Traffic And Capacity Analytics
For Major Ports

Team Id: PNT2022TMID00141

TEAM MEMBERS:

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NANDHAKUMAR R
KEESAVAN PR
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PROBLEM STATEMENT

The Indian Railways has a capital base of about Rs. 1 lacs crores and is often referred to as the lifeline of the Indian economy. As it includes transportation of bulk freight and long-distance passengers, traffic and congestion on rail corridors becomes a major challenge. Data analytics can be applied to visualize freight transportation and congestion on rail corridors across major railway ports to get better insight of the working of the port network and to improve the port connectivity.

CHAPTER 1

1. INTRODUCTION

1.1 OBJECTIVES

- To visualize distribution of capacity and traffic for major ports.

- To improve the efficiency in transportation of freights and passengers across major ports based on rail corridor congestion analysis.

- To easily track the ports and improve port connectivity.

1.2 PURPOSE

1. Developed analytics dashboard can be used to track the freight movement patterns across major ports.

2. It can be used to visualize the capacity and to ensure less traffic on the ports.

3. It helps predict delays at the ports due to congestion and makes supply chain efficient.

PLATFORM

IBM Cognos Analytics

CHAPTER 2

2. LITERATURE SURVEY

PAPER-1: PERFORMANCE ANALYSIS OF MAJOR PORTS IN INDIA- A QUANTITATIVE APPROACH.

Publication year : January, 2016

Author : Anindita-Mandal

Summary : The performance of 13 significant Indian ports is examined in the report with regard to important operational performance indicators. India's participation in global trade is growing as a result of its rapid economic expansion. This increases the strain on these ports, which handle a sizable amount of the commerce, to operate as efficiently as possible. The study examines the state of each port in various performance categories by conducting a systematic analysis of various performance indicators over a 10-year period (from 2003 to 2013).

PAPER-2: ENHANCING PORT ACTIVITIES USING INFORMATION AND COMMUNICATION TECHNOLOGY.

Publication year : April,2020

Author : Shuhong Peng, Junaid Quair

Summary :The topic of this essay is how to employ technological improvements to enhance port services and operations. The goal is to provide a comprehensive study of the limited research on smart ports with a focus on the role of ICT (Information and Communication Technology). A few of the port services that are optimised by smart port management include commodity inspection, customs clearance, transportation planning, procedures, and applications, customer service, market information exchange, and insurance provisioning. It has been suggested to use IoT platforms to build a networked and collaborative platform.

PAPER-3: CONCENTRATION ANALYSIS OF CONTAINER TERMINALS IN INDIA.

Publication year   : July,2021

Author name   : K.Chandrasekhar Iyer, V.P.S.N.Nanyam

Summary   : This article investigates India's container terminals' propensity for reconcentration. India's container terminals have grown by 46% in the last five years, and since 2015, they have grown by 9% annually. To take advantage of the underutilised capacity at container terminals, efforts to modernise equipment and digitise processes have been made. This has led to a rise in the use of container terminals across the nation. In terms of the growth share matrix over the under-consideration period, the Adani International Container Terminal (AICT) has emerged as the top performer. analyses India's container terminals' tendencies toward reconcentration.

PAPER-4: AN INTEGRATED BERTH ALLOCATION AND YARD ASSIGNMENT PROBLEM FOR BULK PORTS: FORMULATION AND CASE STUDY.

Publication year   : August,2015

Author name   : Jasem Al-Hammadi and Ali Diabat

Summary   : As a result of the effects of globalisation during the past 10 years, maritime transportation has seen remarkable growth. The rapidly growing demand for commodities supplied by water has led to a lot of attention being paid to improving port efficiency by encouraging the efficient use of available resources. Optimization is crucial in achieving the economical goal of improving port efficiency as opposed to the pricey alternative of increasing existing capacity. The integrated dynamic hybrid berth allocation and yard assignment problem is examined in the context of bulk ports in the current research (BYAP). Key ideas are taken into account in order to construct an usable and realistic model.

PAPER-5: FROM HISTORICAL POSITIONING DATA TO UNSUPERVISED MARITIME TRAFFIC MONITORING.

Published year   : May,2017

Author Name   : Virginia Fernandez Argudas,Giuliana Pallota,Michele Vespe

Summary   : Due to the high volume of maritime traffic and its consequences on the economy, ecology, safety, and security, a system that can monitor maritime traffic without supervision is required. An automated method for creating synthetic maritime traffic is suggested in this research. The primary goal of marine surveillance is to make it possible to automatically monitor, analyse, and comprehend nautical activity. To improve the MSA, the proposed technique is utilised to analyse, model, and depict large amounts of marine traffic data (Maritime Situational Awareness). Creates a network-based picture of maritime traffic by analysing past self-reporting positioning data. The representation of maritime traffic using self-reporting data has been addressed by a number of ways.

CHAPTER 3

3. IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP

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.

Reference:
https://app.mural.co/t/trafficandcapacityanalytics6273/m/trafficandcapacityanalytics6273/1663579
832355/6c61f15d7c31a20fa71ef5af5cc4cee3ac367a17?sender=u562f0f4ce03f4fad30ca3769

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

Step-2: Brainstorm, Idea Listing and Grouping

Step-3: Idea Prioritization

3.3 PROPOSED SOLUTION

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Improving port connectivity and reducing thecongestion on the railcorridors using Data Analytics.
2.	Idea / Solution description	The Indian Railways has a capital base of aboutRs. 1 lakh crores and is often referred to as thelifeline of the Indian economy because of its predominance in the transportation of bulk freight and long-distance passenger traffic.
3.	Novelty / Uniqueness	Traffic survey and assessment of traffic volumesidentification of technically and economically viable route /Alignment
4.	Social Impact / Customer Satisfaction	Adequate resources will be provided. India's electrical crisis 86% of the open wages on the railway are used to deliver poles to different power plants in India. An appropriate supply ofresources will bemade available to prevent power outages.
5.	Business Model (Revenue Model)	Railway ports provide for the tracking of the flow of commodities being transferred from one location to another. Government can ensure reduced traffic on the portsby using a data analytics dashboard.

6.	Scalability of the Solution	With the establishment of the railway as a development effort and the use of data analytics, the Indian economy has moved into a high growth zone.

3.4 PROBLEM SOLUTION FIT

Define CS, fit into CC

1. CUSTOMER SEGMENT(S) CS

The Central Government, which manages Indian Railways, will benefit most.

The organization that routinely transports its goods

6. CUSTOMER CONSTRAINTS CC

The Indian railway system is a pillar of our economy. It's crucial to analyse those because it's challenging to manage traffic in those major ports.

5. AVAILABLE SOLUTIONS AS

Several interlocking device types were introduced. Interlocking manually: Relay, Telematics, Mechanical, and Human Electronic, free-wired relay automatic interlocking.
Failure of the interlocking system can result in a collision.
There are two types of ERTMS, the common signalling and communication system.(ATP) GSM-R ETCS (European Train Control System) (Global System for Mobile Communications - Railway)
None of these options were effective enough.

Explore AS, differentiate

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS J&P

Data analytics can help in reducing rail corridor congestion and enhance the port connectivity

Effective analysis must be done of all the port traffic data.

A critical part of port development is port-rail connectivity, both from an economic and competitive perspective and to minimize the adverse externalities on people and the environment.

9. PROBLEM ROOT CAUSE RC

1.Delay in transporting goods
2. Loss for Industries

7. BEHAVIOUR BE

The customer is the one who sends their goods by train; they need to know if they will arrive safely. They also require the reputation of Indian Railways, which promotes growth for both parties.

Focus on J&P, tap into BE, understand RC

Identify strong TR & EM

3. TRIGGERS TR
Due to increased traffic, it was necessary to assess the capacity and traffic in key ports.

4. EMOTIONS: BEFORE / AFTER EM
BEFORE:
They were unhappy about their products.
AFTER:
They were at ease and felt safe. Transportation

10. YOUR SOLUTION SL

Our Idea is to ask the details of their product and start destination with their given

8.CHANNELS OF BEHAVIOUR CH

8.1ONLINE
Customer can track their goods in their place

8.2 OFFLINE
After the product is reached their required destination Customer will be informed through a normal message which does 't required any network

CHAPTER 4

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 throughGmail
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Input Acceptance	The dashboard accepts userinput by means of selecting thelocation of the ports.
FR-4	Options for User to Filter location of ports	The user can use filter options to view ports by countries.
FR-5	Visualization of ports.	The dashboard offers a number of visualisation methods to follow the flow.
FR-6	Providing DelayInformation of trains.	The dashboard can givethe user information such as the delayof a specific train reaching the ports.

