GLOBAL SALES DATA ANALYTICS

A PROJECT REPORT

ABSTRACT

Data visualization is a general term that describes any effort to help people understand the significance of data by placing it in a visual context. Patterns, trends and correlations that might go undetected in text-based data can be exposed and recognized easier with data visualization software. Data visualization is the presentation of quantitative information in a graphical form. In other words, data visualizations turn large and small data-sets into visuals that are easier for the human brain to understand and process. Data visualizations are surprisingly common in our everyday life, but they often appear in the form of well-known charts and graphs. It can be used to discover unknown facts and trends. Good data visualizations are created when communication, data science, and design collide. Data visualizations done right offer key insights into complicated data-sets in ways that are meaningful and intuitive.

There has been the need for displaying massive amounts of data in a way that is easily accessible and understandable. Organizations generate data every day. As a result, the amount of data available on the Web has increased dramatically. It is difficult for users to visualize,explore, and use this enormous data. The ability to visualize data is crucial to scientific research. Today, computers can be used to process large amounts of data. Data visualization is concerned with the design, development, and application of computer generated graphicalrepresentation of the data. It provides effective data representation of data originating fromdifferent sources. This enables decision makers to see analytics in visual form and makes iteasy for them to make sense of the data. It helps them discover patterns, comprehend information, and form an opinion.

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1. INTRODUCTION

Online shopping is beyond buying for necessity, but it's part of the lifestyle for many people, it's an addictive activity that can be done while waiting for traffic lights, during lunchbreak, killing time, and more. With the growing e-commerce trends, we are curious about the current state of the retail world and how they affect the consumers online shopping behavior and spending behaviors. We wanted to know more about the effects of the online shopping trend, internet, online purchase trends, and technologies towards the retail world, such as consumers preferences on retail shopping, what are their opinions on the shopping experience, and the futuretrends in consumers spending.

1.1 Project Overview

Shopping online is currently the need of the hour. Because of this COVID, it is not easy to walk in a store randomly and buy anything you want. So, now we try to understand a few things like, Customer Analysis and Product Analysis of this Global Super Store.

This project is a web based shopping system for an existing shop. The project objective is to deliver the online shopping application into android platform. This project is an attempt to provide the advantages of online shopping to customers of a real shop. It helps buying the products in the shop anywhere through internet by using an android device. Thus the customer will get the service of online shopping and home delivery from his favorite shop. This system can be implemented to any shop in the locality or to multinational branded shops having retail outlet chains. If shops are providing an online portal where their customers can enjoy easy shopping from anywhere, the shops won't be losing any more customers to the trending online shops such as flip cart or eBay. Since the application is available in the Smartphone it is easily accessible and always available.

1.2 Purpose

In existing systems, there is a need to install software to analyze and visualize the sales data, users need to shift between different applications and it takes more time to visualize the data. Since, these software cannot be used from a mobile phone, there is a need for a computer desktop and installing these software which in turn requires space. To overcome the above disadvantages, we are proposing this paper. The main aim of our project is to design and develop a web application which can help companies and retailers to analyze and visualize enterprise sales data in the form of graphs. Since we are developing a web application for this purpose, we do not need any storage space as once deployed the application can be used by any device with an internet connection. Using websites, we can see our output quickly. In this application, there is no

need to install any software since everything can be accessible on a devicewith internet connection. There is no need to shift between applications. It is a faster process as we can analyze in less time. The primary aim of our project is to develop a web application using which a company or a retailer can analyze and visualize the sales data and also compare daily sales by different salesperson.

2. LITERATURE SURVEY

2.1 Existing Problem :

Every company would want a way through which they can get an idea of the sale of different products in the company, and simultaneously they could get analytics and visualization of sales bydifferent salesperson in the organization and also get analysis of whether the total profit matcheswith the number of salesperson in the company. There are some existing software, that helps businesses track and manage customer interactions and sales of the company. In most of these softwares major problems were that the learning curve was high, they were paid and required skilled employees to use them.

Dashboards are being widely used to visualize the sale amount by the salesperson on a bar graph with different colours. Sales by salespersons and sales of products are also visualized on the same application. The way the human brain processesinformation, presenting insights in charts or graphs to ascertain significant amounts of complex data is more accessible than relying on spreadsheets or reports.

Analytics offer a user with an intuitive, detailed and simpler way of conveying critical concepts universally – and it is possible toexperiment with different scenarios by making tiny adjustments. Recent studies discovered that the use of visualizations in data analytics could shorten business meetings by 24%.

Moreover, a business intelligence strategy with visualization capabilities boasts an ROI of $13.01 back on every dollar spent. Therefore, the analysis and visualization of data is critical to the sustained success of a business and to help the business yield the foremost possible value from this tried and tested means of analyzing and presenting vital information.

2.2References

- https://www.researchgate.net/publication/328246040_Walmart%27s_Sales_Data_Analysis_-_A_Big_Data_Analytics_Perspective

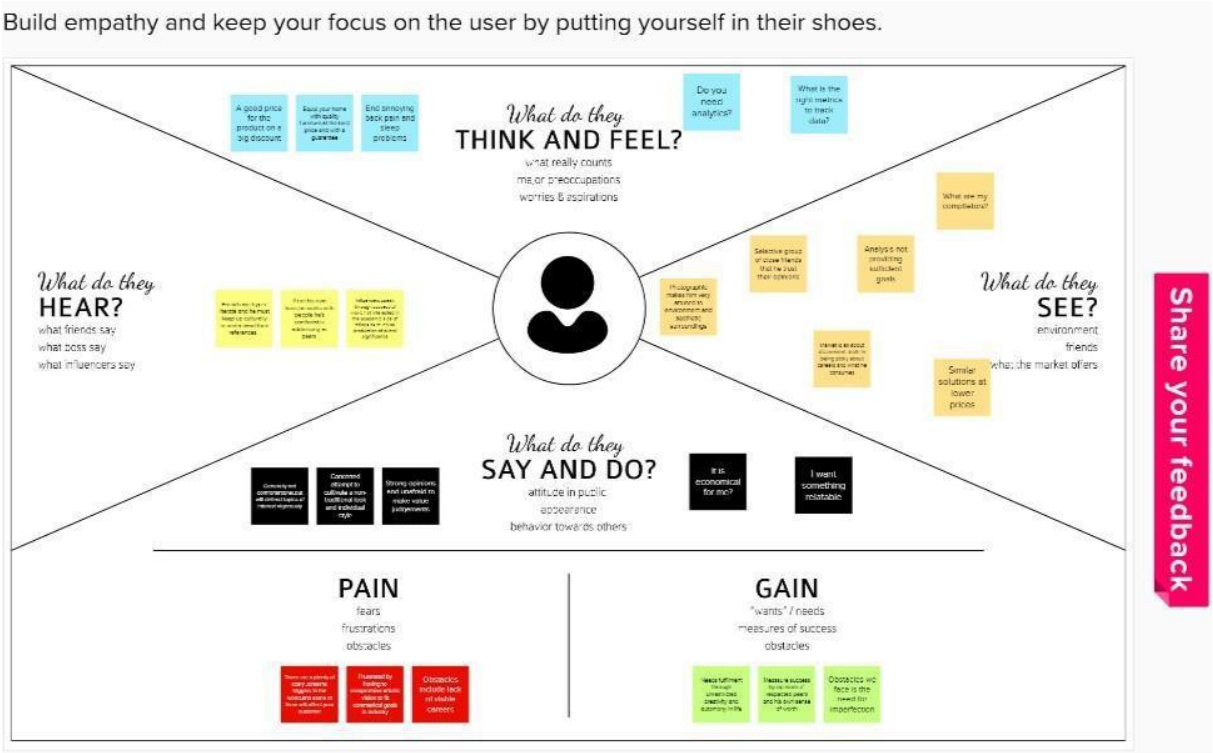
- Han Jiawei, Micheline Kamber and Jian Pei, "Data Mining Concepts and Techniques" in , MK Publications, 2009. https://scholar.google.com/scholar?as_q=Data+Mining+Concepts+and+Techn iques

