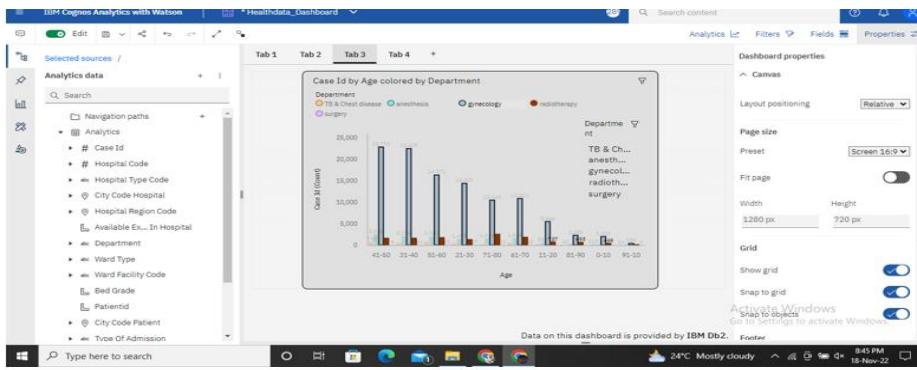
Build the visualization in IBM cognos Analytics by using the Dashboard To Show Number Of Patients



9.1.3. Age wise Number of Patients with

Department and Severity Filters:

Create a visual representation of a column showing the number of patients by age and the filters for department and severity.



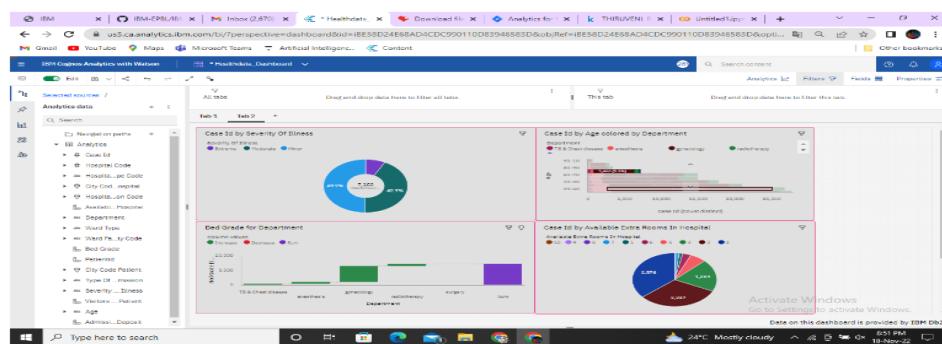
9.1.4. Dashboard Showing Pie, Stacked Bar, Waterfall And Pie Charts

Waterfall And Pie Charts

Build the visualization of Dashboard Showing Pie, Stacked Bar, Waterfall And Pie Charts

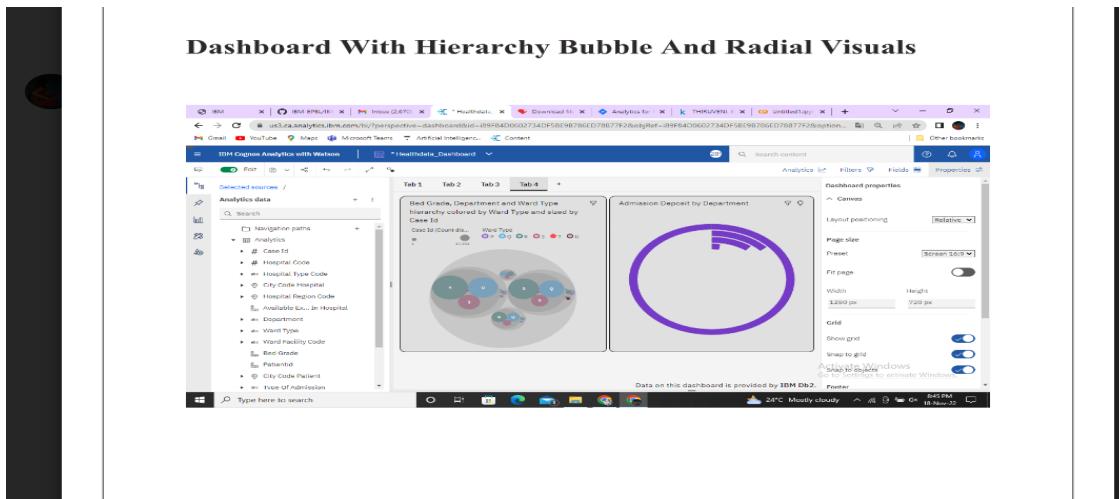
Waterfall And Pie Charts

Dashboard Showing Pie, Stacked Bar, Waterfall And Pie Charts



9.1.5.Dashboard With Hierarchy Bubble And Radial Visuals

Build a Dashboard With Hierarchy Bubble And Radial Visuals



9.1.6.CreatingTheDashboard

A data dashboard is a tool that many businesses use to monitor, examine, and present data—typically to acquire understanding of the general health of an organisation, division, or particular procedure. combining all previously produced charts to create an interactive dashboard.