4.2 Non-functional Requirements:

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	The dashboard's visual quality is faultless and the user can utilise it continuously. Users can get the consistency and style theywant from the dashboard.
NFR-2	Security	The dashboard is well protected so that user data is kept private and it is also impervious to all types of attacks.
NFR-3	Reliability	The failure rate is quite small, and employing the measures, any failure may be quickly fixed. As a result, the dashboard is now significantly more trustworthy.
NFR-4	Performance	The performance is enhanced by the dashboard. It provides the user a simple and adaptable UserInterface.
NFR-5	Availability	The dashboard is constantly accessible to users. The dashboard is made available so that the user can view it fromany location at any time.
NFR-6	Scalability	The dashboard can be expanded greatly. It is capable of enduring any change in load.

CHAPTER 5

5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAM
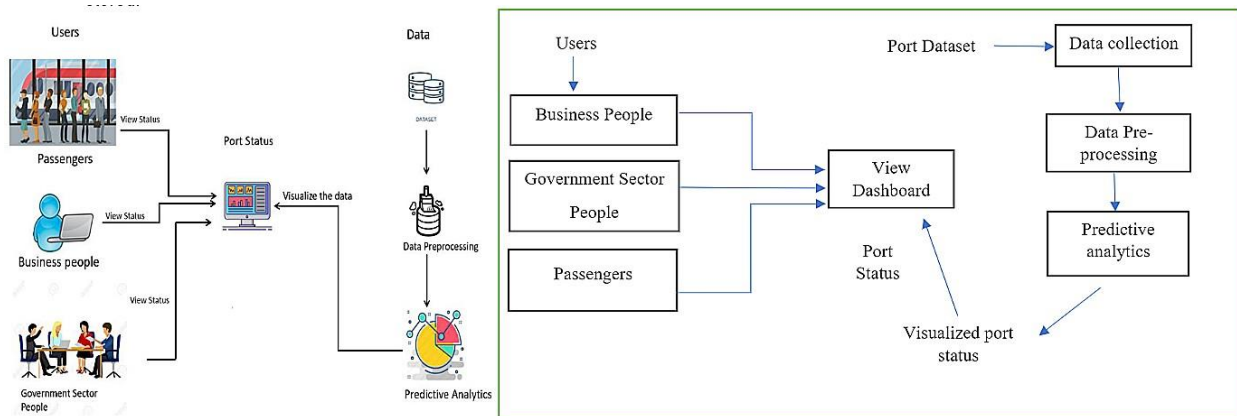
5.2 SOLUTION ARCHITECTURE

Solution architecture is a complex process – with many sub-processes – that bridges the gap betweenbusiness problems and technology solutions. Its goals are to

- Find the best tech solutionto solve existingbusiness problems.
- Describe the structure, characteristics, behaviour, and other aspects of thesoftware to project stakeholders.

- Define features, development phases, and solutionrequirements.
- Provide specifications according to which the solution is defined, managed,and delivered.

Reference:

https://aws.amazon.com/blogs/industries/voice-applications-in-clinical-research-powered-by-ai-on-aws-part-1-architecture-and-design-considerations/
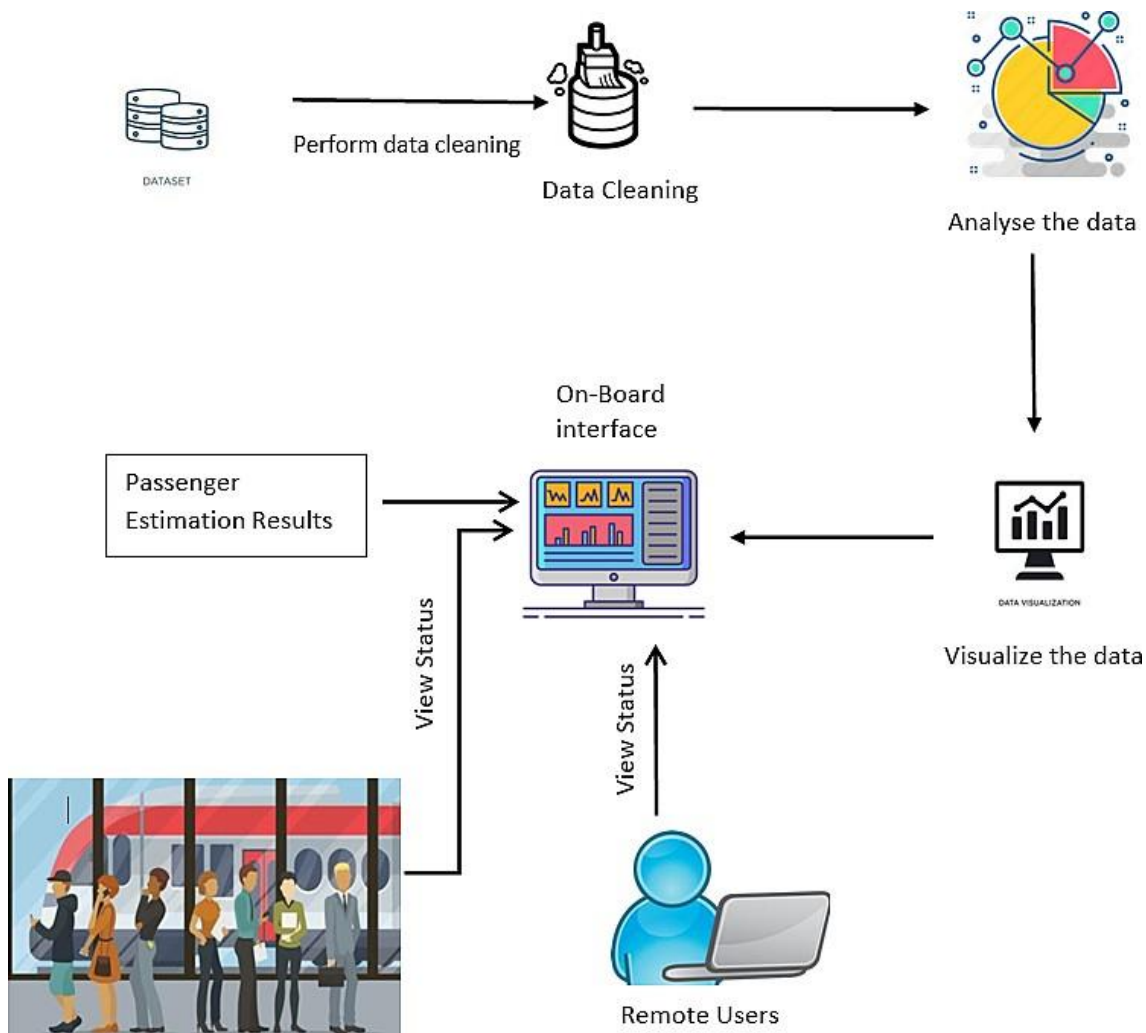
5.3 TECHNICAL ARCHITECTURE:

• To regain some of the market, it has lost over past decades and regain market share in some commodities and overcome the challenges and to maintain sustainable growth in all its commodities.
• Reducing the congestion on rail corridors and improving port connectivity.
• The development of two Dedicated Freight Corridors across key ports
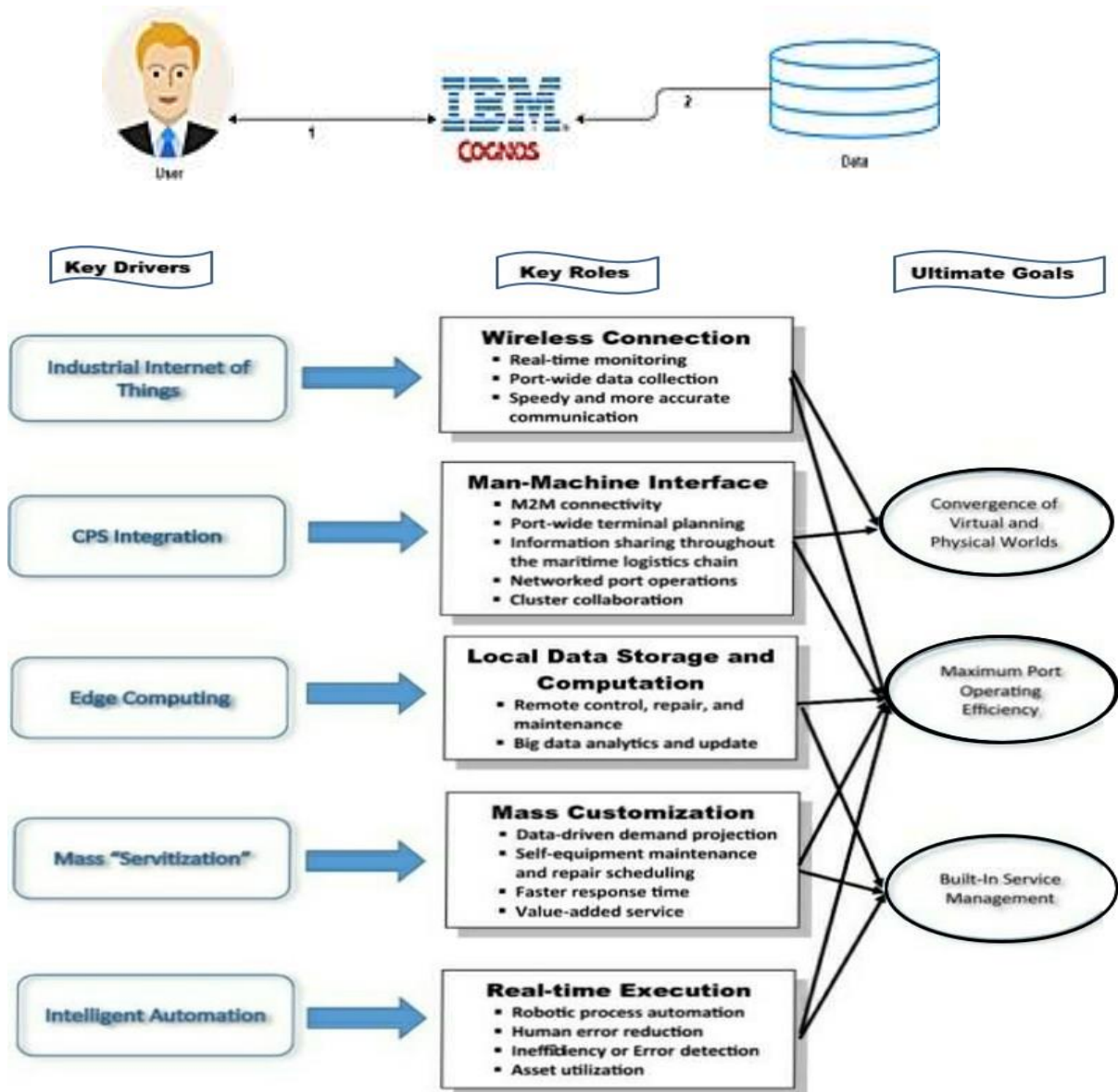
ASSIGNMENT-1

Dataset: 50-Startup-Dataset

Challenge: Upload the dataset to Cognos Analytics, explore and visualize the dataset. About the 50 startups dataset. This particular dataset holds data from 50 startups in New York, California, and Florida. The features in this dataset are R&D spending, Administration Spending, Marketing Spending, and location features, while the target variable is: Profit.

1. R&D spending: The amount which startups are spending on Research and

development.