2.3 Problem Statement Definition

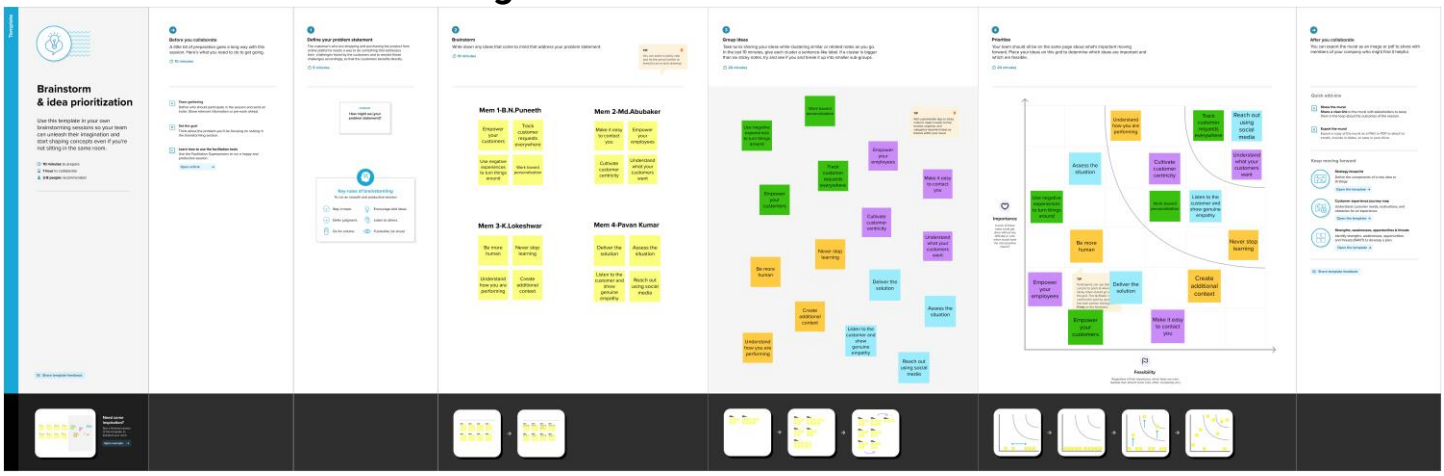
Any company's end goal is to maximize finances acquired by selling their product or service. If this is done in an arbitrary, haphazard manner, it is very difficult to reach the maximum possible revenue and profit. Thus, it is important to use the data available from past sales to make inferences and come up with the best possible sales strategies. Doing this manually may be tedious, time consuming and inefficient. Using available technologies to visualize, analyze and observe underlying trends could be greatly helpful for the same.

3 . IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming

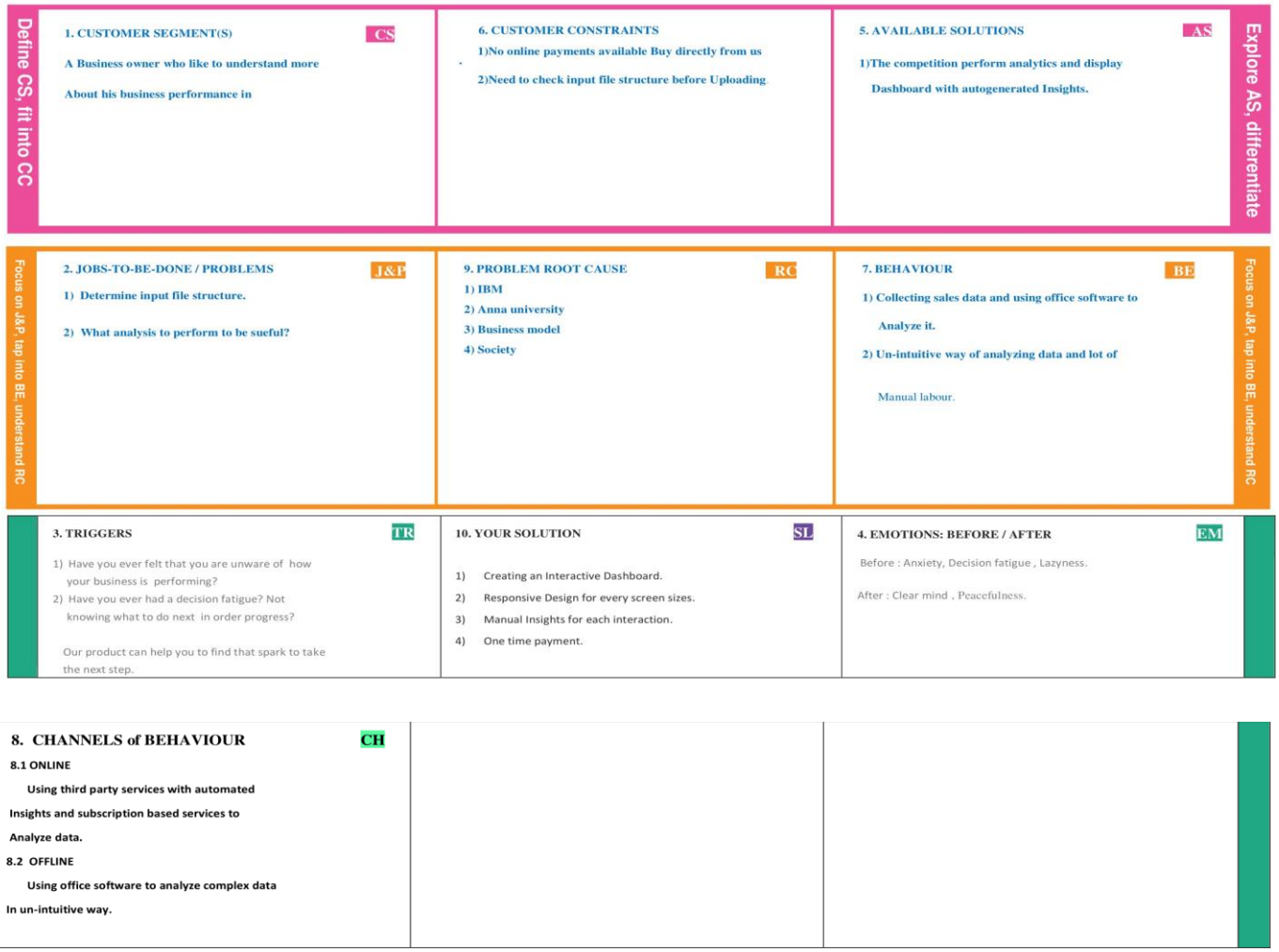


3.3 Proposed Solution

S.No.	**Parameter**	**Description**
1.	Problem Statement (Problem to be solved)	● Decision makers of E-commerce companies(User) need a way to comprehend raw data, analyse and make more informed business decisions. ● E- commerce companies(User) need a way to understand the shift in preferences of customers and the current trend, so that they can satisfy the customers.
2.	Idea / Solution description	A powerful and easy-to-use sales analytics tool that automates and visualizes sales trends to optimize business outcomes.
3.	Novelty / Uniqueness	● Interactive Dashboard and simple UI ● Dynamic and real time analytics ● AI based predictions and forecasting
4.	Social Impact / Customer Satisfaction	● Visible profits driven by informed decisions ● Optimize sales and marketing ● Ability to react to competitor's strategies
5.	Business Model (Revenue Model)	Three tier pricing- Basic, Standard, Enterprise ● Basic: Limited features targeting startups and individuals. ● Standard: Limited premium features. Target customers- Medium Scale businesses. ● Enterprise with all premium features targeted at Large corporations
6.	Scalability of the Solution	● More B2B customer services can be provided alongside ● Usable by all customer facing companies and startups of all scale

