RETAIL STORE STOCK INVENTORY ANALYTICS

NALAIYA THIRAN PROJECT BASED LEARNING

on

PROFESSIONAL READINESS FOR INNOVATION, EMPLOYABILITY, AND ENTREPRENEURSHIP

A PROJECT REPORT

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BACHELOR OF TECHNOLOGY

IN

INFORMATION TECHNOLOGY

MEPCO SCHLENK ENGINEERING COLLEGE(AUTONOMOUS), SIVAKASI

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1. INTRODUCTION

1.1 PROJECT OVERVIEW

Retail inventory management is stocking products buyers want, pricing and promoting to sell those products profitably, and maintaining stock levels that meet demand without over-purchasing. As a retailer, you know that your merchandise is the crux of your business, so creating an accurate and efficient system to manage products will play a huge role in determining your store's success. The various processes which help the customers to procure the desired merchandise from the retail stores for their end use refer to retail management. Retail management includes all the steps required to bring the customers into the store and fulfill their buying needs. Retail management makes shopping a pleasurable experience and ensures the customers leave the store with a smile. In simpler words, retail management helps customers shop without any difficulty.

The retailer must keep a record of all the products coming into the store. The products must be well arranged on the assigned shelves according to size, colour, gender, patterns etc. Necessary labels must be put on the shelves for the customers to locate the merchandise on their own. The retailer must ensure enough stock is available at the store. Make sure the store is kept clean. Don't stock unnecessary furniture as it gives a cluttered look to the store. The customers must be able to move freely. The store manager, department managers, cashier and all other employees should be trained from time to time to extract the best out of them. They should be well aware of their roles and responsibilities and customer oriented. They should be experts in their respective areas. The store manager must make daily sales reports to keep a track of the cash flow. Use softwares or maintain registers for the same. Remove the unsold merchandise from the shelves. Keep them somewhere else. Plan things well in advance to avoid confusions later on. Ask the customers to produce bills in case of exchange. Assign fixed timings for the same. Don't entertain customers after a week.

Basic Questions of every retailer: How much inventory should I carry? Too much inventory means working capital costs, operational costs and a complex operation, lack of inventory leads to lost sales, unhappy customer sand a damaged brand. This is why short-term forecasting is so important in the retail and consumer goods industry.

1.2 PURPOSE

The main purpose of inventory management is to help businesses easily and efficiently manage the ordering, stocking, storing, and using of inventory. By effectively managing your inventory, you'll always know what items are in stock, how many of them there are, and where they are located. Plus, practicing strong inventory management allows you to understand how you use your inventory–and how demand changes for it–over time. You can zero in on exactly what you need, what's not so important, and what's just a waste of money. That's using inventory management to practice inventory control. By the way, inventory control is the balancing act of always having enough stock to meet demand, while spending as little as possible on ordering and carrying inventory.

Additionally, inventory management may be used to determine the volume of product sales. Sales is one of the most essential and crucial phases of the whole process. Understanding the present condition as well as making future assumptions from the analysis are two key elements in making a successful prediction. You can identify things that move at a slower rate, and remove them. The Inventory Management System can serve a variety of functions in this case. It can help in identifying the overstock and understock products prior. It also provides sales insights and stock reports in the form of graphs/ charts which will be useful for easier visualization. Supplies should be easily available for all stages of production, from raw materials to completed goods.

You need to make sure you have enough of the necessary material on hand to meet client demand without having to cut corners. The manufacturing department no longer has to be concerned about running out of raw materials or products because of the steady supply. It is impossible to fulfil a received order if you do not have an accurate count of the items in your possession. In order to meet requests, you must have accessible the appropriate goods at the right time. Otherwise, you may end yourself in a state of confusion. To fulfill the needs for quality products, the concern must maintain an adequate supply of completed items to guarantee that customers' orders are fulfilled. It will increase the company's brand image.

2.LITERATURE SURVEY

2.1 EXISTING PROBLEM

Efficient management of on-shelf availability and inventory is a key issue to achieve customer satisfaction and reduce the risk of profit loss for both retailers and manufacturers. Conventional store audits based on physical inspection of shelves are labor-intensive and do not provide a reliable assessment. The aim is to develop a low-cost embedded system for early detection of out of-stock situations with particular regard to perishable goods stored in countertop shelves, refrigerated counters, baskets or cratesNo a priori knowledge about the product type is required, while the shelf reference model is automatically learn based on an initial training stage. The output of the system can be used to generate alerts for store managers, as well as to continuously update product availability estimates for automated stock ordering and replenishment and for e-commerce apps. Experimental tests performed in a real retail environment show that the proposed system is able to estimate the onshelf availability percentage of different fresh products with a maximum average discrepancy with respect to the actual one of about 5.0%.

Retailers with short lifetime products in stock always face a problem of whether new products should be ordered when on-hand products partially decay and how to deal with the old products if a new batch is ordered. In this article, we consider the sales of a perishable product with a fixed short lifetime in two shelves, where new items of the product in a regular shelf are sold in a preset normal price, and old items in a markdown (discount) shelf are sold in a discounted price. We study the problem of the joint ordering of new items and pricing of old items and propose a joint ordering and markdown policy when the demand of the product depends on its price, and freshness as well as unsatisfied demand is lost. First, we formulate a one-period model, in which the present shelf ages of items in the two shelves are considered and use the Karush–Kuhn–Tucker condition to analytically obtain the optimal solution of the joint ordering and markdown problem. Second, numerical experiments are conducted to evaluate the performance of the two-shelf policy when the optimal solution of the one-period model is applied to the multiperiod problem in the form of a myopic policy. The results show that the proposed two-shelf joint ordering and markdown policy for perishable products performs better than the traditional one-shelf policy

2.2 REFERNCES

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2.3 PROBLEM STATEMENT DEFINITION

Problem Statement 1:

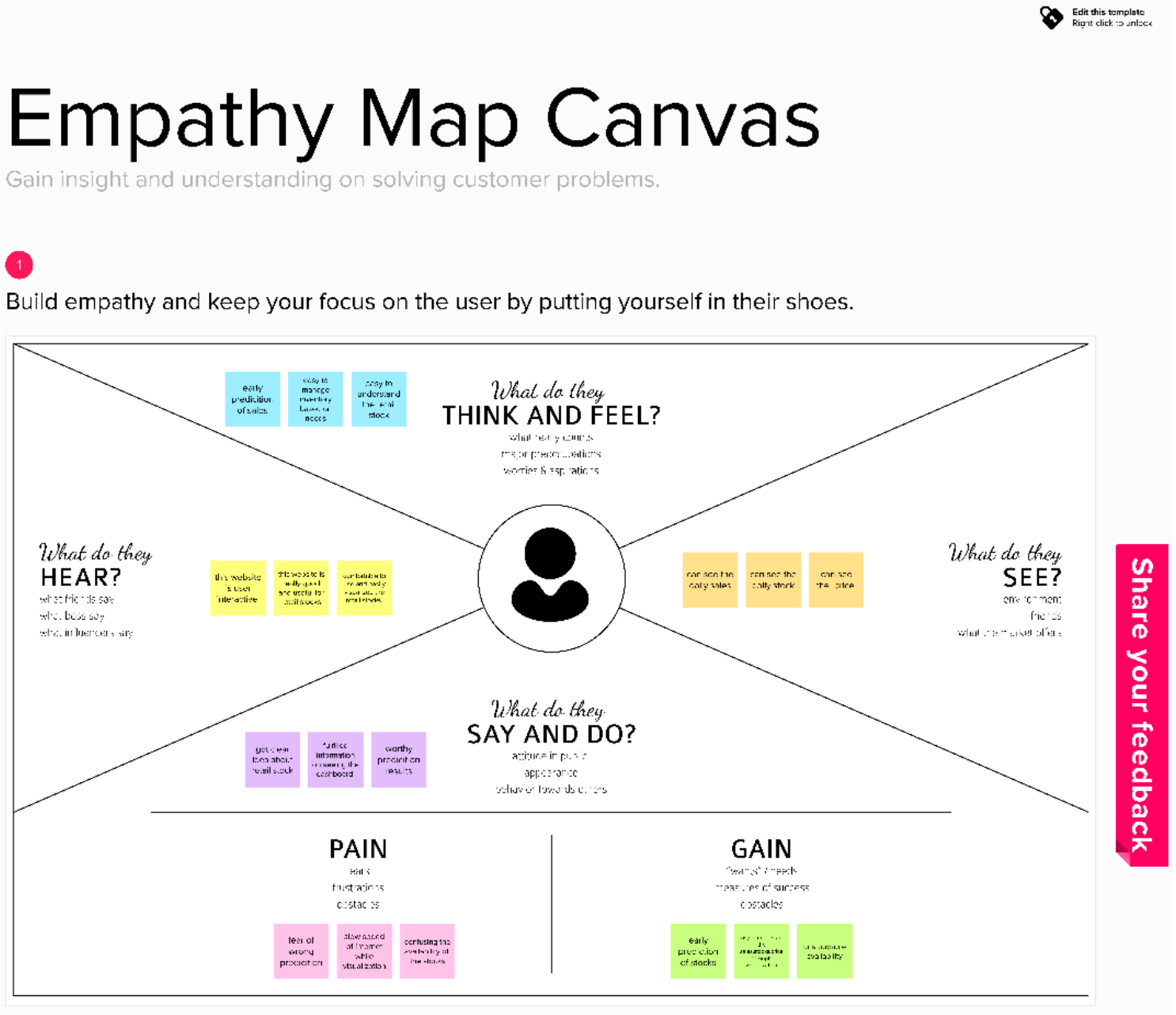
Problem statement 2:

Problem statement 3:

Problem statement 4:

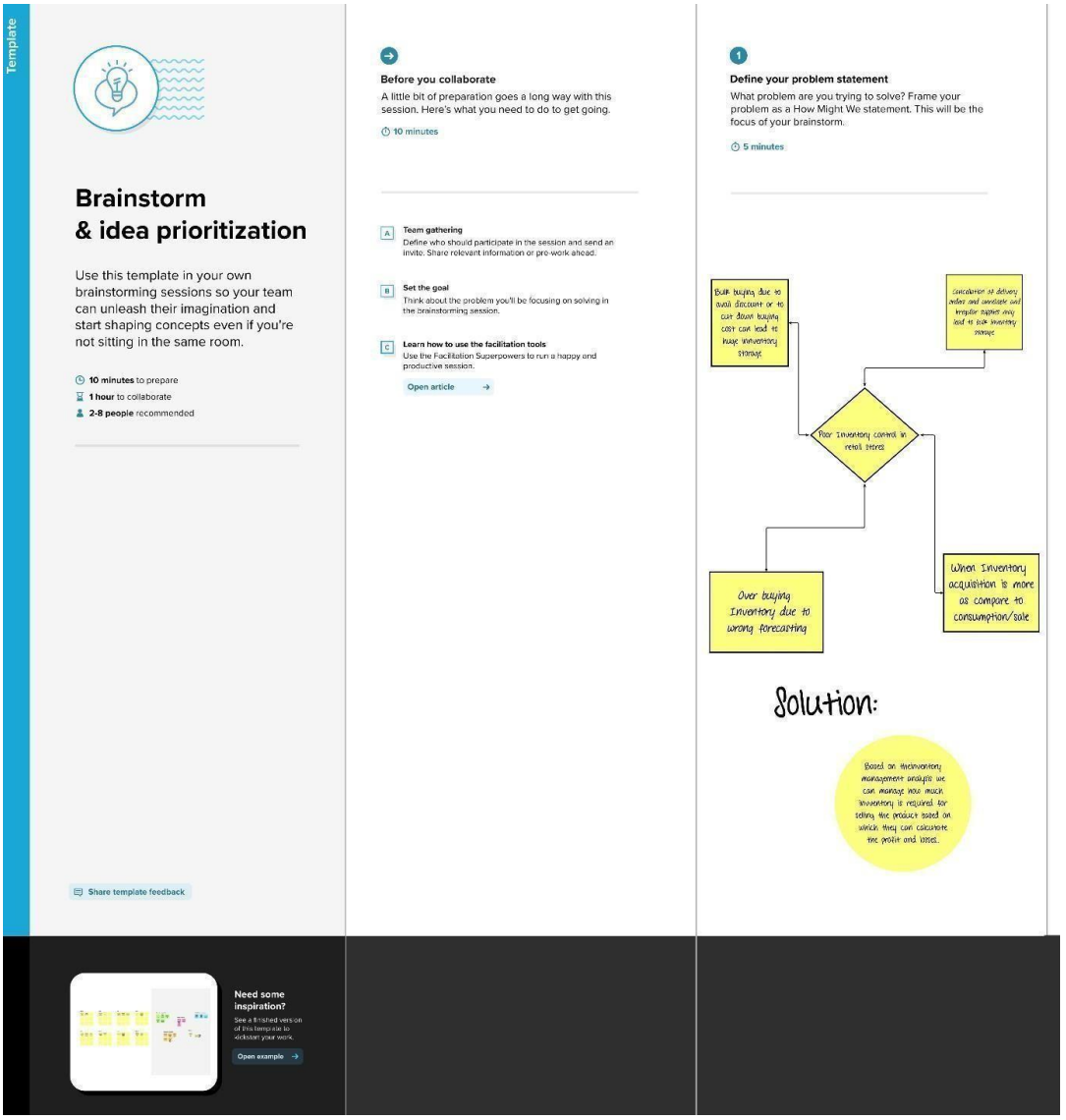
3. IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP



3.2 IDEATION PHASE AND BRAIN STORMING

Step 1:



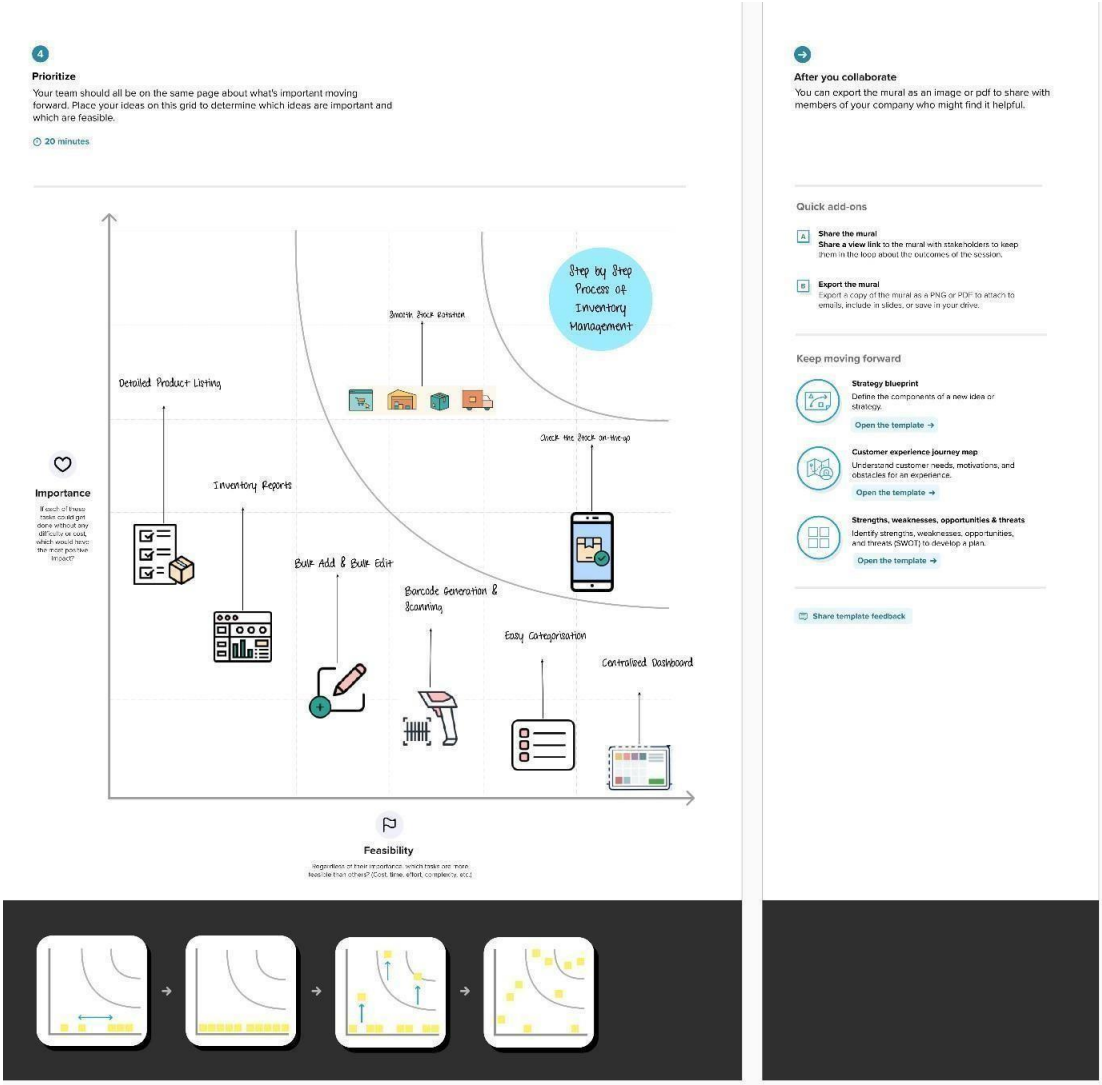
3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

20 minutes

Step 2:


4
Prioritize
Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.
20 minutes
Step by Step Process of Inventory Management
Barcode Stock Scanner
Detailed Product Listing
Check the Stock on-the-go
Inventory Reports
Bulk Add & Bulk Edit
Barcode Generation & Scanning
Easy Categorisation
Centralised Dashboard
Importance
Feasibility
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 a view link to the mural with stakeholders to keep them in the loop about the outcomes of the session.
Export the mural
Export a copy of the mural as a PNG or PDF to attach to emails, include in slides, or save in your drive.
Keep moving forward
Strategy blueprint
Define the components of a new idea or strategy.
Open the template
Customer experience journey map
Understand customer needs, motivations, and obstacles for an experience.
Open the template
Strengths, weaknesses, opportunities & threats
Identify strengths, weaknesses, opportunities, and threats (SWOT) to develop a plan.
Open the template
Share template feedback

3.3 PROPOSED SOLUTION

S.No.	Parameter	Description
1.	Problem Statement (Problem to be saved)	1. To predict the stock demand and give insight to retailers regarding the demand 2. To predict and visualize the season sales with help of historical sales data for the products
2.	Idea / Solution description	1. As we know Inventory management deals with stock demand and supply which helps retailers to improve their business with more profit 2. By understanding the dataset and identifying the pattern and relationship with the help of python libraries like pandas, NumPy, TensorFlow, Keras, matplotlib 3. To create meaningful dynamic dashboards with help of IBM tools like IBM Cognos, IBM cloud, etc.,
3.	Novelty / Uniqueness	Season Sales: We know that season sales occur during a particular month or period of the year and some products are brought in large quantities during that period. And some products are brought along with other products. For example, During the Pongal sale if a person buys rice he/she may also buy jaggery, ghee, or dry fruits. If we analyze those records we can and supply them accordingly. As for leftover milk which has an expiry of one day we can convert the milk to other by-products like curd, ghee, butter, etc., and milk has a short lifetime for which we can fix competitive prices.
4.	Social Impact / Customer Satisfaction	Retailers will know the market trends and also what products are brought frequently together
5.	Business Model (Revenue Model)	1. This business model will increase the number of sales by the quantity of stock available because the stocks are stored in the warehouse depending upon the demand from the customers 2. This idea will increase the profit because we can sell the by-products of milk which increases the profit by multi- folds than the raw product milk itself.
6.	Scalability of the solution	1. This idea will predict the most selling product during season sales which can optimize overstocking and understocking 2. This model can be scaled from corner shop retailers to supermarket retailers

3.4 PROBLEM SOLUTION FIT

Define CS, fit into CC

1. CUSTOMER SEGMENT(S) CS

Who is your customer?
i.e. working parents of 0-5 y.o. kids

1. Retail Store Owner
2. Stock Supplies

6. CUSTOMER CONSTRAINTS CC

What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices.

1. Overstocking
2. Understocking
3. Demand and Supply budget

5. AVAILABLE SOLUTIONS AS

Which solutions are available to the customers when they face the

1. Existing solution has more drawbacks like facing the demand and supply of product isdifficult
2. It is difficult to predict when a certain product will get rocket sales and when it will go down

Explore AS, differentiate

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

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

Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.

1. Predicting the sales by understanding customer behaviour.
2. Managing the budget in terms of product which did not sale but thereare more stocks available without moving.
3. To provide better supply chain management by understanding the demand and supply

What is the real reason that this problem exists?
What is the back story behind the need to do
9. PROBLEM ROOT CAUSE
i.e. customers have to do it because of the change in regulations.

1. Retail shop owners face difficulty in understanding customer behavior manually without help of technology.
2. And because of rapid growth in products available it has become difficult to trace the demand and supply for various products

inc
Gr
What does your customer do to address the problem and get the job done?
i.e. directly related: find the right solar panel installer, calculate usage and benefits;

1. They try the interface for overcoming the problem but existing models are complicated to use so they stop using it.
2. They can attend workshops to gain knowledge on inventory management.

3. TRIGERS TR

1. How to increase sales during seasonal festivals without any demand and supply problems.
2. Inspired by reading stock analysing and marketing strategies magazine.

4. EMOTIONS: BEFORE / AFTER EM

How do customers feel when they face a problem or a job and afterwards?
i.e. lost, insecure > confident, in control - use it in your communication strategy & design.

10. YOUR SOLUTION SL

If you are working on an existing business, write down your current solution first,

1. Analysing the sales in the previous year can help us know the ups and downs sales of the product.
2. By analyzing the frequency pattern and the items bought together to manage the inventory of those products.

8. CHANNELS of BEHAVIOUR CH

8.1 ONLINE

1. Online:

Giving ads about how they provide service and giving ads like they have all products instock when asked they'd never say that it isnot available.

2. Offline:

By interacting personally with the surrounding

Identify strong TR & EM	1. Frustrated, Stressed, Confused, Anxious 2. Empathy, Joy, Satisfied, Relaxed	3. l'o have another solution to keep the stocks safe in case of emergency situations.	customer the retail shop ownerhas and the regular customer he/she has.

4.REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Login	Login using userID and Password
FR-4	Profile Settings	Update Password Update the Details like Address and Contacts
FR-5	Dashboard	Gives the monthly sales of each product Analyzing the most products sold periodically Monitoring Stocks and giving alert messages Monitor Demand and Supply
FR-6	Bill Generation	To generate bills for received Stock

4.2 NON- FUNCTIONAL REQUIREMENTS

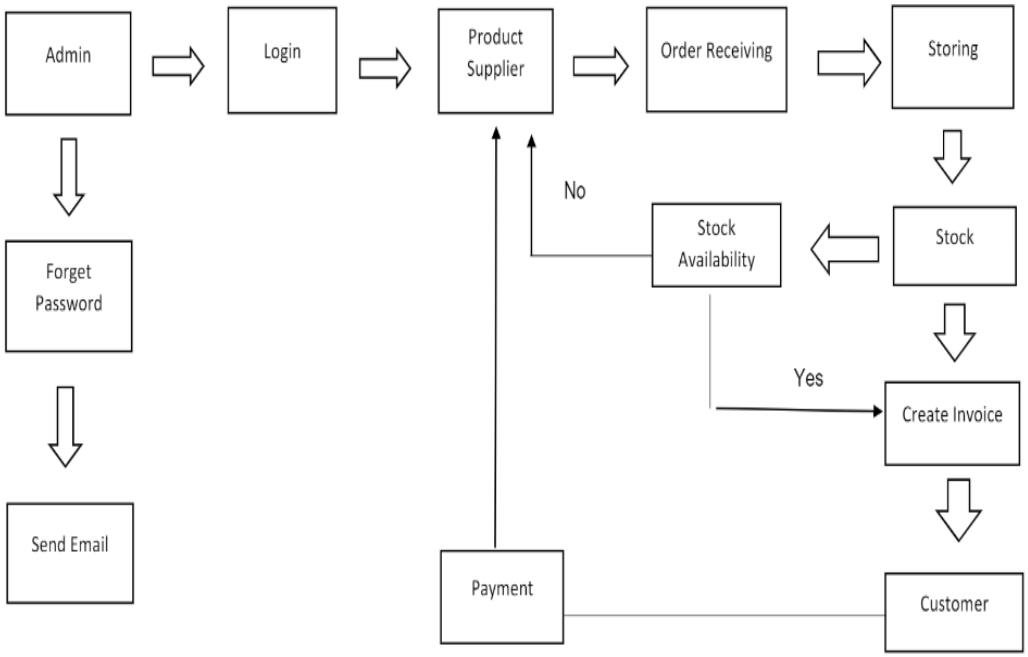
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	To avoid overstocking and understocking to minimize loss and maximize profit. Supported through the browser.
NFR-2	**Security**	Details like contacts and addresses are stored securely in the cloud.
NFR-3	**Reliability**	Avoids overstocking and understocking Ensure accurate inventory Prevent order delays
NFR-4	**Performance**	This model can predict profitable stocks. The accuracy of this model has been ensured through various accuracy algorithms
NFR-5	**Availability**	It is available 24*7 and this model is suitable for all retail stores and can be accessed from anywhere with help of a browser and internet supporter.
NFR-6	**Scalability**	More users can be accessed at the same time.