2. Administration spending: The amount which startups are spending on the Admin panel.

3. Marketing spending: The amount which startups are spending on marketing strategies.

4. State: To which state that particular startup belongs. 5. Profit: How much profit that particular startup is making.

BARCHART

MARKETING SPEND BY STATE
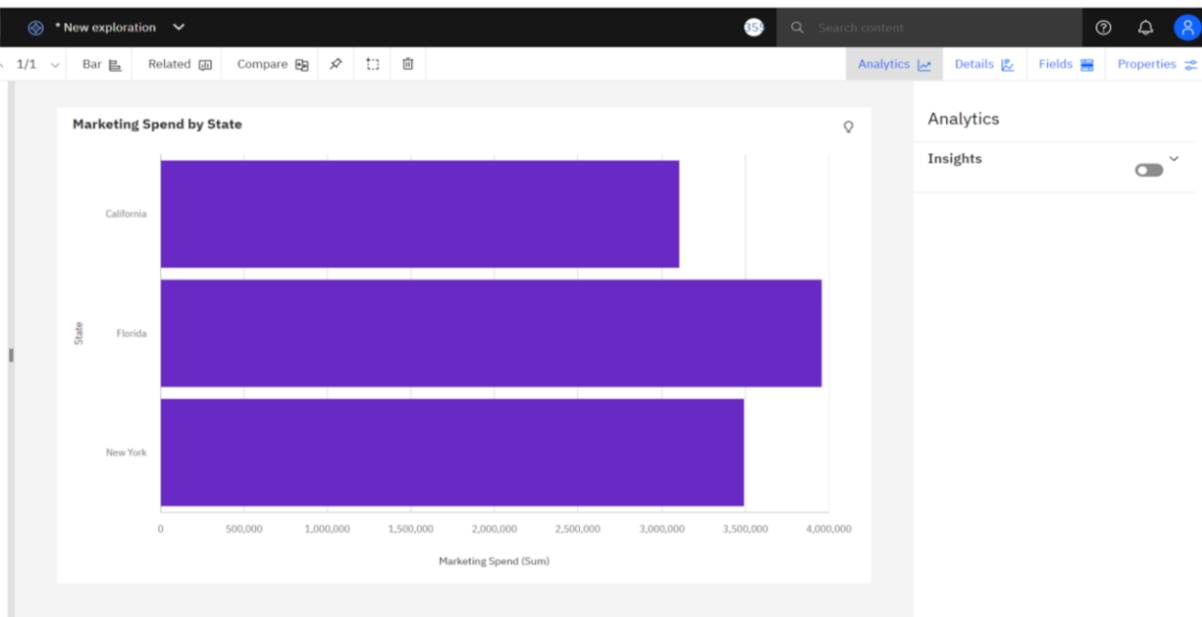
PIE CHART

R&D SPEND BY STATE
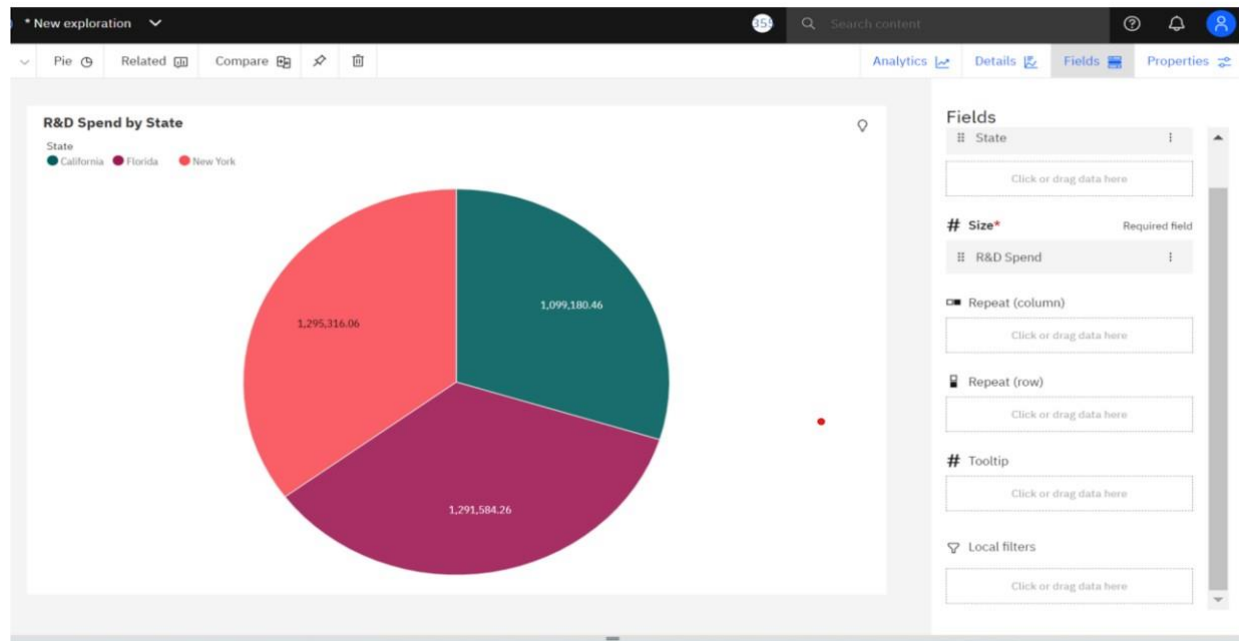
LINE AND COLUMN CHART

MARKETING SPEND AND PROFIT BY STATE
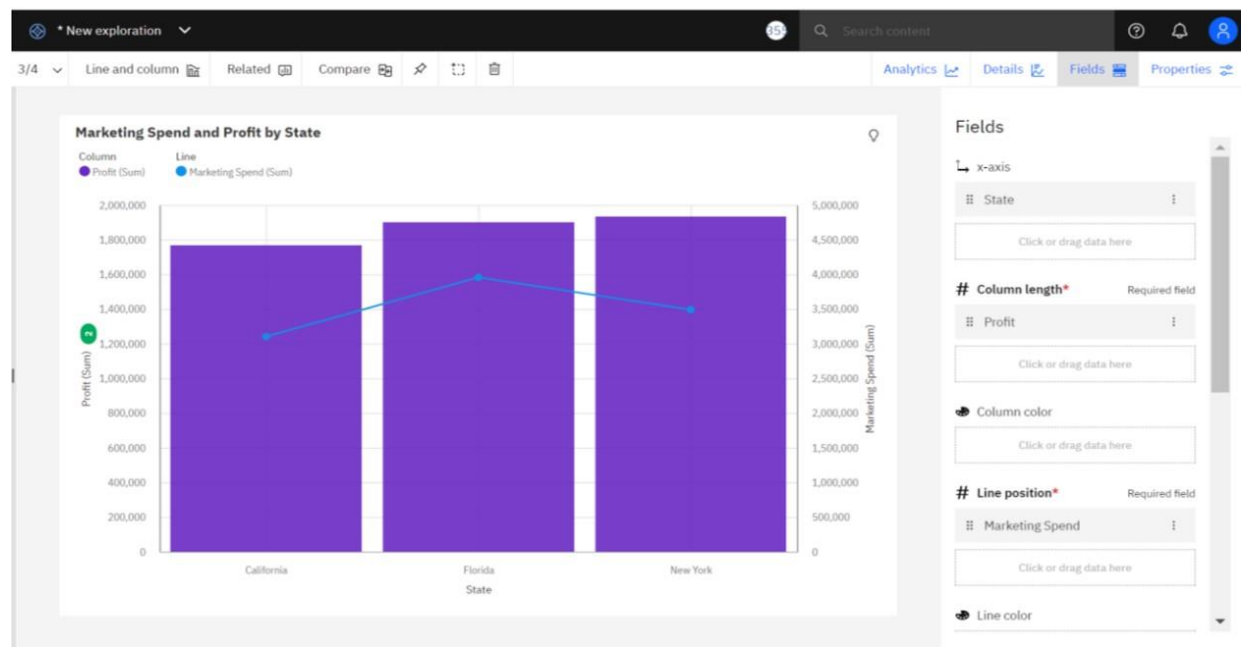
POINT PLOT

Marketing spend by state
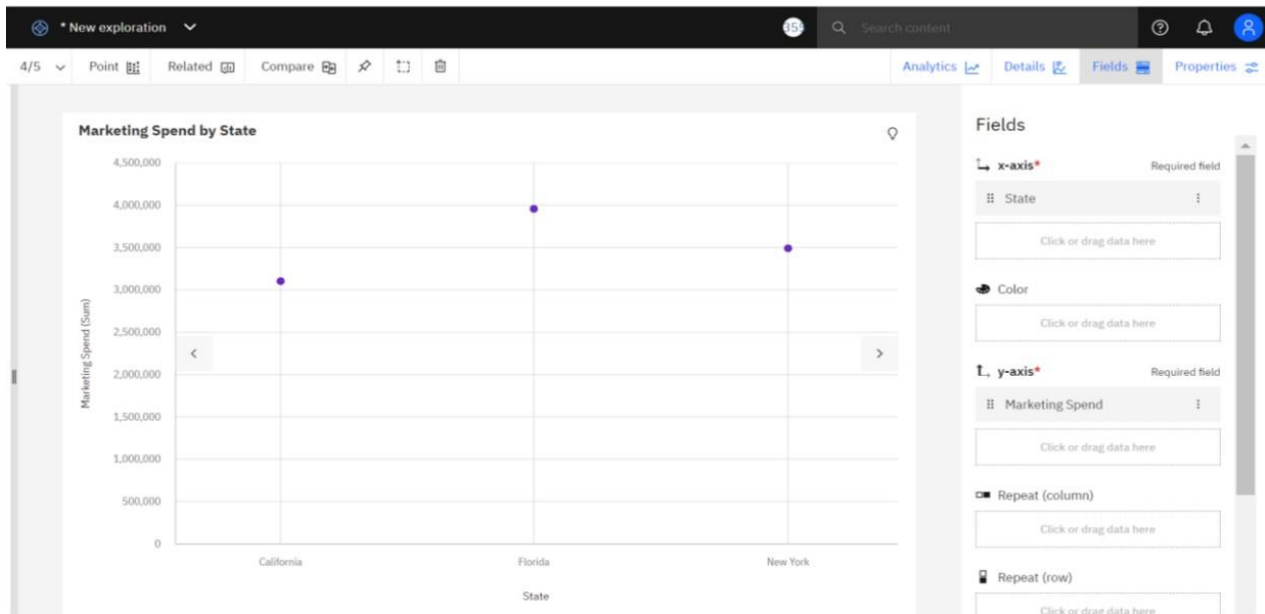
PACKED BUBBLE CHART
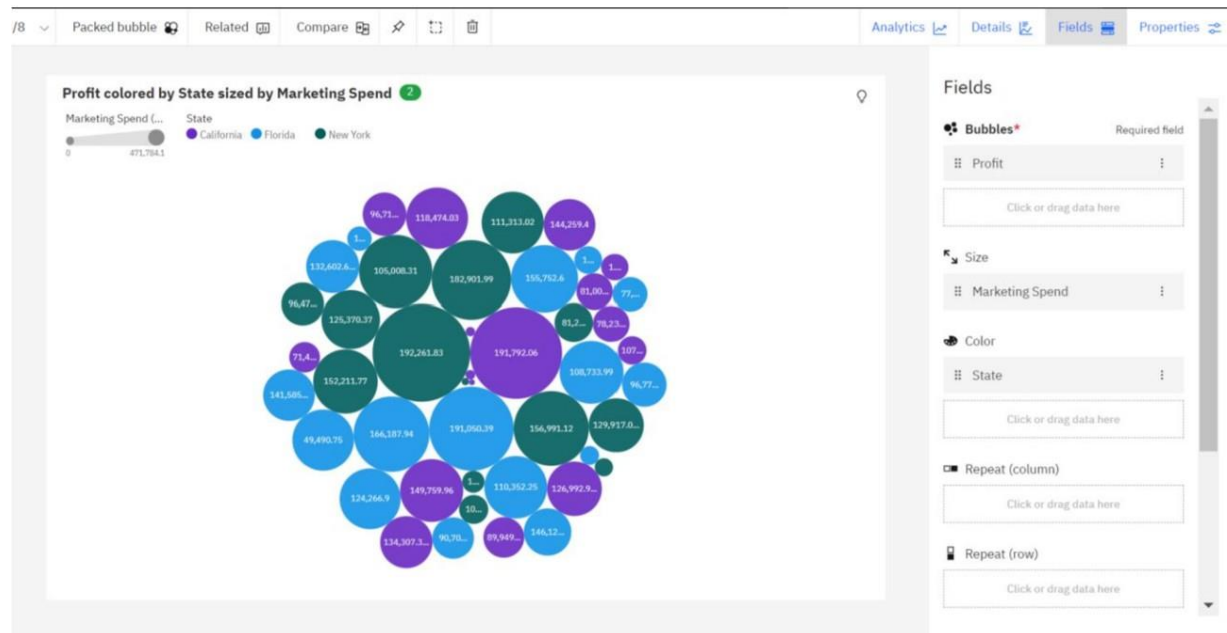
ASSIGNMENT-2

Dataset:- Pharma-Sales-Dataset

Challenge:- Upload the dataset to Cognos

Analytics, prepare the data, explore and Create Interactive Dashboard.