3.3 Problem Solution fit

Project Title: Global sales data analytics | Project Design Phase-I - Solution Fit Template | Team ID: PNT2022TMID39896



4. REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

FR No.	Functional Requirement (Epic)	SubRequirement(Story / Sub-Task)
FR-1	Download the dataset	Get the data from the given resource
FR-2	Data pre processing	Fill missing values, Remove duplicate values
FR-3	Choose the tool for visualization	IBM Cognos analytics is chosen
FR-4	Data visualization	Required graph, charts are chosen for visualization
FR-5	Prepare dashboards	Dashboards, story boards and reports are created in IBM Cognos analytics

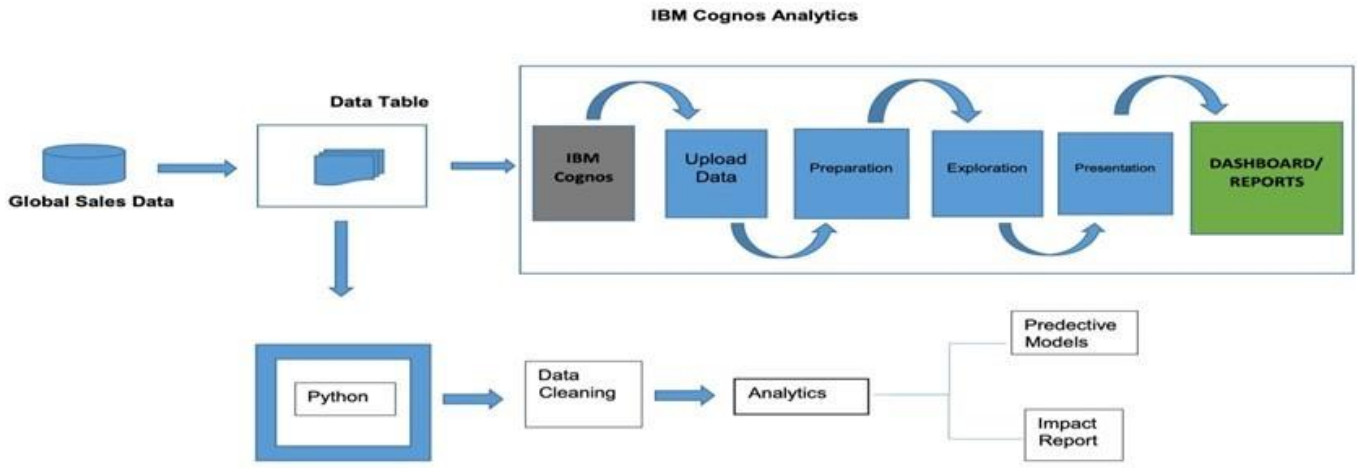
4.2 NON – FUNCTIONAL REQUIREMENTS

FR No.	Non-FunctionalRequirement	Description
NFR-1	**Usability**	**It should be easier to understand the insights for the customers.**
NFR-2	**Security**	**The data is protected from unauthorized access.**
NFR-3	**Reliability**	**Connecting the data to the software and further process.**
NFR-4	**Performance**	**The analyzed information is recorded and updated.**
NFR-5	**Availability**	**The tool is only available for the authorized personsto create, update, remove and the record customer information.**
NFR-6	**Scalability**	**Everyday activities are monitored for the growth of work.Analytic tool should support even the size of data is increased.**

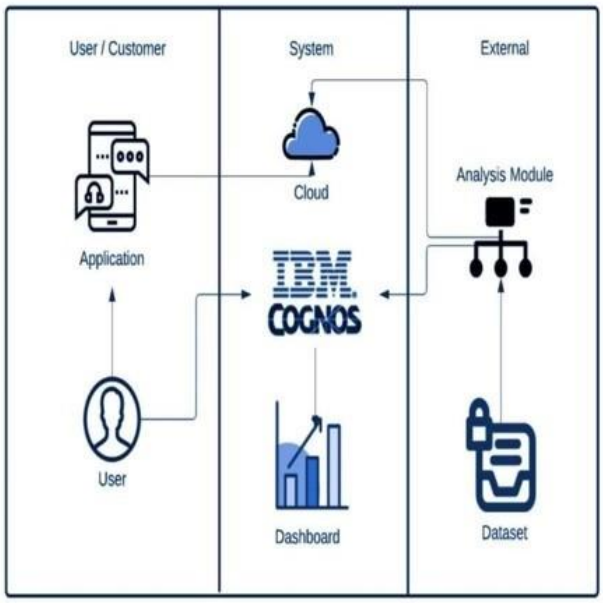
5. PROJECT DESIGN

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.



Customer View:



5.2 Solution & Technical Architecture

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per thetable1 and table 2

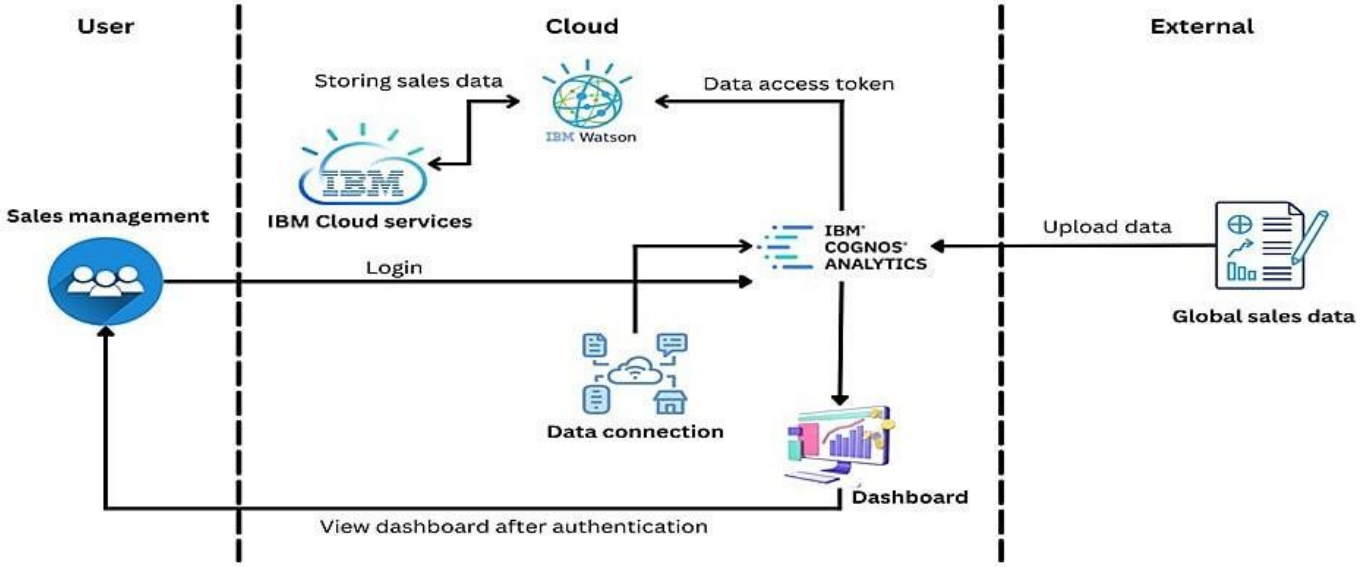


Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	user interacts with application or web	IBM Cognos analytics

2.	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloud
3.	Data exploration	Information in the data is identified according to the requirements	IBM Cognos analytics
4.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local File system
5.	Data visualization	Various data are represented in charts, graphs according to need of the customers.	IBM Cognos analytics

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	IBM Cognos Analytics tools like dashboard, report are used. Python packages like numpy,pandas, matplotlib and seaborn are used.	IBM Cognos Analytics with Watson, IBM Cloud, Python
2.	Scalable Architecture	Small dataset to large dataset are used.	BM Cognos Analytics with Watson, IBM Cloud, Python
3.	Availability	The dashboard creation will be done at any time. Users can view and analyze data all the time.	IBM Cognos Analytics with Watson
4.	Performance	This application provides high performance by producing analyzed data quickly.	IBM Cognos Analytics with Watson

5.3 User Stories

Registration:

User can register for the application by entering my email, password, and confirming my password.