5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAM

Data Flow Diagram:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. Aneat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.



5.2 SOLUTION & TECHNICAL ARCHITECTURE

Technical Architecture:

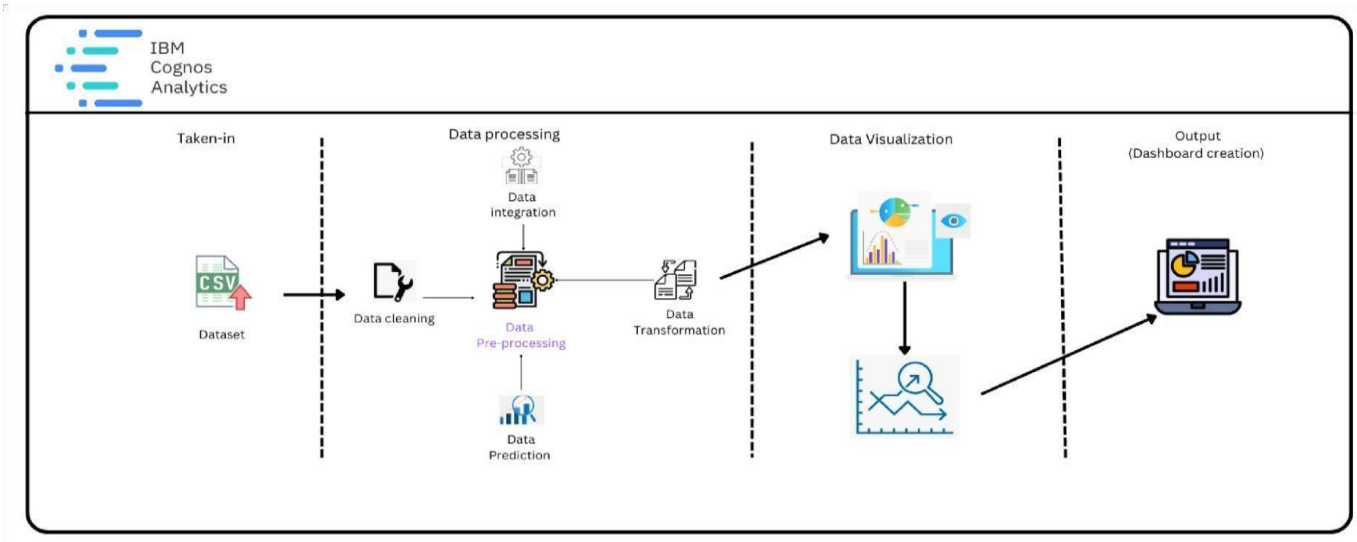


Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	The user interacts with application using Web UI	HTML, CSS, JavaScript
2.	Data Processing	The data from the dataset is pre- processed	IBM Cognos Analytics
3.	Cloud Database	The clean dataset is stored on IBM Cloud	IBM Cloud
4.	Data visualization	The data is visualized into different forms	IBM Cognos Analytics, Python
5.	Prediction	These Algorithm techniques are used to predict the proper way to make the stock in store.	ML algorithms – Logistic Regression, Linear Regression, Random Forest,ABC.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Open-source frameworks used	IBM Cognos Analytics, Python
2.	Security Implementations	Request authentication using Encryptions	Encryptions
3.	Scalable Architecture	Scalability consists of 3-tiers	Web Server – HTML, CSS, Javascript Application Server – Python Database Server – IBM Cloud
4.	Availability	The application is available for cloud users	IBM Cloud Hosting
5.	Performance	The user can know how to maintain the inventory to increase profits.	ML algorithms

5.3 USER STORIES

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 application by entering my email, password, and confirming my password.	I can access my account / Display Line/Bar Graph	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook	I can register & access the account	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can register through already logged in Gmail Account	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	After registration , I can login in by only email &password	High	Sprint-1
	Line/Bar Graph		After entering the inputs, the model will display inventory in Line/Bar Graph Format	I can get the expected inventory through the Format process	High	Sprint-3
Customer (Web user)	Login	USN-1	As a web user, I can login simply by using Gmail or Facebook Account	Already Created Gmail can be used for login	Medium	Sprint-2
Customer Care Executive	Support		The Customer care Service will provide solutions for any FAQ and also provide chatbot	I can solve the problem raised by support	Low	Sprint-3
Administrator	News		Admin will give the recent news about stock availability	Provide the Stock availability details	High	Sprint-4

	Notification		Admin will notify when the stock availability changes	Notification by Gmail	High	Sprint-4

6.PROJECT PLANNING AND SCHEDULING

6.1 SPRINT PLANNING & ESTIMATION

Product backlogs, Sprint schedule, Estimation(4 marks)

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, andconfirming my password.	2	High	Thanaswvtha A, Deepaasree VK
Sprint-1	Confirmation	USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	ThanaswvthaA, Deepaasree VK
Sprint-2	Registration through Facebook	USN-3	As a user, I can register for the applicationthrough Facebook	2	Low	ThanaswvthaA, Deepaasree VK
Sprint-1	Registration through Gmail	USN-4	As a user, I can register for the application through Gmail	2	Medium	ThanaswvthaA, Deepaasree VK
Sprint-1	Login	USN-5	As a user, I can log into the application byentering email & password	1	High	ThanaswvthaA, Deepaasree VK
Sprint-2	Dashboard	USN-6	As a user, I can view my dashboard and canperform stock prediction and analysis	3	High	ThanaswvthaA, DeepaasreeVK ,Aishwarya Tangam S
Sprint-2	View list of stocks	USN-7	As a user I can view the list of categorizedproducts and their details	4	High	Aishwarya Tangam S,Abarna

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3	Stock Prediction	USN-10	As a user I can predict out of stock and lessstock for a product	5	High	ThanaswvthaA, Deepaasree VK
Sprint-4	Notification system	USN-11	As a user I can view notification for expiredand out of stock products	4	High	ThanaswvthaA, Deepaasree VK
Sprint-4	Re-Ordering stock	USN-12	As a user I can reorder stocks based onpredictions and notification	3	High	Aishwarya Tangam S,Abarna
Sprint-2	Updating stock	USN-13	As a user I can add/delete products	5	High	ThanaswvthaA, Deepaasree VK , Aishwarya Tangam S,Abarna
Sprint-4	Invoice generation	USN-14	As a user I can generate invoice calculatingtaxes, discount and calculate credits	4	High	Aishwarya Tangam S,Abarna
Sprint-4	Discount system	USN-15	As a user I can provide discount based oncredit points	3	Medium	Aishwarya Tangam S,Abarna

Project Tracker, Velocity & Burndown Chart:

Sprint	**Total Story Points**	**Duration**	**Sprint Start Date**	**Sprint End Date (Planned)**	**Story Points Completed (as onPlanned End Date)**	**Sprint Release Date(Actual)**
Sprint-1	6	6 Days	24 Oct 2022	29 Oct 2022	6	29 Oct 2022
Sprint-2	16	6 Days	31 Oct 2022	05 Nov 2022	16	05 Nov 2022
Sprint-3	10	6 Days	07 Nov 2022	12 Nov 2022	10	12 Nov 2022
Sprint-4	14	6 Days	14 Nov 2022	19 Nov 2022	14	19 Nov 2022

6.2 SPRINT DELIVERY & SCHEDULE

Project Development Phase:

Sprint-1:

- ➢ Data Collection ➢ Data Preparation **Sprint-2:**
- ➢ Data Exploration **Sprint-3:**
- ➢ Dashboard Creation **Sprint-4:**
- ➢ Report Creation
- ➢ Story Creation

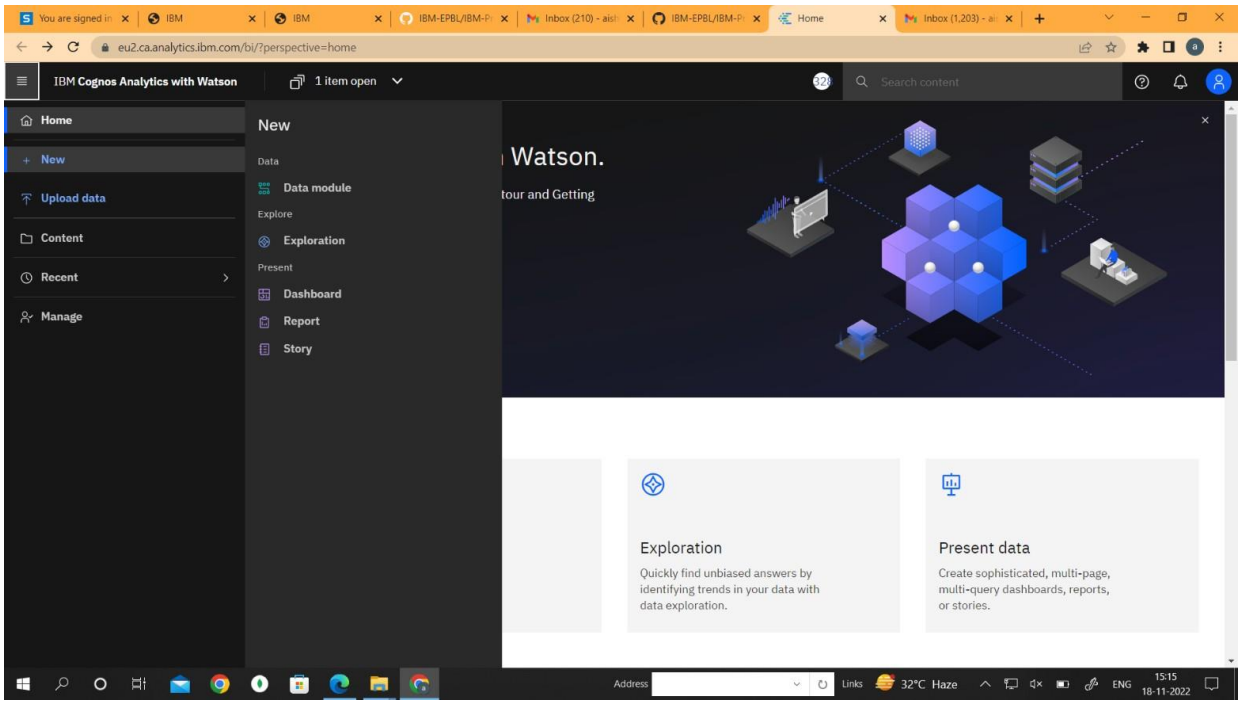
Sprint-1:

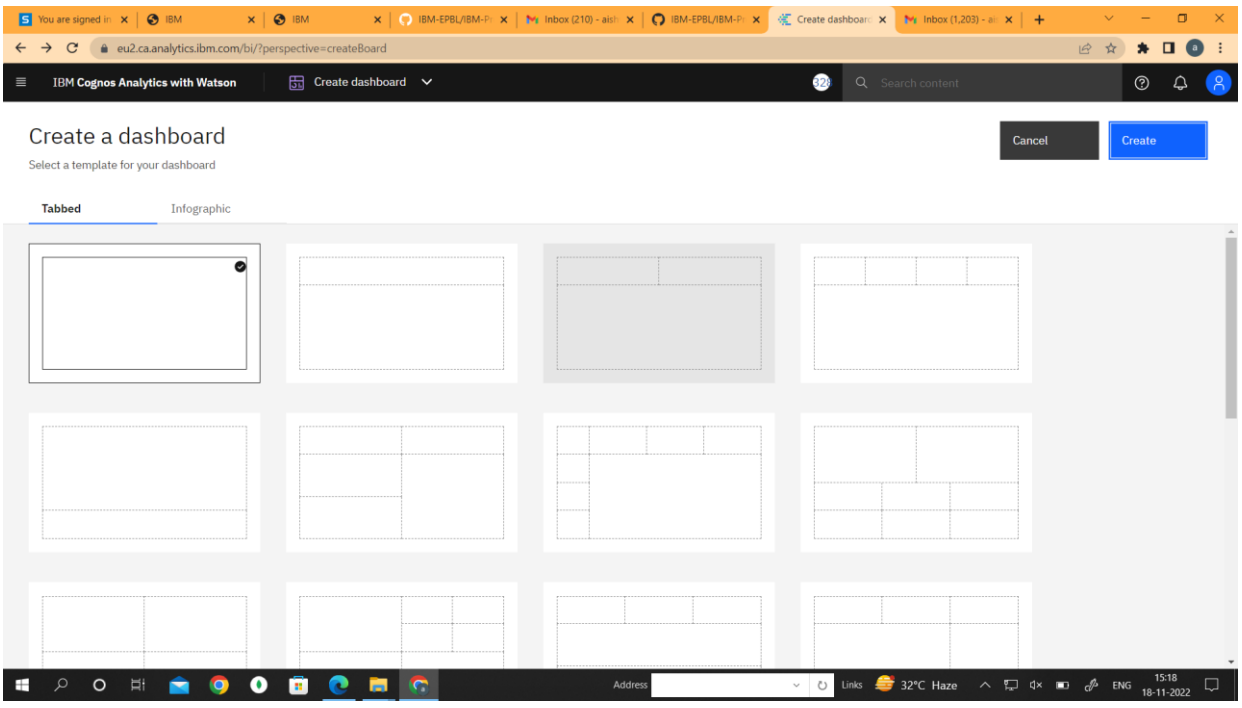
Data Collection:

Download the Dataset

Dataset link - https://drive.google.com/drive/folders/1kiL-5CHJmQvbk9VyFsuUs-myAupBZGNy

Load the Dataset:
Tool used – IBM Cognos





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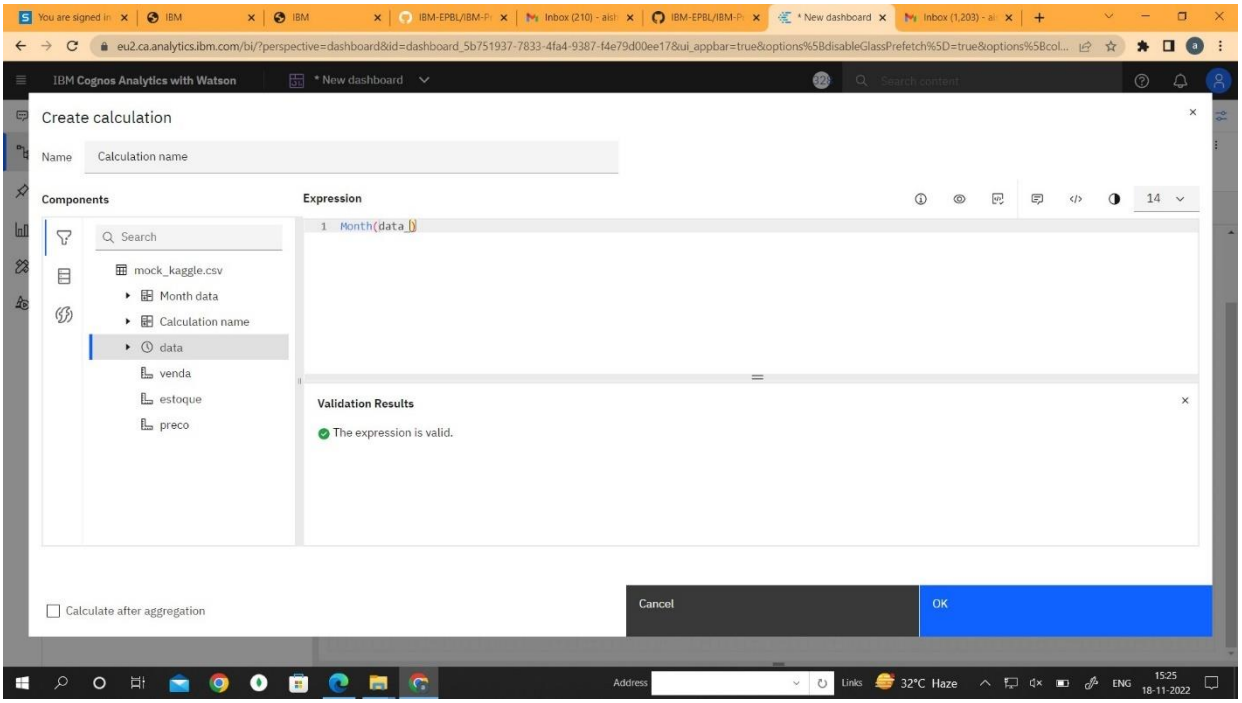
IBM Cognos Analytics with Watson
* New dashboard
Create calculation
Name
Calculation name
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Expression
Search
mock_kaggle.csv
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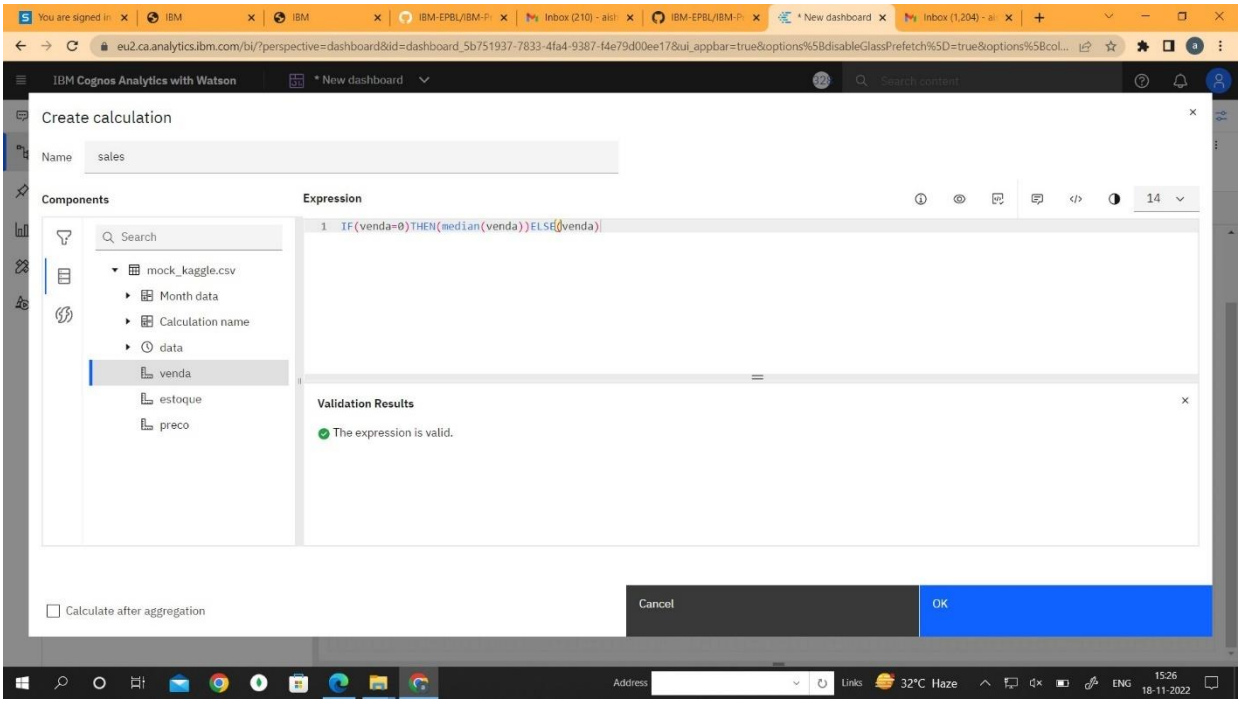
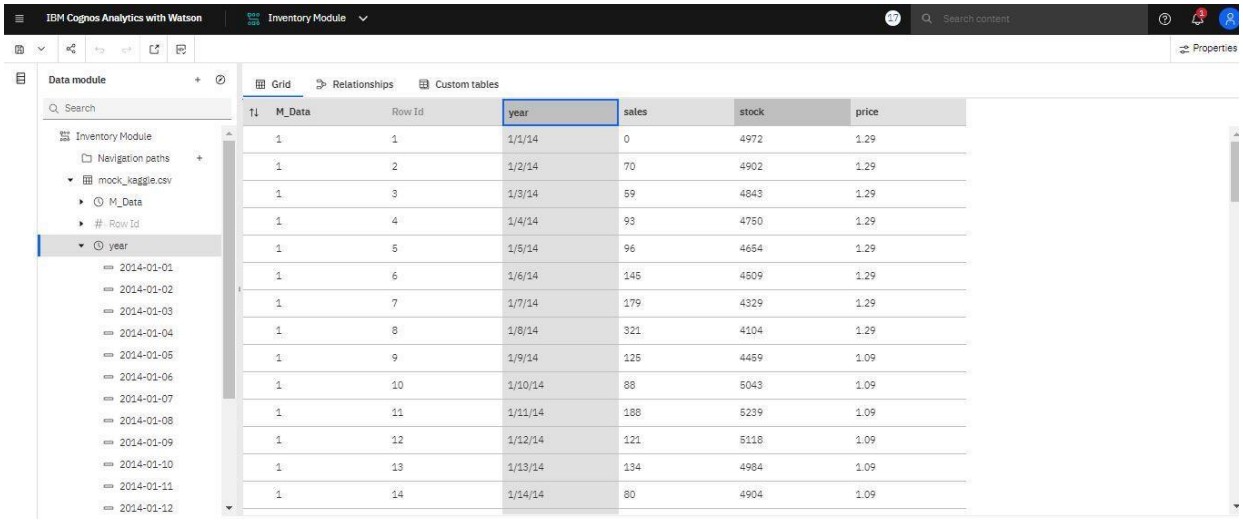
1 Month(data_)
Validation Results
The expression is valid.
Calculate after aggregation
Cancel
OK


IBM Cognos Analytics with Watson
* New dashboard
Create calculation
Name
sales
Components
Expression
Search
mock_kaggle.csv
Month data
Calculation name
data
venda
estoque
preco
1 IF(venda=0)THEN(median(venda))ELSE(venda)
Validation Results
The expression is valid.
Calculate after aggregation
Cancel
OK