Task 1:Sales By Customer

Task 2:Sales By Location

Task 3:Sales By Sales Representative

Task 4: Received Inventory From Supplier

Task 5: Inventory Stock for Warehouse Locations

Task 6: Sales Trend

Task 7:Monthly Sales

Task 8: Actual and Received Inventory by Mont

Customer and Location Sales
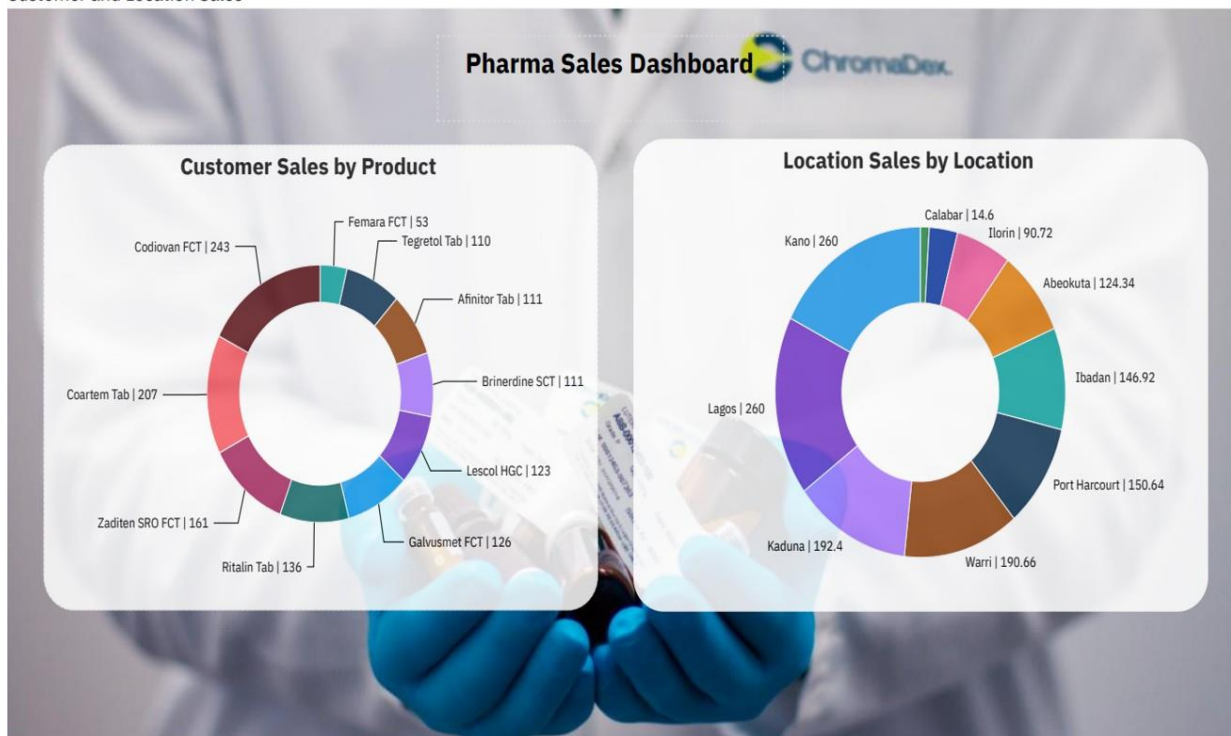
Sales by Sales Representative and Received Inventory By Supplier

Sales by Sales Representative

Categories (x-axis): A. Oni, M. Sule, A. Chukwu, P. Michaels, S. Sunday
Y-axis: 400 to 700

Received Inventory by Supplier

Categories: Astra Zeneca, Novartis, Pfizer, Sanofi
Y-axis: 0 to 600,000
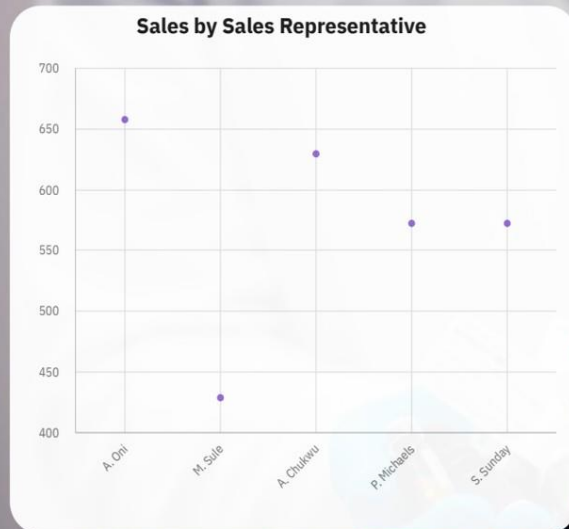
Inventory Stock by Warehouse Location and Sales Trend

ChromaDex.

Inventory Stock by Warehouse Location

- Calabar | 4,080
- Ilorin | 15,820
- Abuja | 17,910
- Warri | 41,890
- Kano | 73,080
- Kaduna | 42,920
- Lagos | 60,424.17
- Ibadan | 44,340
- Abeokuta | 48,560
- Port Harcourt | 47,220

Sales Trend

Legend: Target, Actual

Y-axis (Values): 0 to 1,200
X-axis: January, February, March, April, May, June, July, August, September, October, November, December

CHAPTER 6

6. PROJECT DEVELOPMENT

6.1 Sprint Planning and Estimation

DATE	MILESTONE	ASSIGNEE	STATUS	DESCRIPTION
31/08	Data Collection-Download dataset	Rajeshwari K Nivetha A Renuka S Priyadharshni K	Completed	The dataset for Traffic and Capacity Analytics is to be collected.The dataset which is considered will have the port information
7/09	Data Pre-processing 1.Renaming the coloumn names 2.Preparing calculations 3.Checking for NULL values 4.Checking for ouliers 5.Summarization of dataset 6.Label Encoding	Rajeshwari K Nivetha A Renuka S Priyadharshni K	Completed	Preprocessing involves renaming the existing coloumn names into meaningful one,preparing calculations such as calculating traffic percent,checking for NULL values in the dataset.
14/09	Visualizing the dataset	Rajeshwari K Nivetha A Renuka S Priyadharshni K	Completed	Visulaizing the dataset involves plotting the dataset using various plots and doing analysis on that.
21/09	Model Building 1.Building the model using suitable machine learning algorithm 2.Training and testing the model	Rajeshwari K Nivetha A Renuka S Priyadharshni K	In -Progress	Using certain algorithms to build the model. Those algorithms include 1.Linear regression

DATE	MILESTONE	ASSIGNEE	STATUS	DESCRIPTION
28/09	Dashboard Creation	Rajeshwari K Nivetha A Renuka S Priyadharshni K	Completed	Dashboard for visualizing the port status will be developed.
7/10	Ideation Phase 1. Litreature survey on the selected project and information gathering. 2. Prepare the empathy map. 3. Ideation	Rajeshwari K Nivetha A Renuka S Priyadharshni K	Completed	Start the ideation process
10/10	Project Design Phase -1 1. Proposed solution. 2. Prepared fit solution 3. Solution Architecture	Rajeshwari K Nivetha A Renuka S Priyadharshni K	Completed	Prepare the proposed solution document, which includes the novelty, feasibility of idea, business model, social impact, scalability of solution, etc.
12/10	Project Design Phase -2 1. Customer journey. 2. Functional requirements 3. Data flow diagram. 4. Technology architecture	Rajeshwari K Nivetha A Renuka S Priyadharshni K	Completed	Prepare the customer journey maps to understand the user interactions & experiences with the application (entry to exit) ,Functional requirements and construct architecture
31/10	Project Planning Phase 1.Milestone Activity List 2.Sprint Delivery plan	Rajeshwari K Nivetha A Renuka S Priyadharshni K	Completed	Prepare milestone activity list and sprint delivery plan for outline of work flow
02/11	Project Development Phase 1.Sprint -1 2.Sprint-2 3.Sprint-3 4.Sprint-4	Rajeshwari K Nivetha A Renuka S Priyadharshni K	In-Progress	Plan of each task sprint to be developed.

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

Velocity:

Imagine we have a 6-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) periteration unit (story points per day)

$$AV = \frac{sprint\ duration}{velocity}$$

= 20/6 =3.33

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 suchas Scrum. However, burn down charts can be applied to any project containing measurable progress over time.
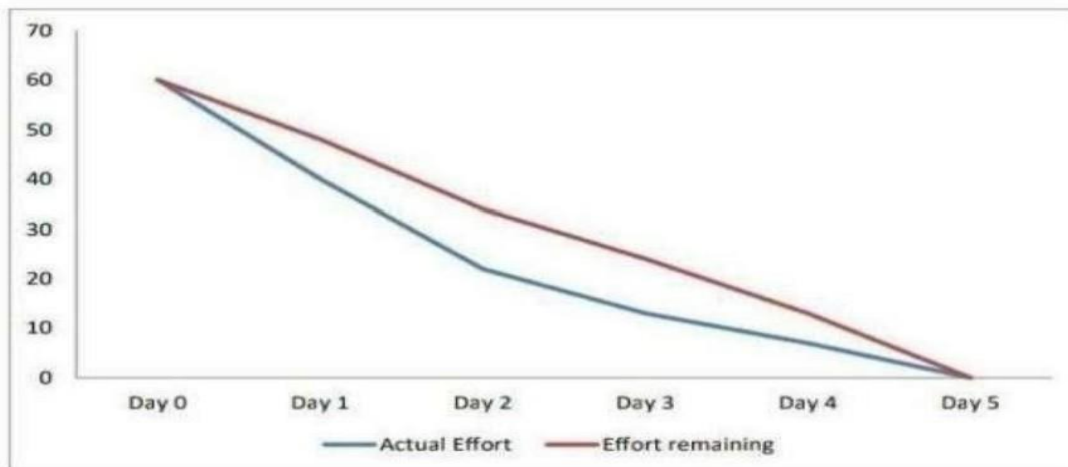
6.3 REPORTS FROM JIRA