CHAPTER 10

10.1 ADVANTAGES

Easy to gather patient information.

We can assess the profit or loss and farmers can easily learn new skills.

10.2 DISAVANTAGES

The problem of lack of privacy is industry.

Pricey to acquire unless already.

Valid instrument is necessary.

CHAPTER 11

CONCLUSION

Patients who travel from far-off places to their clinic benefit much from health data. Because the medical staff won't have to scour a storage room full of crammed shelves for their paper records, they can be treated much more quickly. It will only take a few system

clicks to acquire access to the patient records. EMR also improves efficiency, which is crucial in underdeveloped nations where the number of healthcare professionals is still insufficient to satisfy the demands of the population. More patients can be treated the more efficiently each visit runs. The versatility of the filtering mechanism is improved by BL. In addition to classification tools, the system offers a robust rule layer that makes use of a flexible language to construct filtering rules (FRs), allowing users to decide which contents should not be displayed on their walls. According to the demands of the user, FRs can enable a number of various filtering criteria that can be combined. In order to provide the filtering criteria to be used, FRs specifically make use of user profiles, user relationships, and the outcome of the categorization process. Additionally, the system supports user-defined Blacklists (BLs), which are lists of users who are momentarily barred from posting any sort of messages on a user wall. There are several ways to put an EMR system into practice. You can choose to build up your own server room or use the services of a cloud hosting company, depending on your available time, space, and resources. The second choice is quicker and involves less preparation. This technique also has the benefit of having the host maintain the server. Your current medical records will need to be digitised after your EMR is established, which will be a time-consuming and laborious process.

CHAPTER 12

FUTURE SCOPE

As part of this project, we will analyse some significant visualisations, build a dashboard, and then go through these to gain the majority of the analytics for hospital health care data insights. Analytics is the understanding of data patterns to support performance enhancement and decision-making. Agriculture By analysing several significant visualisations and building a dashboard with the use of data analytics, we can gain the majority of the insights and analytics for hospital health care data. Hospitals utilise IBM Cognos Analytics to provide reports, models, analyses, visualisations, exploration, dashboards, and storytelling so that staff members can quickly grasp the data pertaining to their organisations and come to wise judgments.

ADVANTAGES:

There are several ways to visualise the data using IBM Cognos analytics.

- i. Several issues are apparent.
- ii. Health care utilisation data for the year.
- iii. Implement standard medical records,
- iv. Data gathering quality assurance.

CHAPTER 13

APPENDIX

13.1 SOURCE CODE

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Data Analytics</title>
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
<link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">
<script src="https://ajax.googleapis.com/ajax/libs/jquery/3.6.0/jquery.min.js"></script>
<script src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></script>
</head>
<body>

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

<div class="container">
<b>Analytics For Hospitals' Health-Care Data</b>
<br>
```

Recent Covid-19 Pandemic has raised alarms over one of the most overlooked areas

to focus: HealthcareManagement.

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.

Goal:

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.

Technical Architecture:


```
</div>
</body>
</html>
<!DOCTYPE html>
<html lang="en">
<head>
<title>Data Analytics</title>
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
<link rel="stylesheet"
 href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">
```

```

<script
src="https://ajax.googleapis.com/ajax/libs/jquery/3.6.0/jquery.min.js"></script>
<script
src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></script>

</head>
<body>

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

<div class="container">
<iframe
src="https://us3.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2FHealthdata_Dashboard&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&mode=dashboard&subView=model000001848e0a42af_00000000"
width="320" height="200" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>
</div>

</body>
</html>
<!DOCTYPE html>
<html lang="en">
<head>
<title>Data Analytics</title>
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1">

```

```

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

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

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

</div>

</body>
</html>
<!DOCTYPE html>
<html lang="en">

```

```

<head>
<title>Data Analytics</title>
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
<link rel="stylesheet"
      href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">
<script
      src="https://ajax.googleapis.com/ajax/libs/jquery/3.6.0/jquery.min.js"></script>
<script
      src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></script>

</head>
<body>

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

<div class="container">
<iframe
      src="https://us3.ca.analytics.ibm.com/bi/?perspective=story&pathRef=.my_fold
      ers%2FAnalytics%2Bstory&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&sceneId=model000001848f71e593_00000001&sceneTime=0" width="320"
      height="200" frameborder="0" gesture="media" allow="encrypted-media"
      allowfullscreen=""></iframe>
</div>

</body>
</html>

```

13.2 GITHUB & PROJECT DEMO LINK

<https://github.com/IBM-EPBL/IBM-Project-2911-1658486221>

S