Login:

User will receive confirmation email once I have registered for the application, and I can log into the application by entering email & password.

Data Collection:

User need to gather the data in the form of CSV/XLS files and clean the data to remove the null values.

Upload dataset:

User will upload the data to IBM Cognos and view the data of the products.

Data Preparation :

User need to filter the data for visualization in IBM Cognos.

Data visualization:

User can easily visualize the data in the form of charts and graphs through IBM Cognos.

Dashboard:

User or agents will create the dashboards based on the given data in IBM Cognos. User or agents must plan visualizations in a way that I'm able to gain insights regarding the sales based upon the category of sales and the respective region.
User or agents must be able to gain insights from the charts/graphs through a variety of relationships established in the dashboard.

Prediction:

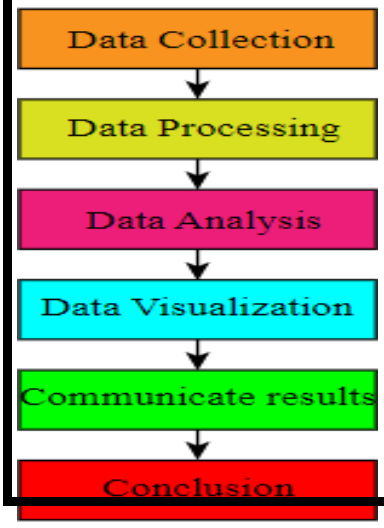
User will predict the specific product's future sales expectation.

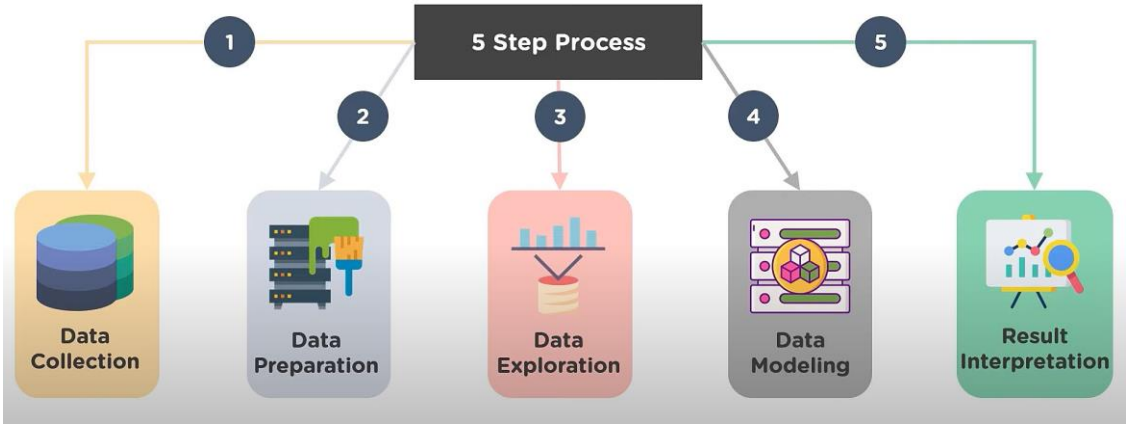
Final Analysis:

User can Analyze the list of categorized products and their details as a report.

Report:

User can prepare the product and customer description information and more additional information as a Report.





6 PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	5	High	Maniyarasi S,Marudhanayagi P,Sineka S,Soundharya V
Sprint-1	Login	USN-2	As a user, I will receive confirmation email once I have registered for the application, and I can log into the application by entering email & password	5	High	Maniyarasi S,Marudhanayagi P,Sineka S,Soundharya V
Sprint-1	Data Collection	USN-3	As a user, I need to gatherthe data in the form of CSV/XLS files and clean the data to remove the null values	10	Low	Maniyarasi S,Marudhanayagi P,Sineka S,Soundharya V
Sprint-2	Upload dataset	USN-4	As a user, I will upload thedata to IBM Cognos and view the data of the Products	5	Medium	Maniyarasi S,Marudhanayagi P,Sineka S,Soundharya

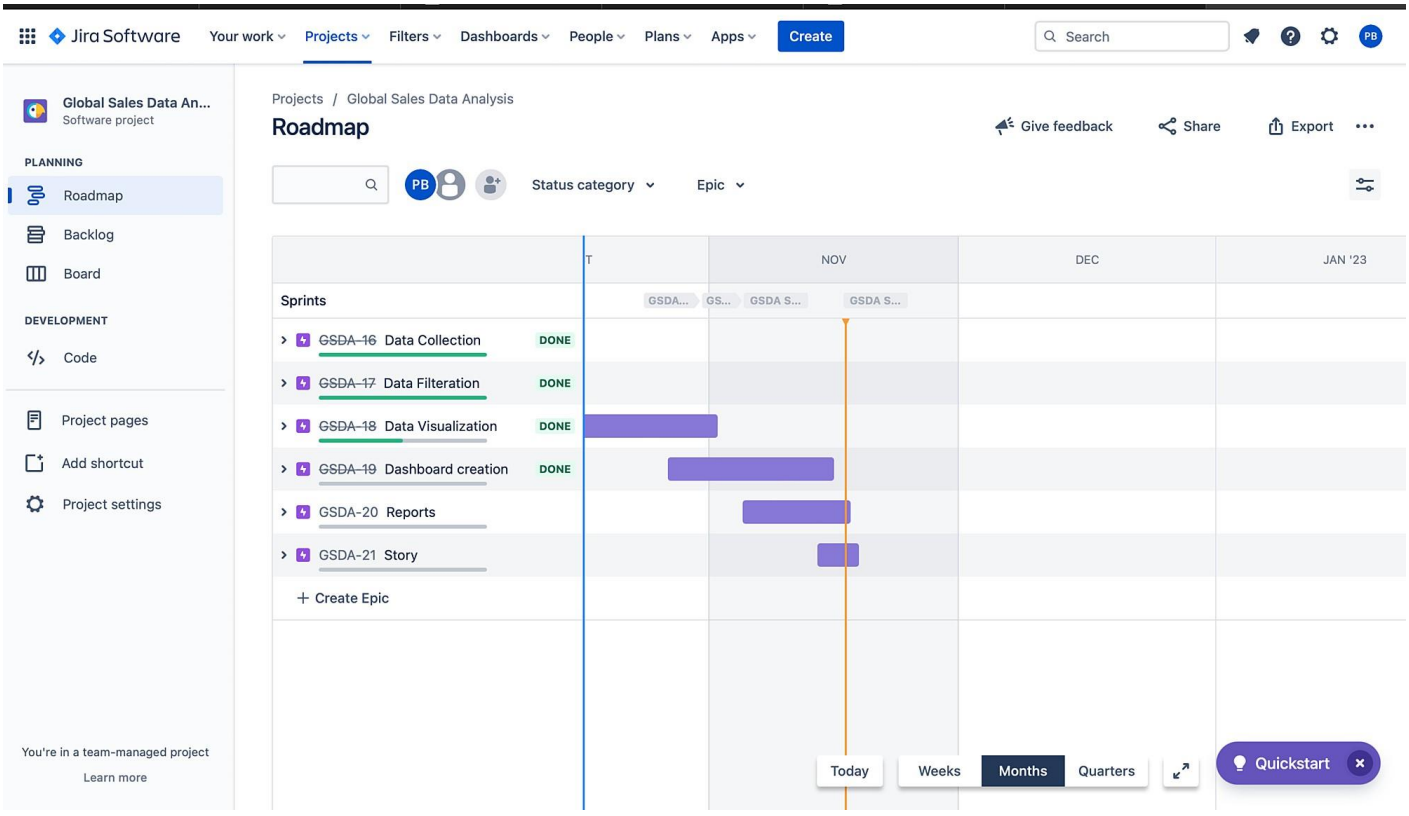
						V
Sprint-2	Data Preparation	USN-5	As a user, I need to filter thedata for visualization in IBMCognos	5	High	Maniyarasi S,Marudhanayagi P,Sineka S,Soundharya V
Sprint-2	Data visualization	USN-6	As a user, I can easily visualize the data in the form of charts and graphs through IBM Cognos	10	High	Maniyarasi S,Marudhanayagi P,Sineka S,Soundharya V
Sprint-3	Dashboard	USN-7	As a user, I will create thedashboards based on the given data in IBM Cognos	5	High	Maniyarasi S,Marudhanayagi P,Sineka S,Soundharya V
Sprint-3	Dashboa rd	USN-8	As a user, I must plan visualizations in a way that I'm able to gain insights regarding the sales based upon the category of sales and the respective region	5	Medium	Maniyarasi S,Marudhanayagi P,Sineka S,Soundharya V
Sprint-3	Dashboa rd	USN-9	As a user, I must be able to gain insights from the charts/graphs through a variety of relationships established in the dashboard.	10	Medium	Maniyarasi S,Marudhanayagi P,Sineka S,Soundharya V
Sprint-4	Prediction	USN-10	As a user, I will predict the specific product's future sales expectation.	5	High	Maniyarasi S,Marudhanayagi P,Sineka S,Soundharya V
Sprint-4	Final Analysis	USN-11	As a user, I can Analyze the list of categorized products and their details as a report.	5	High	Maniyarasi S,Marudhanayagi P,Sineka S,Soundharya V
Sprint-4	Report	USN-12	As a user, I can prepare the product and customer description	10	Medium	Maniyarasi S,Marudhanayagi P,Sineka S,Soundharya