RoadMap
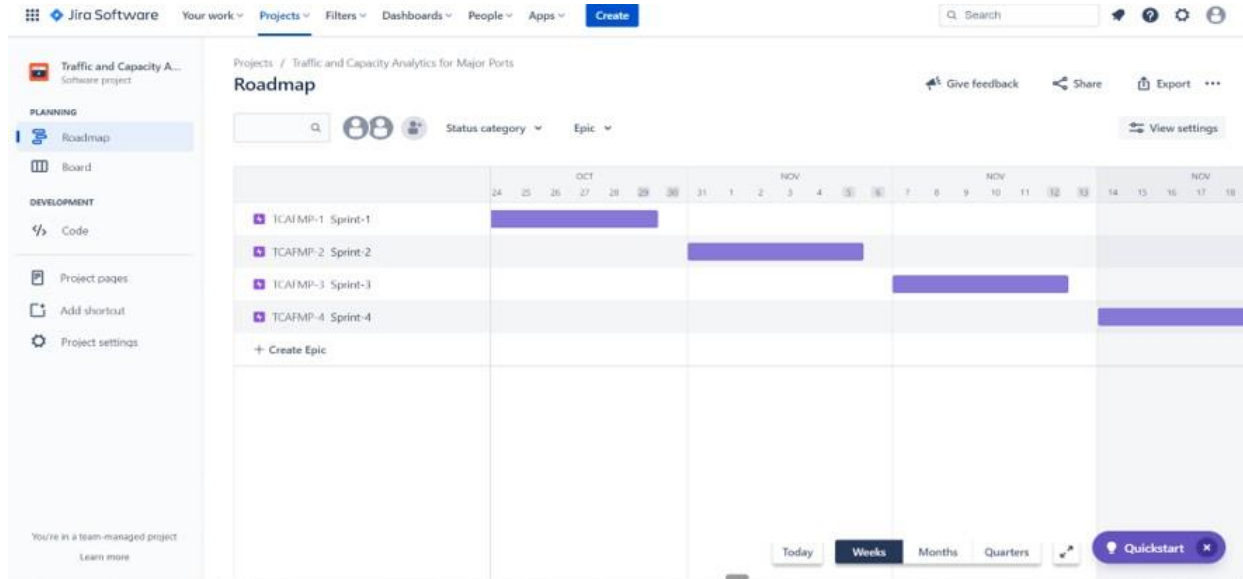
BackLog
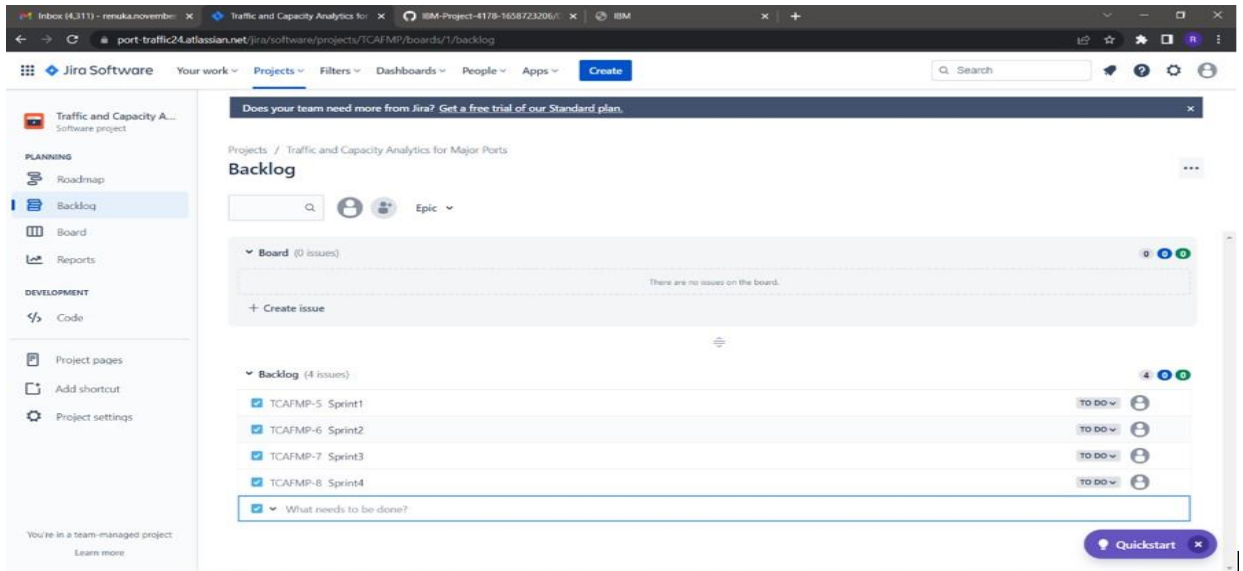
BurnUpChart
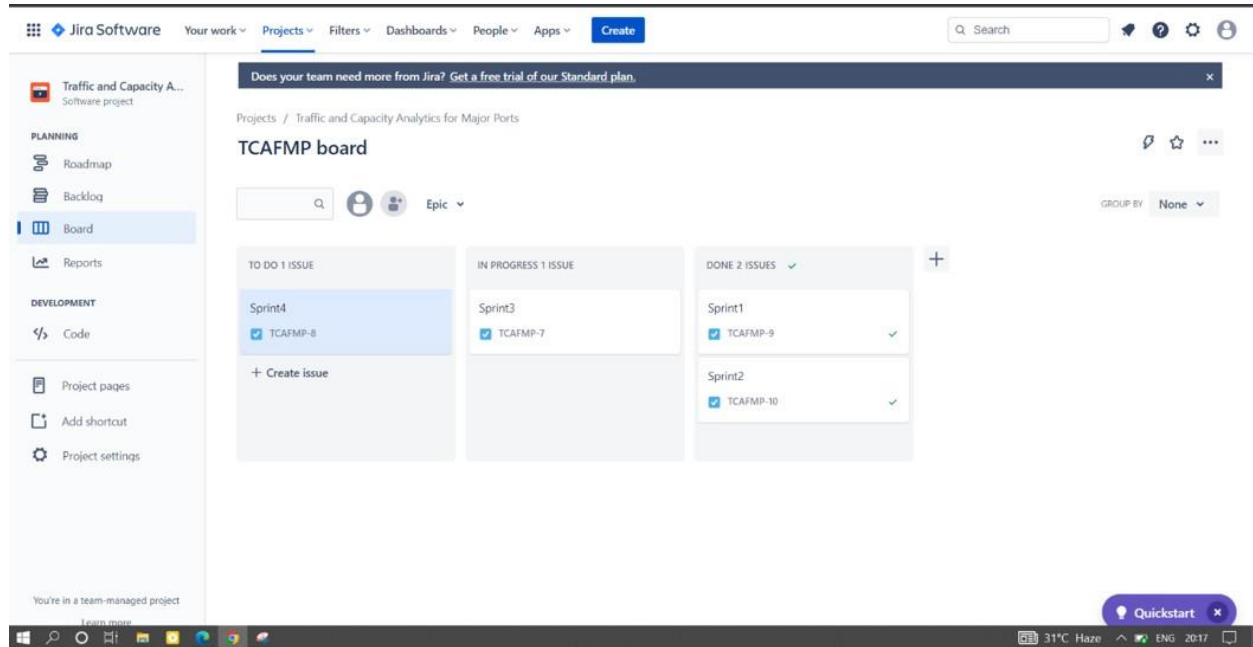
Sprint Burndown Chart
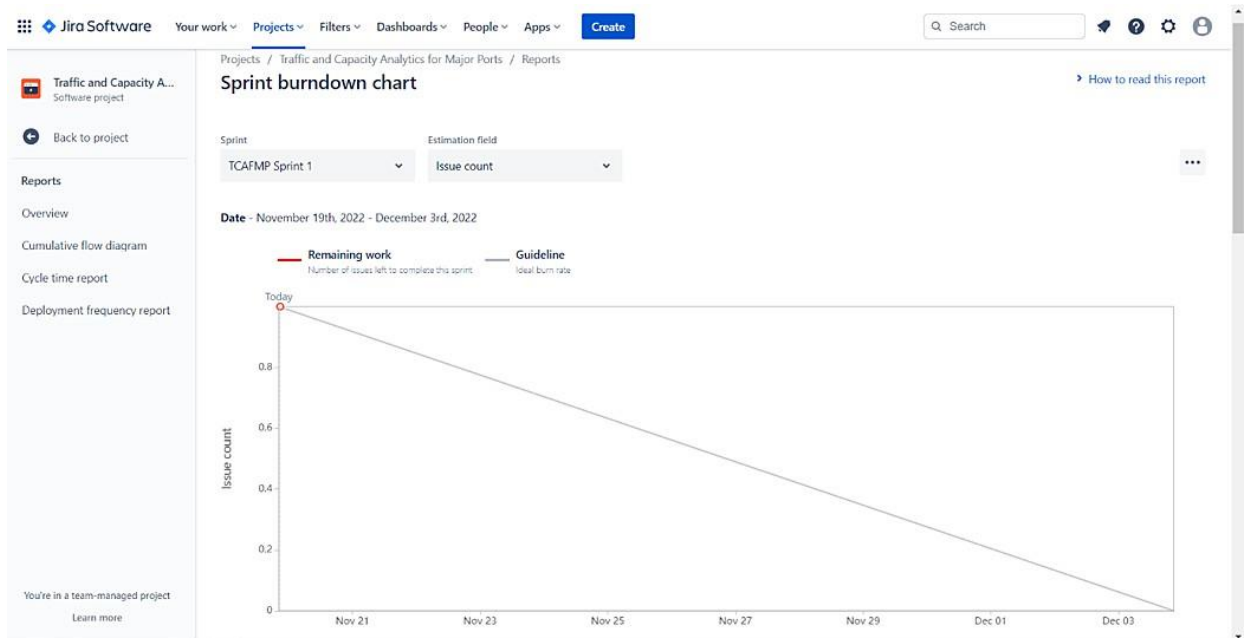
CHAPTER 7