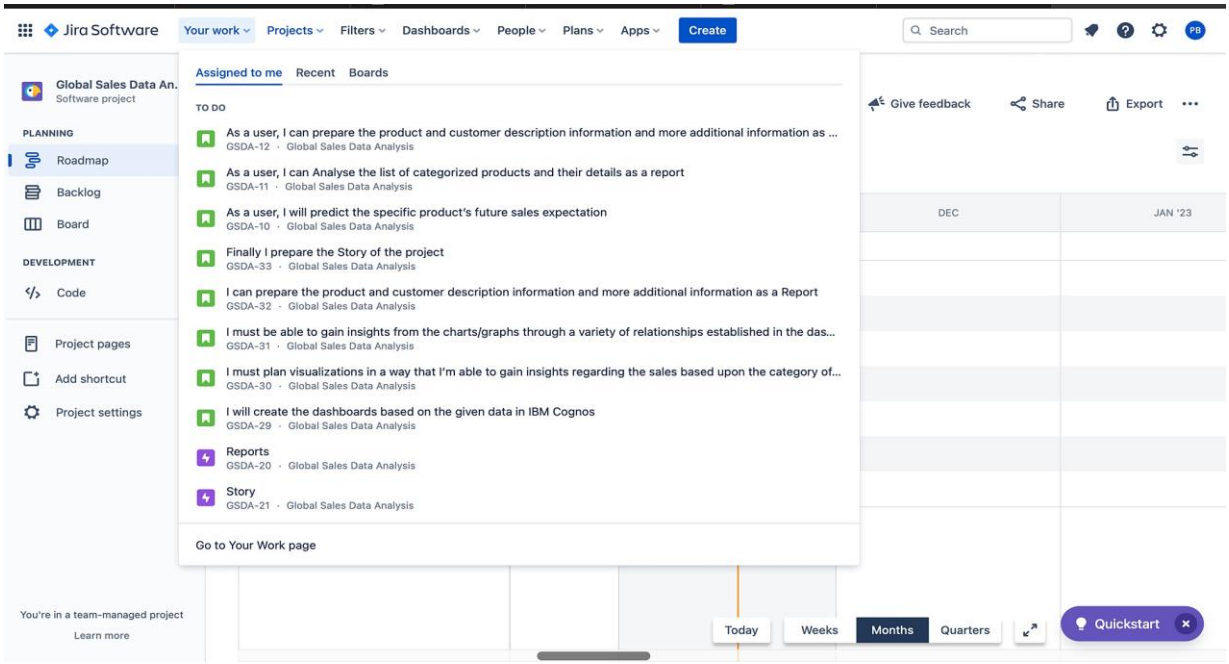
			information and more additional information as a Report			**V**

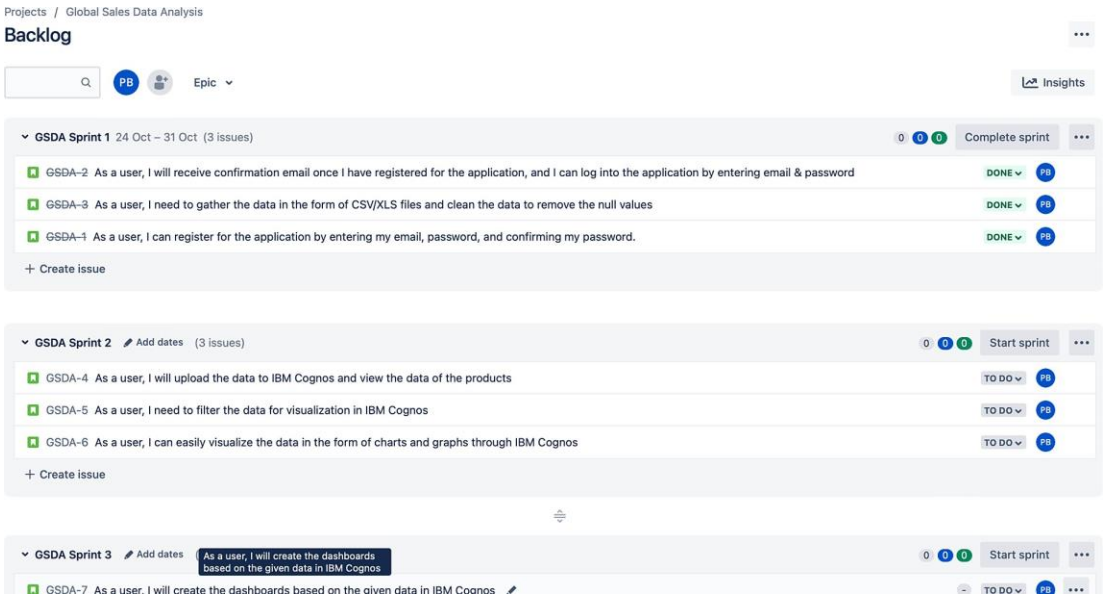
6.2 Sprint Delivery Schedule:

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	30 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	06 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	13 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	20 Nov 2022

6.3 Reports from JIRA







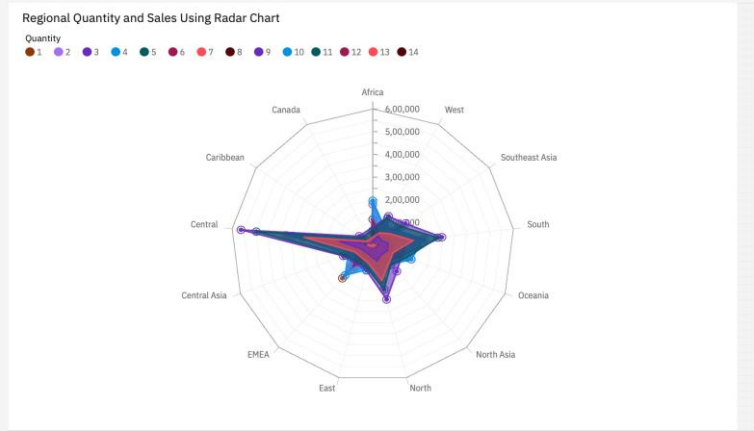
7. CODING & SOLUTIONING

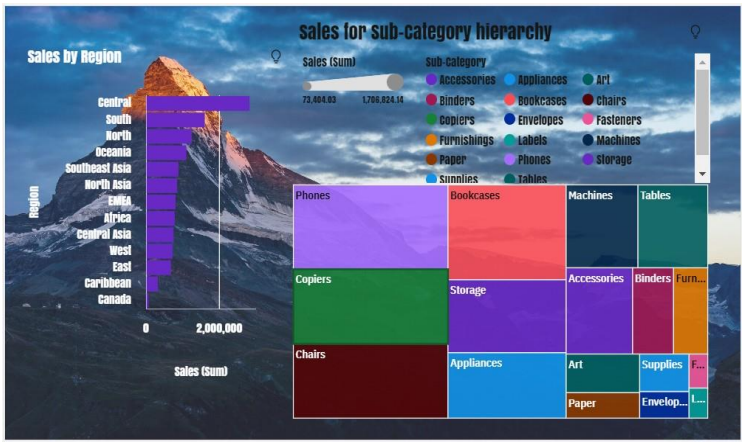
Exploratory Data Analysis on "GLOBAL SALES DATASET"

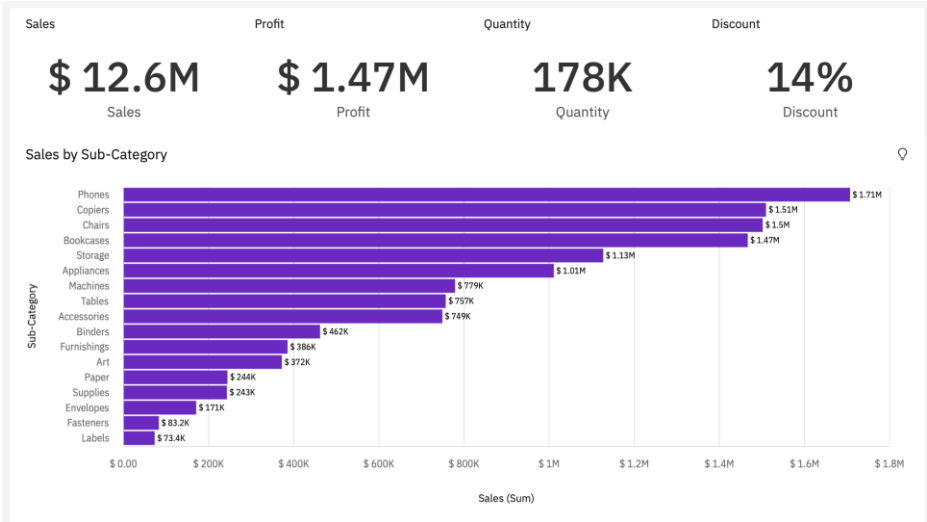
7.1 CODE:

Exploratory Data Analysis (EDA)

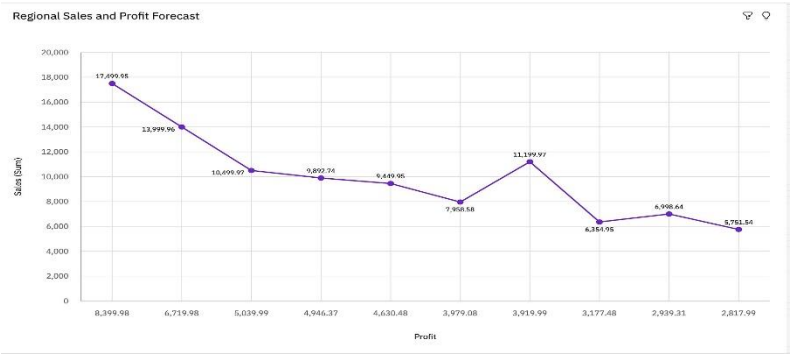
7.2 DATA VISUALIZATION CHARTS:

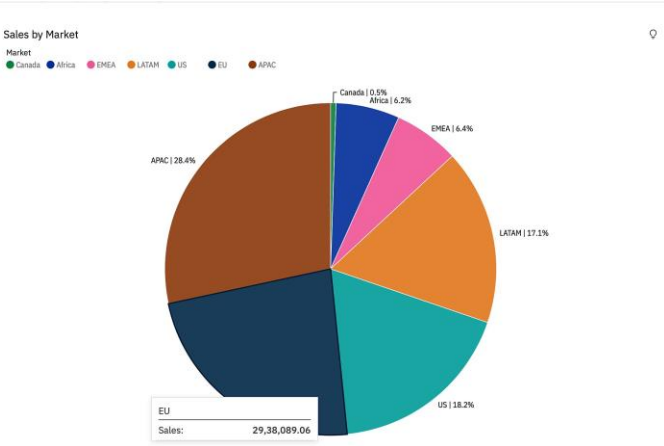


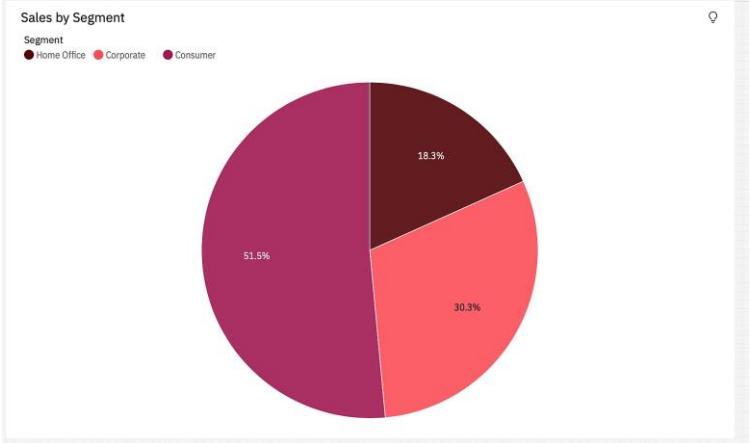


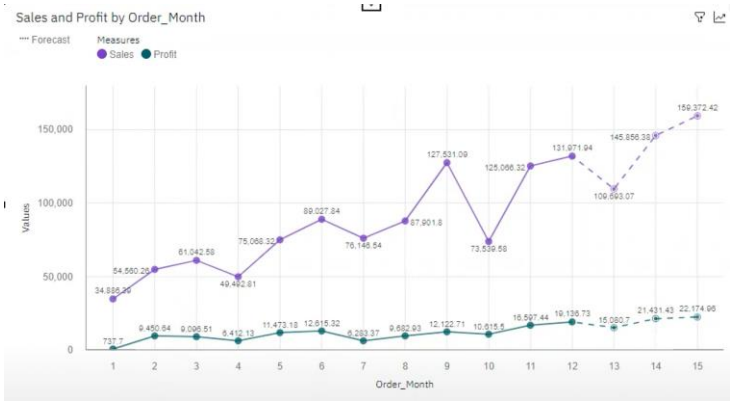


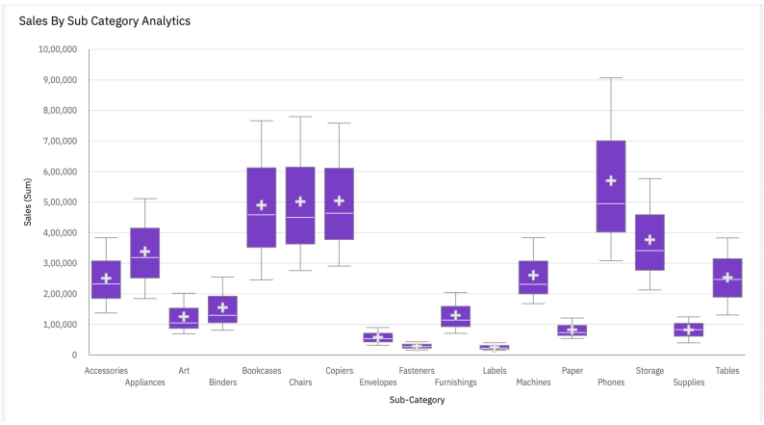

Sub Category Wise Sales And Profits Using Line And Bar Chart
Column
Sales (Sum)
Line
Profit (Sum)
US$2M
US$1M
US$0.00
-US$1M
Sales (Sum)
600,000
400,000
200,000
0
-200,000
Profit (Sum)
Phones
Chairs
Storage
Machines
Accesso...
Furnish...
Paper
Envelopes
La...
Copiers
Bookcases
Appliances
Tables
Binders
Art
Supplies
Fasteners
Sub-Category

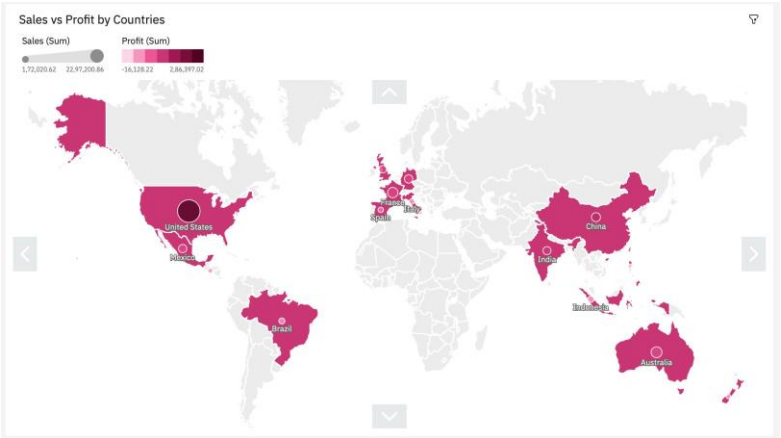

Regional Sales and Profit Forecast
Sales (Sum)
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
17,499.95
13,999.96
10,499.97
9,892.74
9,449.95
7,958.58
11,199.97
6,354.95
6,998.64
5,761.54
8,399.98
6,719.98
5,039.99
4,946.37
4,630.48
3,979.08
3,919.99
3,177.48
2,939.31
2,817.99
Profit

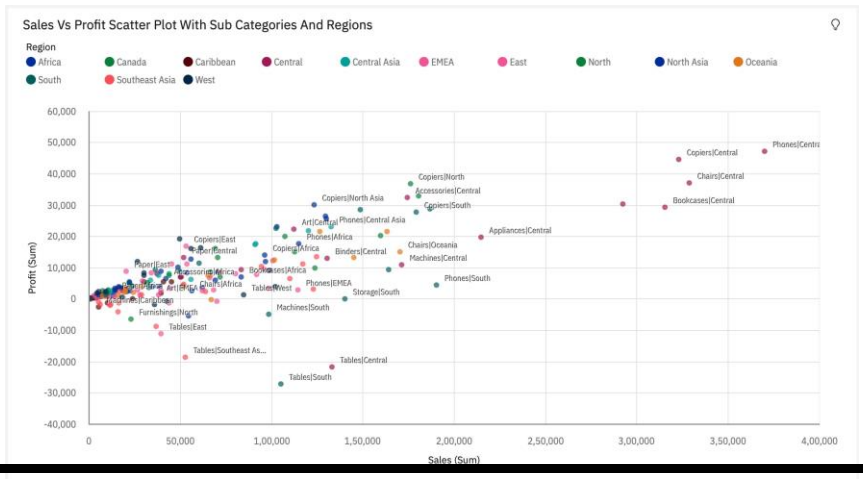

Sales by Market
Market
Canada
Africa
EMEA
LATAM
US
EU
APAC
Canada | 0.5%
Africa | 6.2%
EMEA | 6.4%
LATAM | 17.1%
US | 18.2%
APAC | 28.4%
EU
Sales:
29,38,089.06


Sales by Segment
Segment
Home Office
Corporate
Consumer
18.3%
51.5%
30.3%

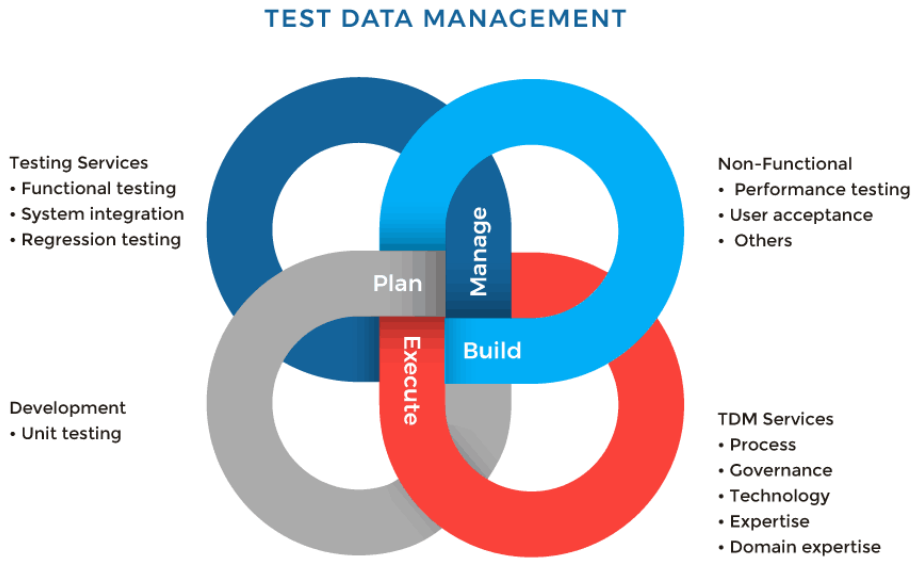

Sales and Profit by Order_Month
Forecast
Measures
Sales
Profit
Values
Order_Month


Sales By Sub Category Analytics
Sales (Sum)
Sub-Category
Accessories
Appliances
Art
Binders
Bookcases
Chairs
Copiers
Envelopes
Fasteners
Furnishings
Labels
Machines
Paper
Phones
Storage
Supplies
Tables


Sales vs Profit by Countries
Sales (Sum)
Profit (Sum)
United States
China
India
Brasil
Australia


Sales Vs Profit Scatter Plot With Sub Categories And Regions
Region
Africa
Canada
Caribbean
Central
Central Asia
EMEA
East
North
North Asia
Oceania
South
Southeast Asia
West
Profit (Sum)
Sales (Sum)

8. TESTCASES



8.1 USER ACCEPTANCE TESTING:

i. Purpose of the Document

The purpose of this document is to briefly explain the test coverage and open issues of the GlobalSales Data Analytics project at the time of the release to User Acceptance Testing (UAT).

ii. Defect Analysis:

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved.