CODING AND SOLUTIONS

Data Analytics includes 4 modules:

    a. Data Collection

    b. Data Preparation and Calculation

    c.   Data Visualization

1. Data Collection:

Data collection is the process of gathering, measuring, and analyzing accurate data from a variety of relevant sources to evaluate outcomes, forecast trends and probabilities. Major data sources used are spreadsheets and csv files.

2. Data Preparation:

Some prevalent challenges faced while collecting data are inconsistent data, ambiguous data, duplicate data, inaccurate data, too much data, etc. To overcome this problem data preparation is done.

It is the process of profiling, cleansing, transforming and validating data.

- Data profiling and cleansing

- Data structuring

- Data transformation

- Data validation

Implementation Details

1. Data analytics for analysing and estimating traffic and capacity on major ports is done by creating various graphs and charts to highlight the insights and visualizations.

2. Plotting different graphs give broad understanding about the data and relationship among the features of data.

3. This supports in creating meaningful dashboards for exploring the data and making future predictions from them.

Code

home.html

```html
<!DOCTYPE html>
<html lang="en">
<head>
<title>Webpage</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>
<style>
    body, html {
  height: 100%;
  margin: 0;
}
.bg {
  /* The image used */
  background-image: url("train1.jpg");

  /* Full height */
  height: 100%;

  /* Center and scale the image nicely */
  background-position: center;
  background-repeat: no-repeat;
  background-size: cover;
}
.fakeimg { height: 200px;
background: rgb(193, 27, 27);
}
</style>

</head>
<body>
<div class="bg">


<h1 style="text-align: center;">Traffic And Capacity Analytics For Major ports</h1>
<nav class="navbar navbar-inverse">
<div class="container-fluid">
<div class="navbar-header">
```

```html
<button type="button" class="navbar-toggle" data-toggle="collapse" data-target="#myNavbar">
<span class="icon-bar"></span>
<span class="icon-bar"></span>
<span class="icon-bar"></span>
</button>
<a class="navbar-brand" href="home.html">Home</a></li>
</div>
<div class="collapse navbar-collapse" id="myNavbar">
<ul class="nav navbar-nav">
<li>    <a    class="navbar-brand"
href="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_f
olders%2FPort%2BTraffic%2BDashboard&action=view&mode=dashboard&subV
iew=model00000183e578e96c_00000000">DashBoard</a></li>

<li><a   class="navbar-brand"
href="https://us1.ca.analytics.ibm.com/bi/?perspective=story&pathRef=.my_folder
s%2FPort%2BTraffic%2Bstory&action=view&sceneId=model000001848e4f3b91
_00000000&sceneTime=15000">Story</a></li>
<li><a   class="navbar-brand"
href="https://us1.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2FData%2BMO
dule%2FPort%2BTraffic%2BReport%2BAnalysis&action=run&format=HTML&
prompt=false">Report</a></li>
<li><a class="navbar-brand" href="report.html">About</a></li>

</ul>
</div>
</div>
</nav>
<div class="container">
<div class="row">
<div class="col-sm-4">
<Pre> Team Id:
    PNT2022TMID00141
 TEAM MEMBERS:
    PRAJOSH GABRIEL G A
    NANDHAKUMAR R
    KEESAVAN PR
    MOUNESH KUMAR
</pre>
<hr class="hidden-sm hidden-md hidden-lg">
</div>
<div class="col-sm-8">
<h2>Traffic And Capacity Analytics For Major Ports</h2>

<p style="font-size:20px">Indian Railways has a capital base of about Rs. 100000
crores and is often referred to as the lifeline of the Indian economy because of its
predominance
```

in transportation of bulk freight and long distance passenger traffic. The network criss-crosses the nation, binding it together by ferrying freight and passengers across the length and breadth of the country. As the Indian economy moves into a high growth trajectory the Railways have also stepped-up developmental efforts and are preparing themselves for an even bigger role in the future.</p>
</div>
</div>
</div>
</div>
</body>
</html>

report.html

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<!DOCTYPE html>
<html lang="en">
<head>
<title>Webpage</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>
<style>
.fakeimg { height: 200px;
background: #aaa;


}
</style>
</head>
<body>


<div class="jumbotron text-center" style="margin-bottom:0">
<h1>Traffic And Capacity Analytics For Major ports</h1>
</div>
<div class="col-sm-8">
<h2>1.Data Collection:</h2>
<h3> DATASET</h3>
<img src="dataset.png" width="700" height="500"/>
<h2> 2.Data Preparations:</h2>
<p> Some prevalent challenges faced while collecting data are inconsistent data, ambiguous data, duplicate data, inaccurate data, too much data, etc.</p>
<p> To overcome this problem data preparation is done. </p>
<p>It is the process of profiling, cleansing, transforming and validating data.</p>
```

```html
<ul>

<li>Data profiling and cleansing</li>
<li>Data structuring</li>
<li>Data transformation</li>
<li>Data validation</li></ul>
<h2>3.Implementation Details:</h2>
<p>Data analytics for analysing and estimating traffic and capacity on major ports is
done by creating various graphs and charts </p>
<p>to highlight the insights and visualizations.</p>


<p>Plotting different   graphs give broad understanding about the data and
relationship among the features of data.</p>


<p>This supports in creating meaningful dashboards for exploring the data and making
future predictions from them.</p>


<h2>4.Data Visualization :</h2>
<p>Each piece (port)    is a level of the categoric variable, and the percentage of
traffic is the numeric variable.</p>
<img src="ibm1.png" width="800" height="500"/><br><br><br>
<img src="ibm2.png" width="800" height="500"/><br><br><br>
<img src="ibm3.png" width="800" height="500"/><br><br><br>
<img src="ibm4.png" width="800" height="500"/><br><br><br>
```

CHAPTER 8

TESTING

1.DETECT ANALYSIS

This result shows the number of resolved or closed bugs at each severity level and how they are resolved.

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	8	5	0	3	16
Duplicate	1	0	4	0	7
External	0	3	5	1	5
Fixed	13	4	3	18	32
Not Reproduced	0	1	0	1	2
Skipped	1	2	0	0	1
Won't Fix	0	5	2	1	8
Totals	23	14	13	26	75

2.TESTCASE ANALYSIS

This report shows number of testcases that have passed, failed and untested.

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	6	0	0	6
Client Application	51	0	0	51
Security	1	0	0	1
Outsource Shipping	3	0	0	3
Exception Reporting	6	0	0	6
Final Report Output	2	0	0	2
Version Control	1	0	0	1

CHAPTER 9

RESULTS
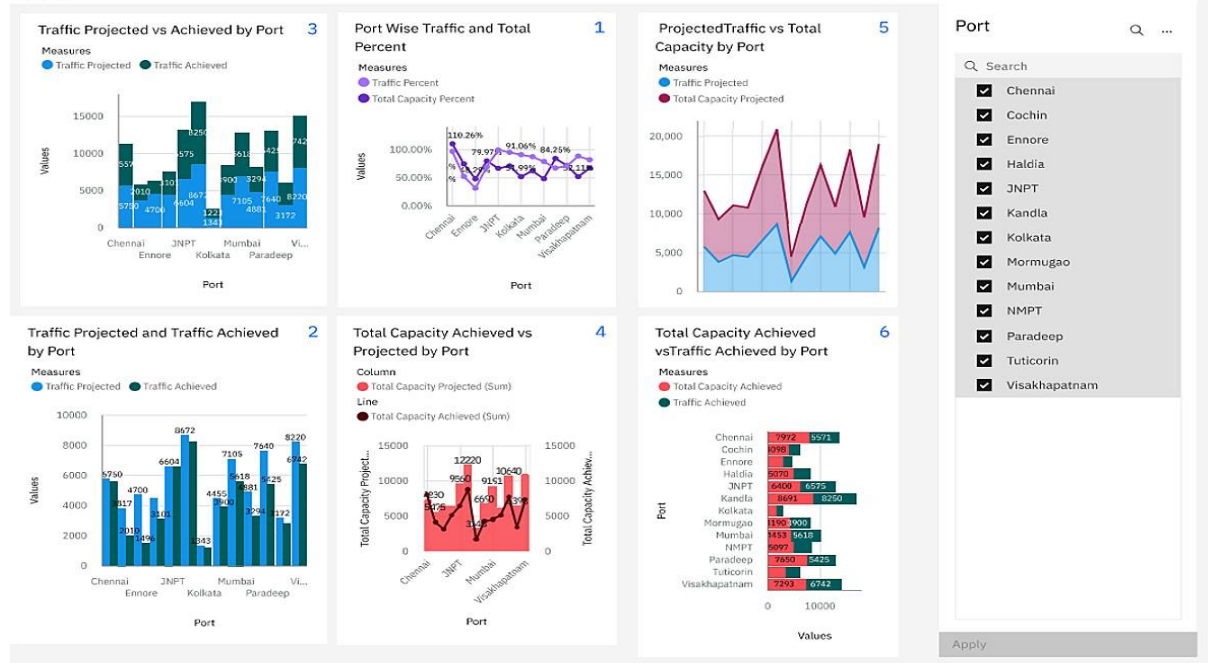
9.1 PERFORMANCE METRICS

PORT TRAFFIC DASHBOARD:
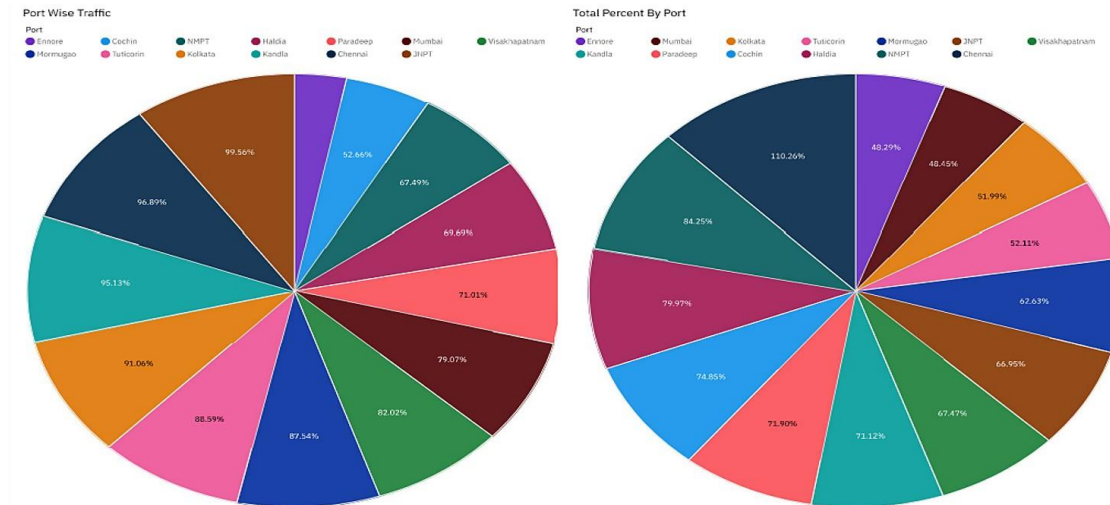
Each piece (port) is a level of the categoric variable, and the percentage of traffic is the numeric variable.

Tab 3

Port regions and Port and Total Capacity Achieved for Port points

Total Capacity Ach...   Port
● Visakhapatnam ● Kolkata ● Haldia ● Paradeep ● Mormugao ● Kandla ● Chennai ● Tuticorin ● Cochin ● Mumbai

Tab 4

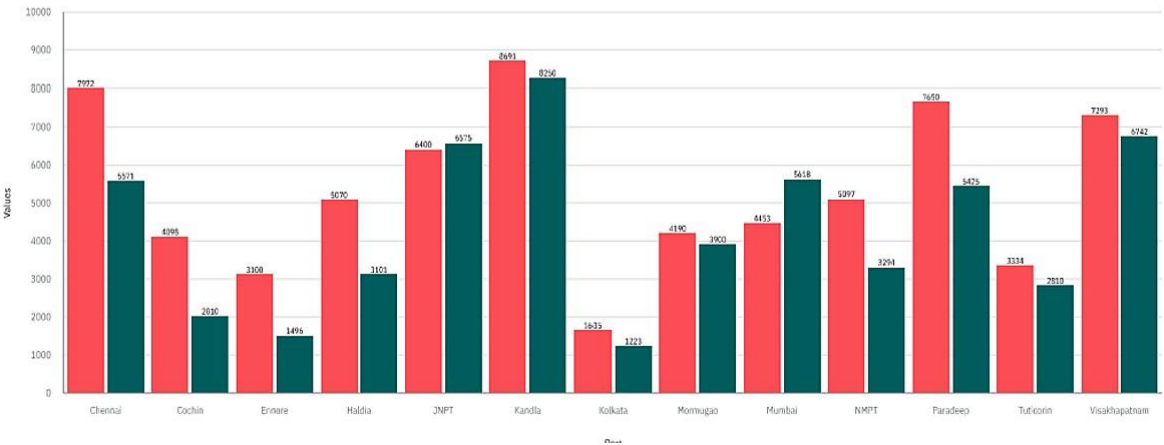| Traffic Projected	Traffic Achieved	Total Capacity Projected	Total Capacity Achieved
70.8K	**56K**	**100K**	**69K**
Traffic Projected	Traffic Achieved	Total Capacity Projected	Total Capacity Achieved

Total Capacity Achieved and Traffic Achieved by Port

Measures
● Total Capacity Achieved ● Traffic Achieved

Port	Total Capacity Achieved	Traffic Achieved
Chennai	7922	5571
Cochin	4095	2010
Ennore	3300	1496
Haldia	5070	3101
JNPT	6400	6575
Kandla	8691	8256
Kolkata	1635	1223
Mormugao	4190	3900
Mumbai	4453	5618
NMPT	5097	3294
Paradeep	7650	5425
Tuticorin	3334	2810
Visakhapatnam	7293	6742

CHAPTER 10

ADVANTAGES AND DISADVANTAGES

ADVANTAGES

- To regain some of the market, it has lost over past decades and regain market share in some commodities and overcome the challenges and to maintain sustainable growth in all its commodities.

- Reducing the congestion on rail corridors and improving port connectivity.

- The development of two Dedicated Freight Corridors across key ports

- Adequate resources will be provided.

- Businesses using railway ports can easily track.

- Government can use data analytics dashboard to ensure less traffic on the ports.

DISADVANTAGES

- It is difficult to handle port connectivity to identify the congestion.

- It makes the user tensed and frustrated

- Difficult to track the status of rails

CHAPTER 11

CONCLUSION

The impact of data analytics in port traffic analysis has already made a substantial difference in the ability of traffic in the port. The role of data analytics in this process has continues to grow and expand as more types of data become available. New tools are available that makes the results of the analytics clear and easy for people to access. Realizing the potential of data analytics to transform the rail port connectivity begins by understanding how the technology can be applied. Data analytics holds the key to unlocking this vital information

CHAPTER 12

FUTURE SCOPE

The network criss-crosses the nation, binding it together by ferrying freight and passengers across the length and breadth of the country. As the Indian economy moves into a high growth trajectory the Railways have also stepped-up developmental efforts and are preparing themselves for an even bigger role in the future.

CHAPTER 13

GITHUB LINK

https://github.com/IBM-EPBL/IBM-Project-12089-1659369783