Resolution	Severity1	Severity2	Severity3	Severity4	Subtotal
By Design	9	5	3	2	19
Duplicate	1	0	2	1	4
External	2	2	1	1	6
Fixed	10	3	5	20	38
Not Reproduced	1	0	1	1	3
Skipped	0	1	0	1	2
Won'tFix	0	0	0	1	1
Totals	23	11	12	27	73

iii. Test Case Analysis:

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

Section	TotalCases	Not Tested	Fail	Pass
PrintEngine	7	0	0	7
ClientApplication	51	0	0	51
Security	2	0	0	2
OutsourceShipping	0	0	3	3
ExceptionReporting	0	9	0	9
FinalReportOutput	4	0	0	4
VersionControl	0	0	2	2

9. RESULTS

a. Performance Metrics:

Sales metrics are data points used to gauge sales performance, both on an individual and a teamlevel. Sales leaders use relevant metrics to determine progress against predetermined goals and objectives.

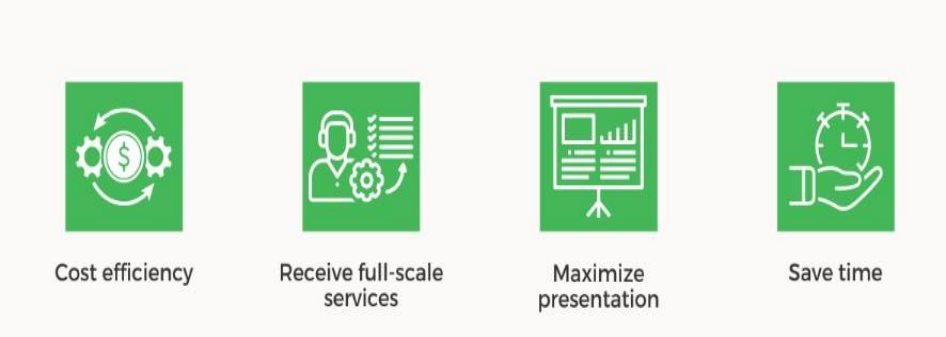
RESULTANT DASHBOARDS:

https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2FGlobal1&action=view&mode=dashboard&subView=model00000184418a6a59_00000000

https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&id=...AuthoringMode=false&boardId=i645FEF6D72C34A448542D8A47323D832

10. ADVANTAGES & DISADVANTAGES

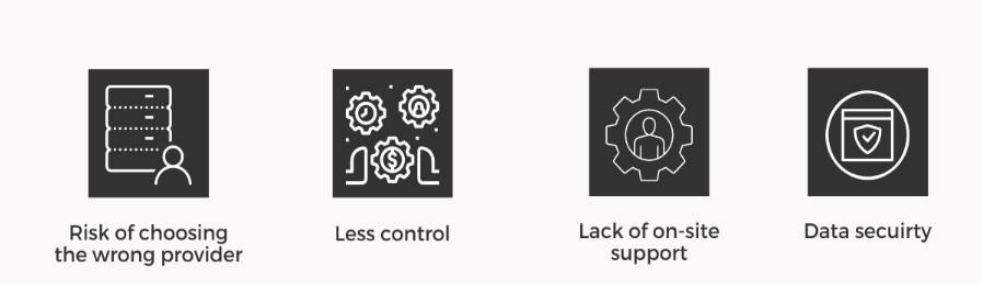
a. ADVANTAGES



i. Better understanding
ii. Easy sharing of information
iii. Accurate analysis
iv. Sales analysis
v. Finding relations between events
vi. Modification of data

vii. Exploring opportunities and trends

b. DISADVANTAGES



i. It gives estimation not accuracy

ii. Biased

iii. Lack of assistance

iv. Improper design issue

v. Wrong focused people can skip core messages

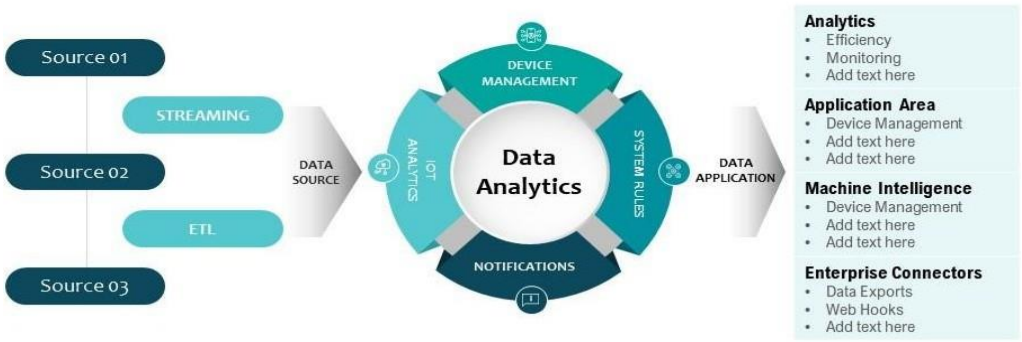
11. CONCLUSION

Based on our survey on consumers' online shopping behavior, online shopping using internet is what preferred by consumers nowadays. It's one of the e-commerce trends and the future for retail shopping. The customer's who are shopping and purchasing the product from online platforms needs a way to do something that addresses their challenges faced by the customers and to resolve these challenges accordingly, so that the customers benefits directly.

Sales analytics is sales team's hidden superpower. It can enablethe agents to spot key trends, dive deep, predict outcomes, and increase productivity. Accurate analysis also gives to the team the ability to tailor their efforts and prioritize high-value prospects.Plus, it may even help spotlight new opportunities for business to pursue. Sales analytics allows us to better gauge team performance and uncover areas for improvement, too. Understanding those strengths and weaknesses leads to better training, more attainable goals, and a cohesive team.

With the re-emergence in demand in this day and age for methodsthat can convey large amounts of data in a simple and understandable manner, data visualizationkeeps proving its status as one of the top techniques that helps people in understanding and categorizing their data by summarizing and presenting it in a simple and manageable way. So to analyze enterprise data in a simple and understandable manner a web application is developed. Itis an online tool to visualize enterprise sales data. It can be used to compare sales of different salespersons and can be used to know the growth of the company by visualizing sales data of products and sales by different salespersons. Since we are plotting a bar graph for salespersons sales, we can see how a salesperson is competing with other salespersons. Here it takes data of product sales as input and depicts a graph in a short amount of time as manual prediction of hugedata is complex. Moreover, manual prediction can result in huge errors, data mismatch, and data can even be missed.

12. FUTURE SCOPE



Global Sales Data Analytics:

Changing technological landscape and newer business challenges compel companies today to look for strategies that ensure higher business returns as well as reduced operational expenses. Companies like Global super market may have large measures of data in every single area of research, showcasing, deals, creation customer service among other examples. They need to standardize data storage and security arrangements, to align their operational structure with industry requirements. The future of Data Analytics looks bright as a career and a subject for research.

Sales analytics is sales team's hidden superpower. It can enable the agents to spot key trends, dive deep, predict outcomes, and increase productivity. Accurate analysis also gives to the team the ability to tailor their efforts and prioritize high-value prospects. Plus, it may even help spotlight new opportunities for business to pursue.

Sales analytics allows us to better gauge team performance and uncover areas for improvement, too. Understanding those strengths and weaknesses leads to better training, more attainable goals, and a cohesive team.

Business Analytics has remarkable prospects. A profession in Business Analytics is fulfilling

and offers ample scope for learning and growth. Thorough knowledge of statistical techniques, quantitative capacity, business learning, logical thinking, Big Data, instruments to understand the accessible data, and asset management are some of the essential skills required to be a Business Analytics. Understanding the business situations and problem-solving abilities are other skills required.

Extensive use of Big Data ensures high employment, increases the compensation and helps individuals to connect with the advanced technologies. Analytics can radically change the present business situation by capturing a large volume of data, expand business models, energize the imaginative procedures and overall growth and development of a company.

13. APPENDIX

Source Code GitHub & Project Demo Link:

Github link : https://github.com/IBM-EPBL/IBM-Project-47479-1660799700
Project demo link: https://drive.google.com/file/d/11gXEn6g1tMeka4__da-e6oMTcLjOrkJz/view?usp=share_link