IBM Cognos Analytics with Watson
Inventory Module
Search content
Properties
Data module
Search
Inventory Module
Navigation paths
mock_kaggle.csv
M_Data
Row Id
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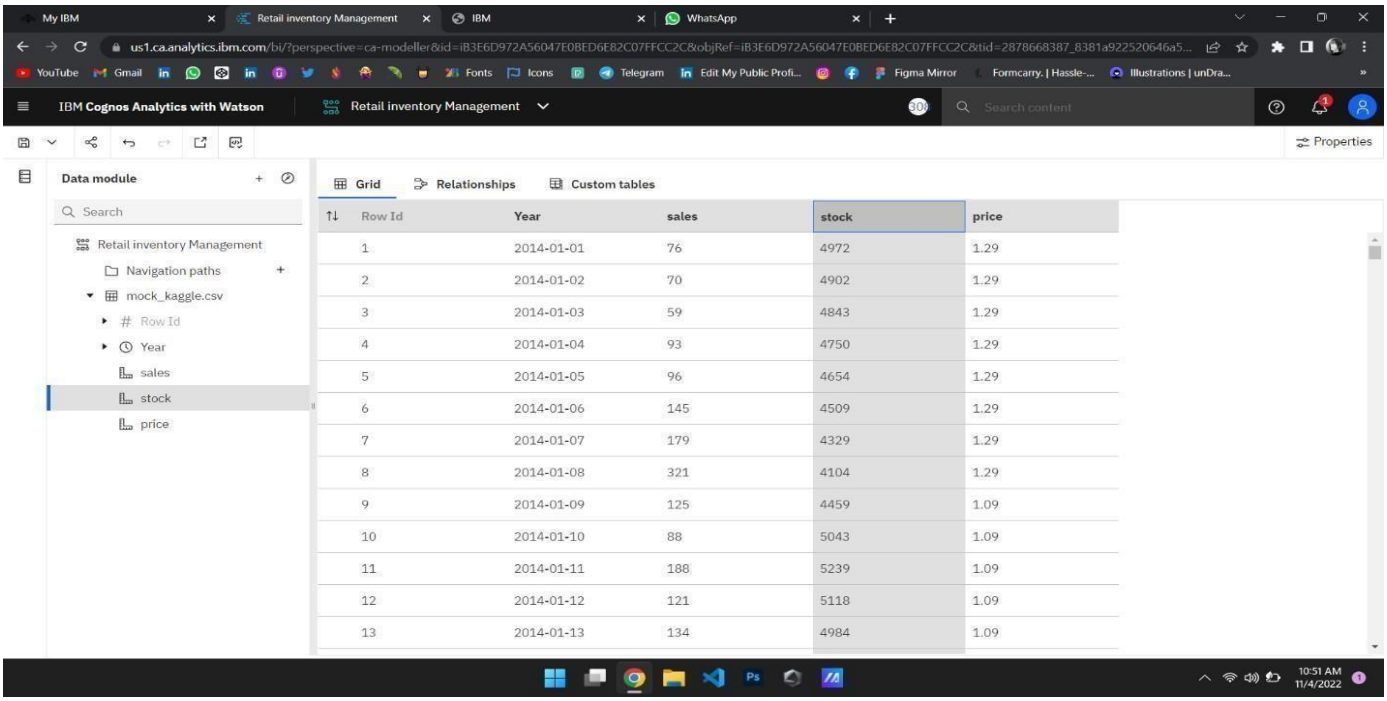
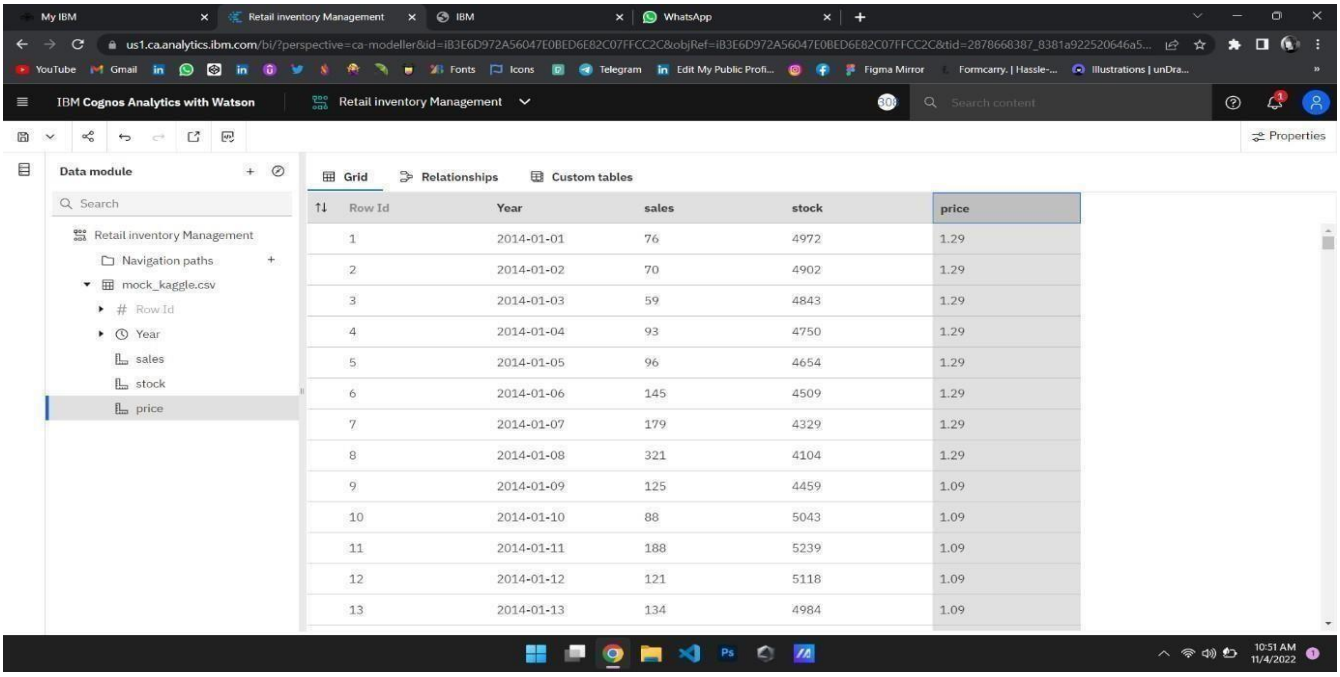
2014-01-01
2014-01-02
2014-01-03
2014-01-04
2014-01-05
2014-01-06
2014-01-07
2014-01-08
2014-01-09
2014-01-10
2014-01-11
2014-01-12
Grid
Relationships
Custom tables
M_Data
Row Id
year
sales
stock
price
1 1 1/1/14 0 4972 1.29
1 2 1/2/14 70 4902 1.29
1 3 1/3/14 59 4843 1.29
1 4 1/4/14 93 4750 1.29
1 5 1/5/14 96 4654 1.29
1 6 1/6/14 145 4509 1.29
1 7 1/7/14 179 4329 1.29
1 8 1/8/14 321 4104 1.29
1 9 1/9/14 125 4459 1.09
1 10 1/10/14 88 5043 1.09
1 11 1/11/14 188 5239 1.09
1 12 1/12/14 121 5118 1.09
1 13 1/13/14 134 4984 1.09
1 14 1/14/14 80 4904 1.09



Row Id	Year	sales	stock	price
1	2014-01-01	76	4972	1.29
2	2014-01-02	70	4902	1.29
3	2014-01-03	59	4843	1.29
4	2014-01-04	93	4750	1.29
5	2014-01-05	96	4654	1.29
6	2014-01-06	145	4509	1.29
7	2014-01-07	179	4329	1.29
8	2014-01-08	321	4104	1.29
9	2014-01-09	125	4459	1.09
10	2014-01-10	88	5043	1.09
11	2014-01-11	188	5239	1.09
12	2014-01-12	121	5118	1.09
13	2014-01-13	134	4984	1.09



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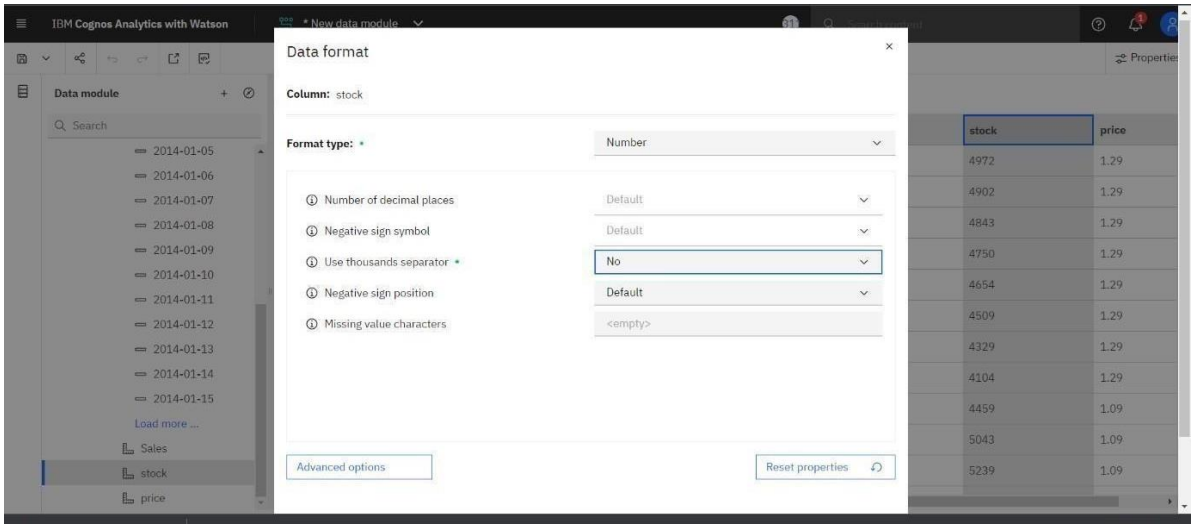
2	2014-01-02	70	4902	1.29
3	2014-01-03	59	4843	1.29
4	2014-01-04	93	4750	1.29
5	2014-01-05	96	4654	1.29
6	2014-01-06	145	4509	1.29
7	2014-01-07	179	4329	1.29
8	2014-01-08	321	4104	1.29
9	2014-01-09	125	4459	1.09
10	2014-01-10	88	5043	1.09
11	2014-01-11	188	5239	1.09
12	2014-01-12	121	5118	1.09
13	2014-01-13	134	4984	1.09

Stock format Data:



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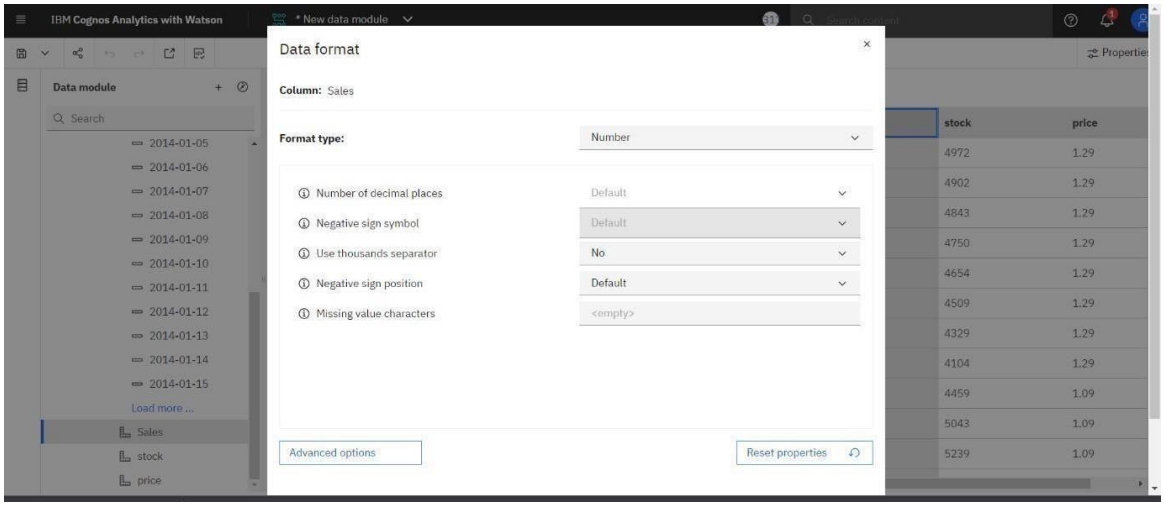
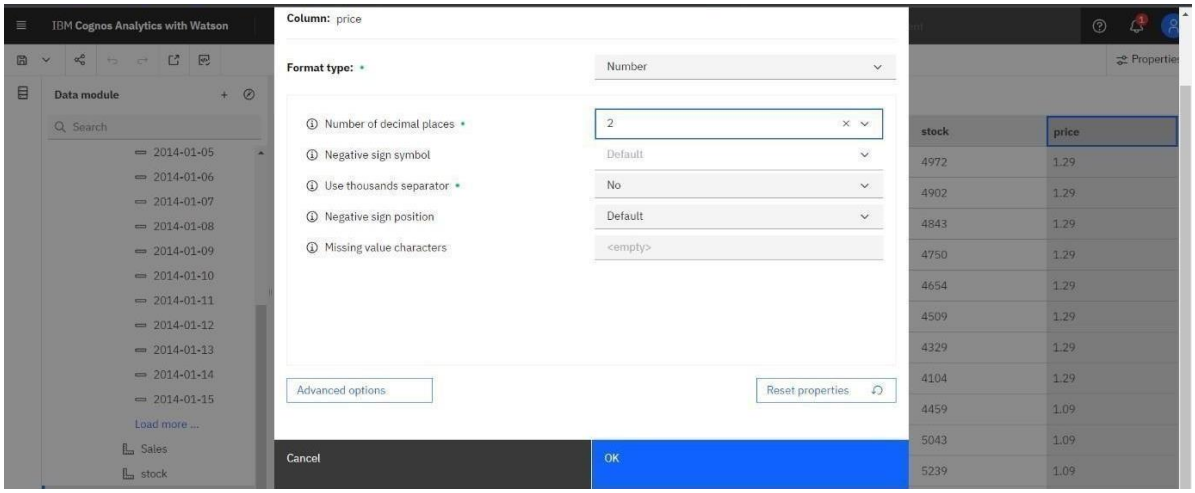
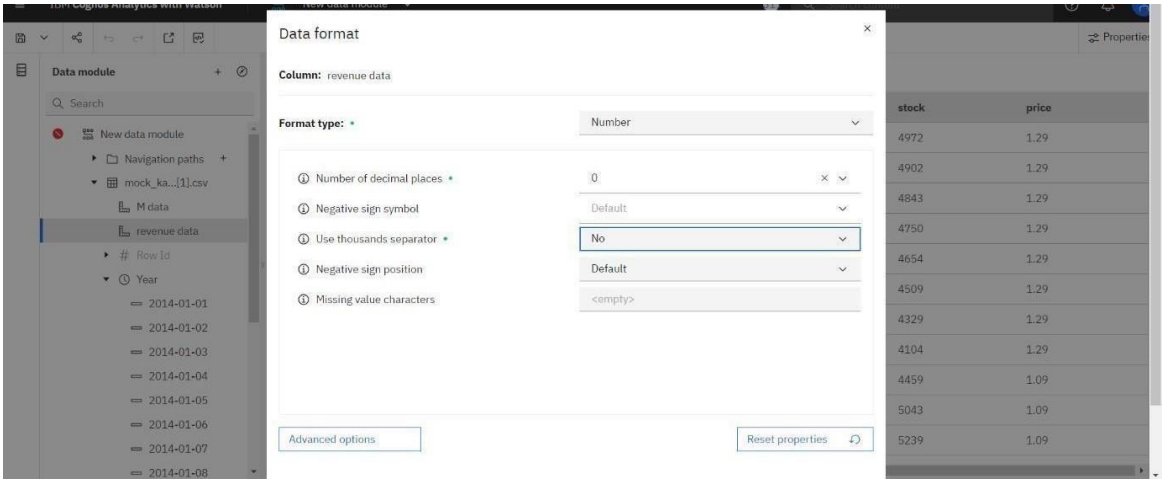


Price Format data:



Revenue format data:



SPRINT-2

DATA EXPLORATION

- ✓ LOAD THE DATASET
- ✓ SALES ANALYSIS
- ✓ PRICE ANALYSIS
- ✓ STOCK AND PRICE FOR YEAR COLORED BY PRICE PRICE FOR YEAR COLORED BY YEAR
- ✓ STOCK AND SALES FOR YEAR COLORED BY YEAR
- ✓ YEAR COLORED BY YEAR SIZED BY STOCK
- ✓ STOCK TREE SUNBURST
- ✓ SALES TO PRICE WITH LINE WIDTH PRICE
- ✓ STOCK USERS
- ✓ YEAR SIZED BY SALES
- ✓ PREPARED DATA LINK

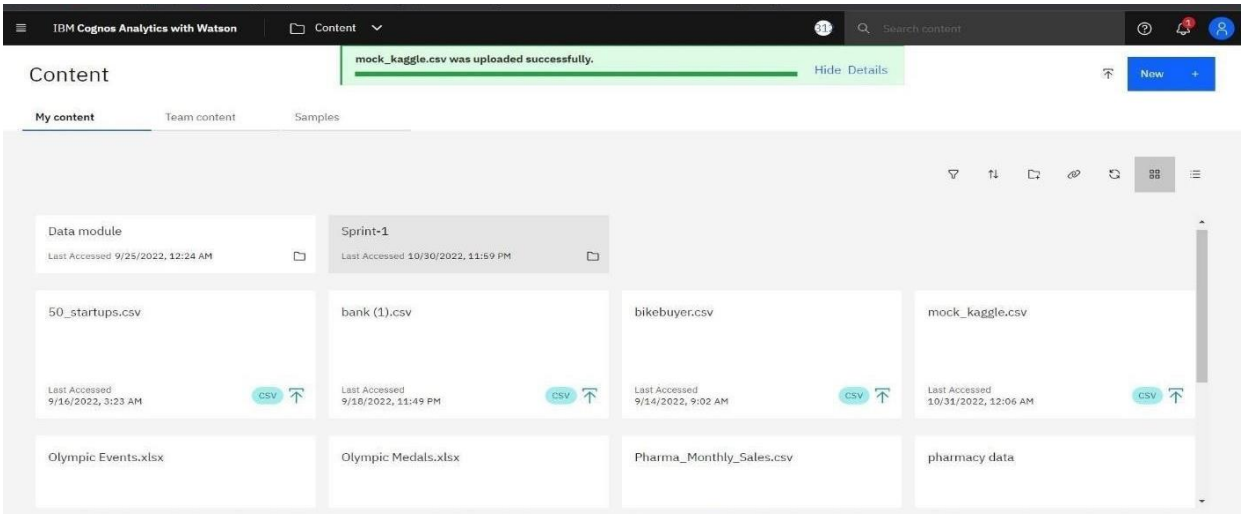
DATA COLLECTION:

Download the Dataset

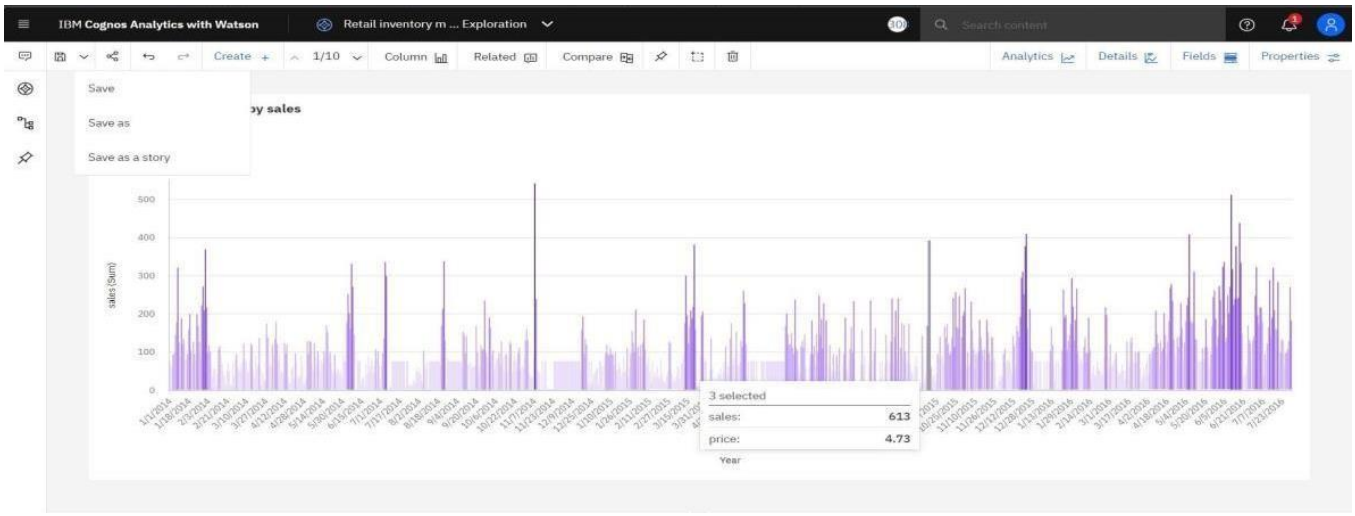
Dataset link - https://drive.google.com/drive/folders/1kiL5CHJmQvbk9VyFsuUs-myAupBZGNy

Load The Dataset:

Tool Used – Ibm Cognos



Sales Analysis:



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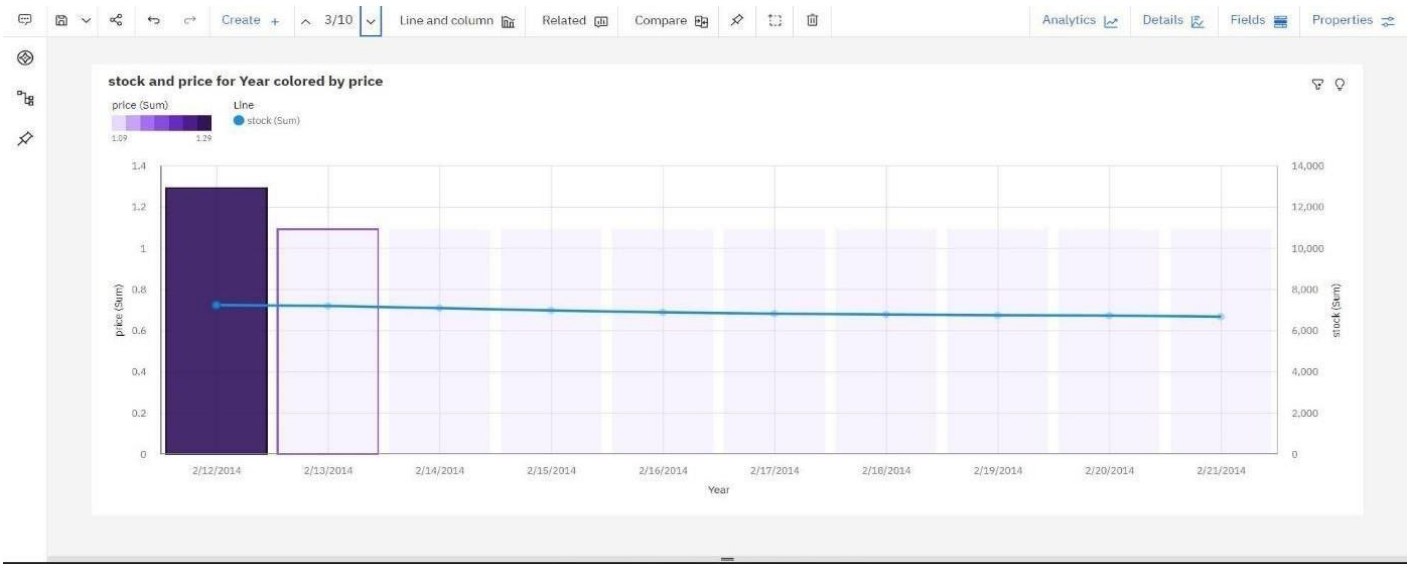
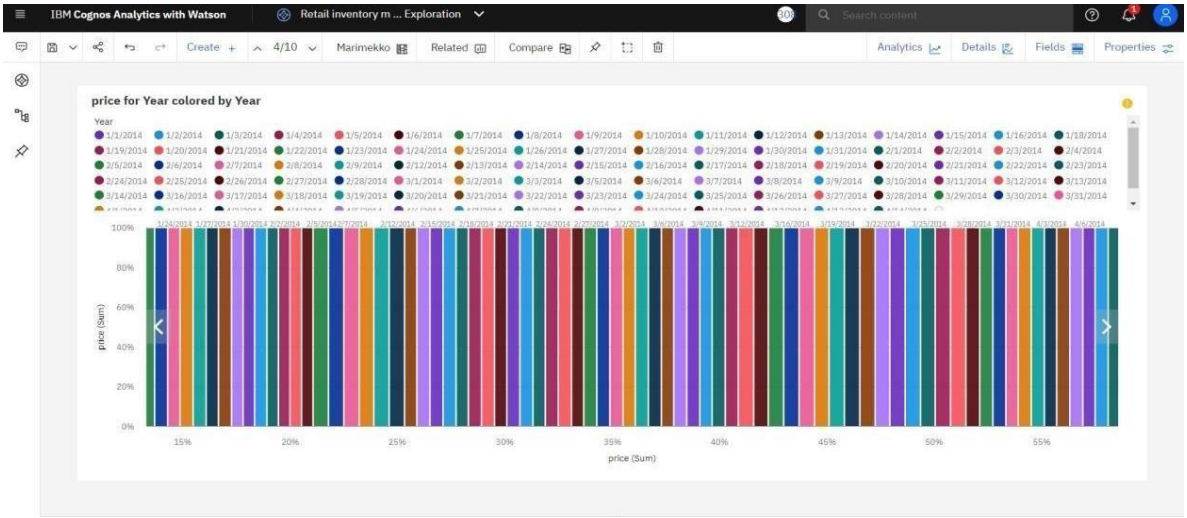
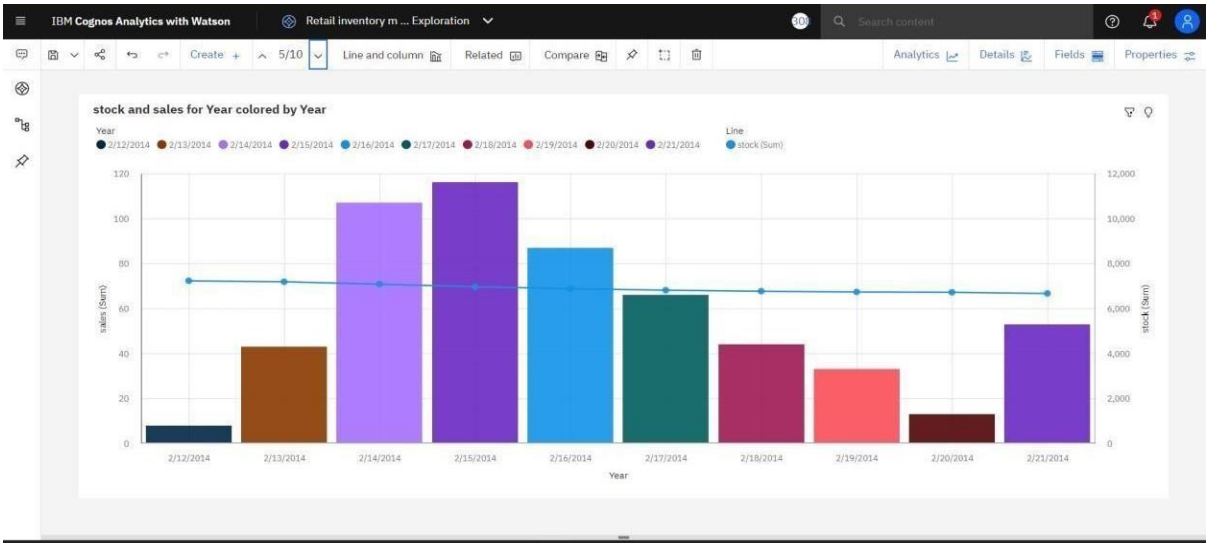


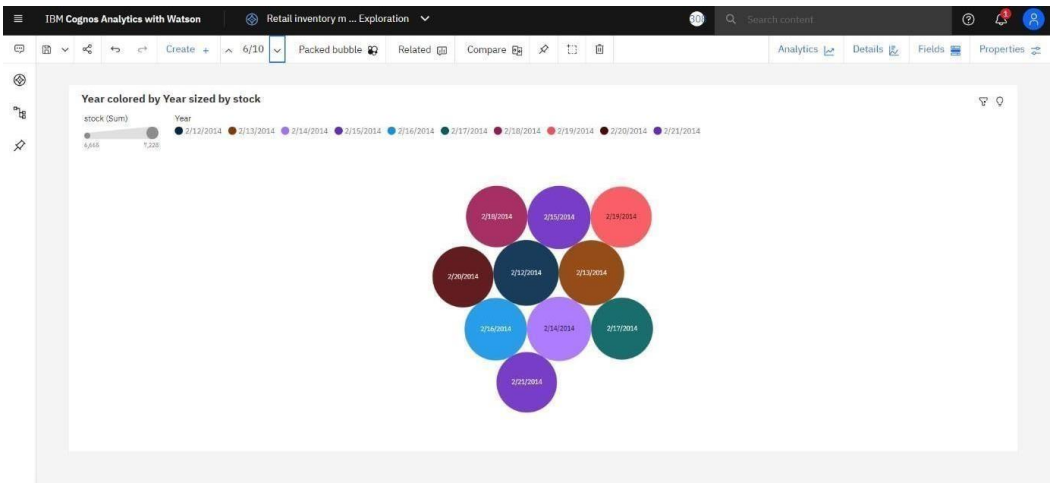
Price For Year Colored By Year:



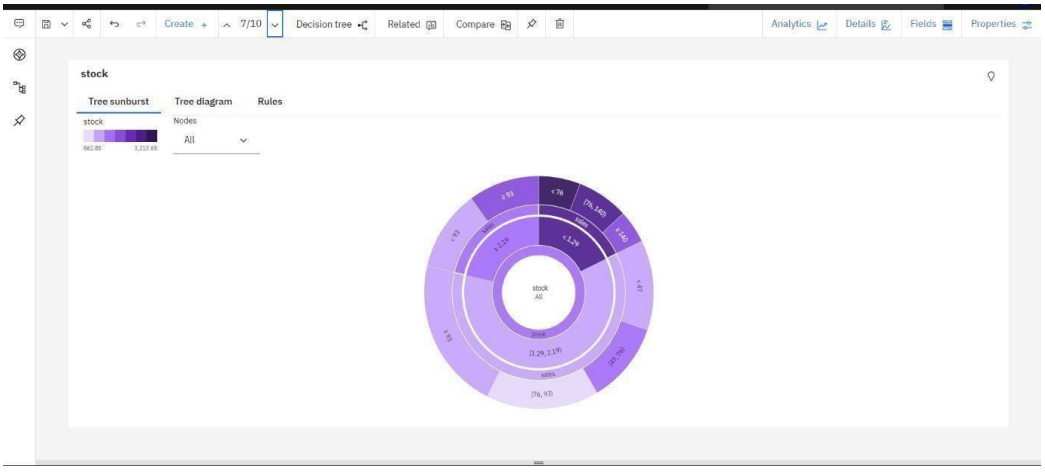
Stock And Sales For Year Colored By Year:



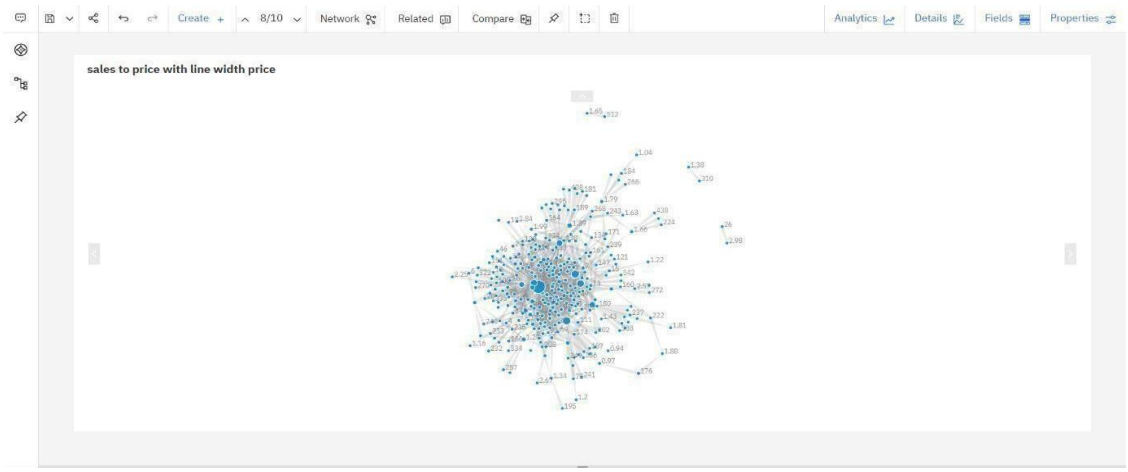
Year Colored By Year Sized By Stock:



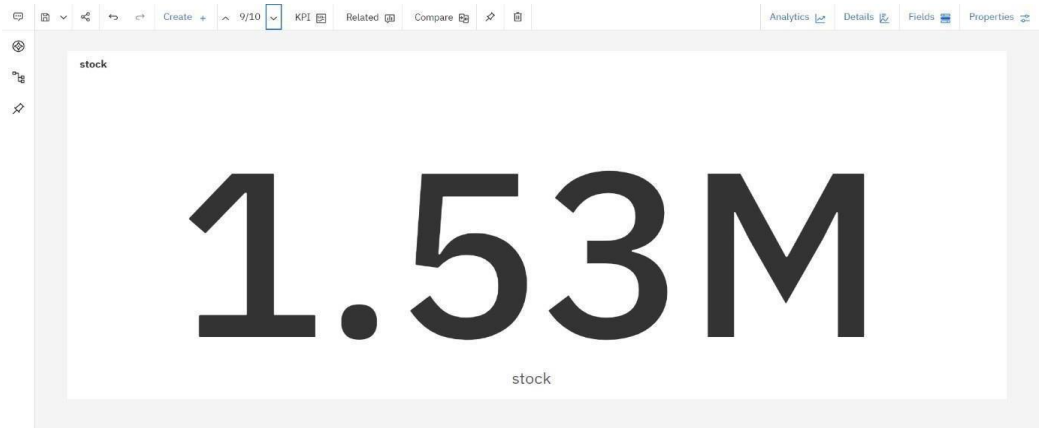
Stock Tree Sunburst:



Sales To Price With Line Width Price:



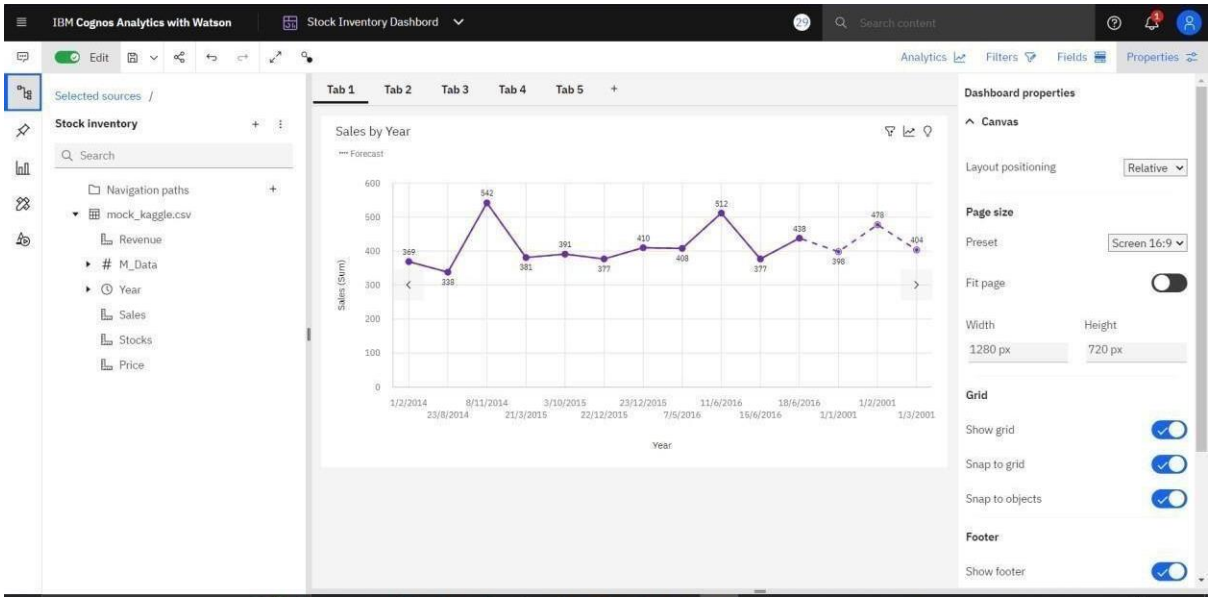
Stock Users:



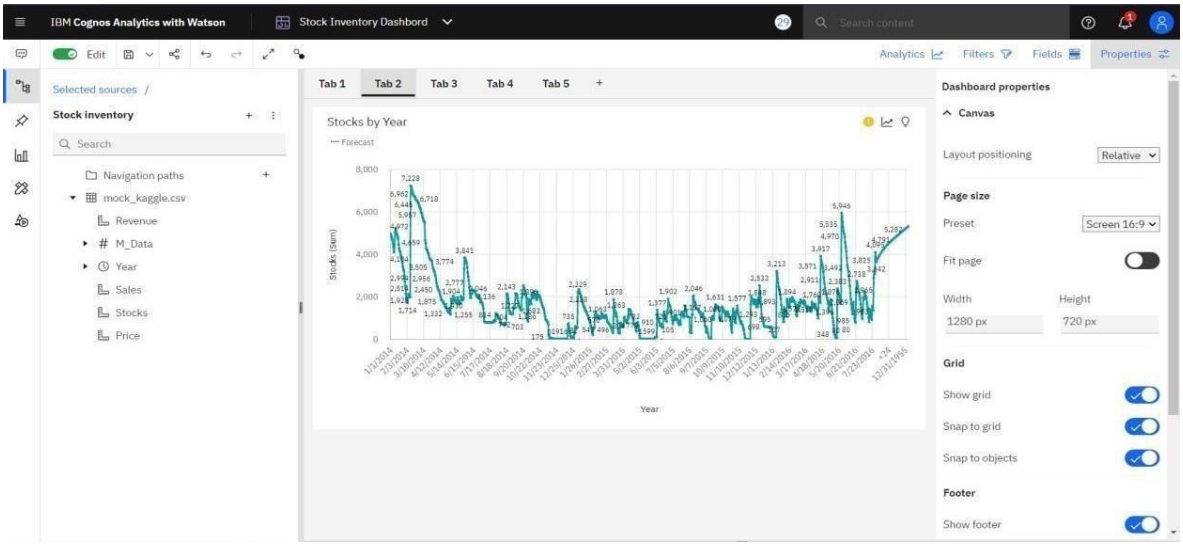
SPRINT 3

Dashboard Creation:

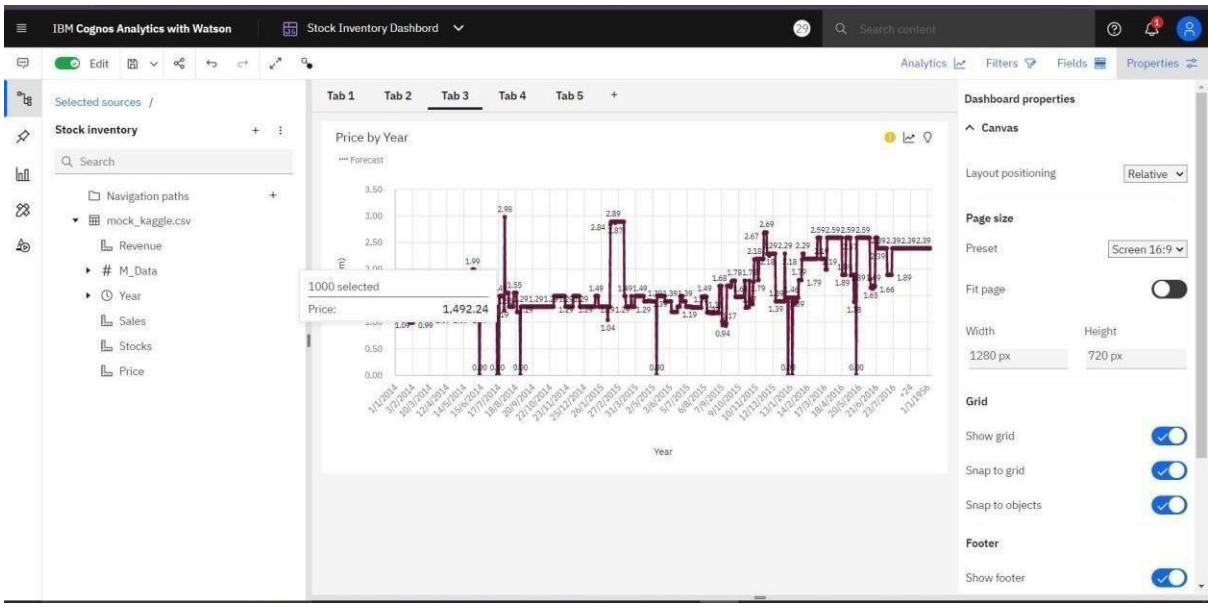
Sales by Year Line Chart



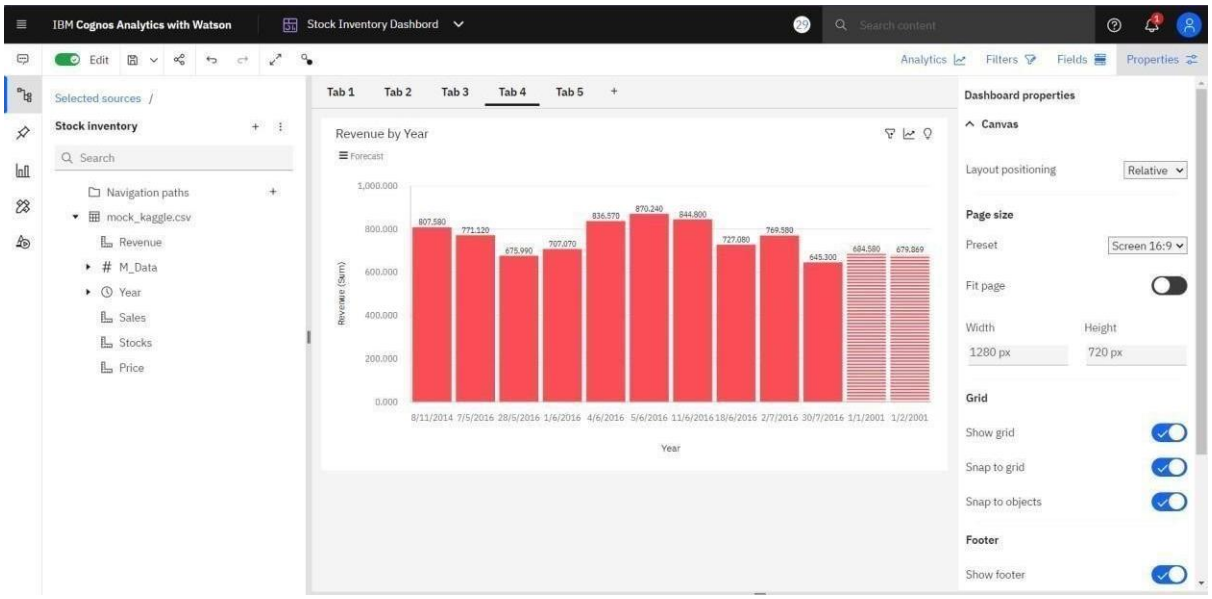
Stock by Year a Line Visual



Price by Year Line visual

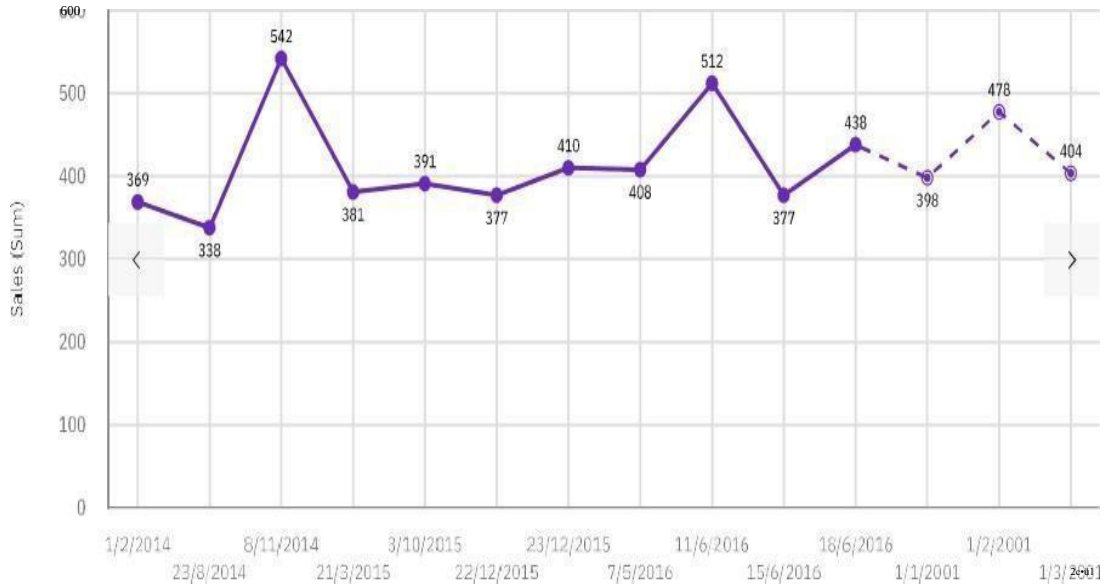


Revenue by Year Column Forecast visual.

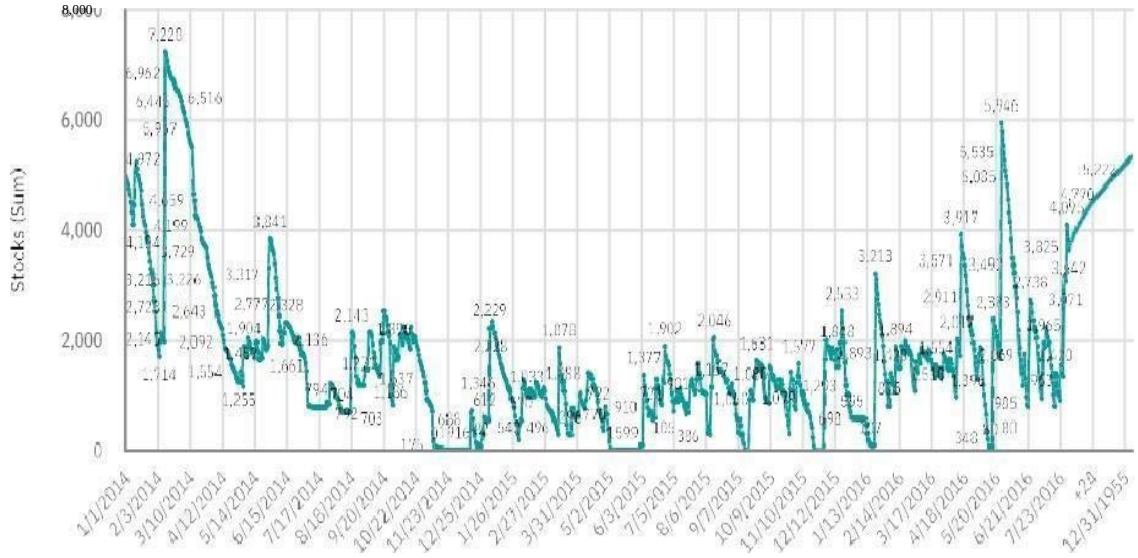


Dashboard:
Stock inventory dashboard

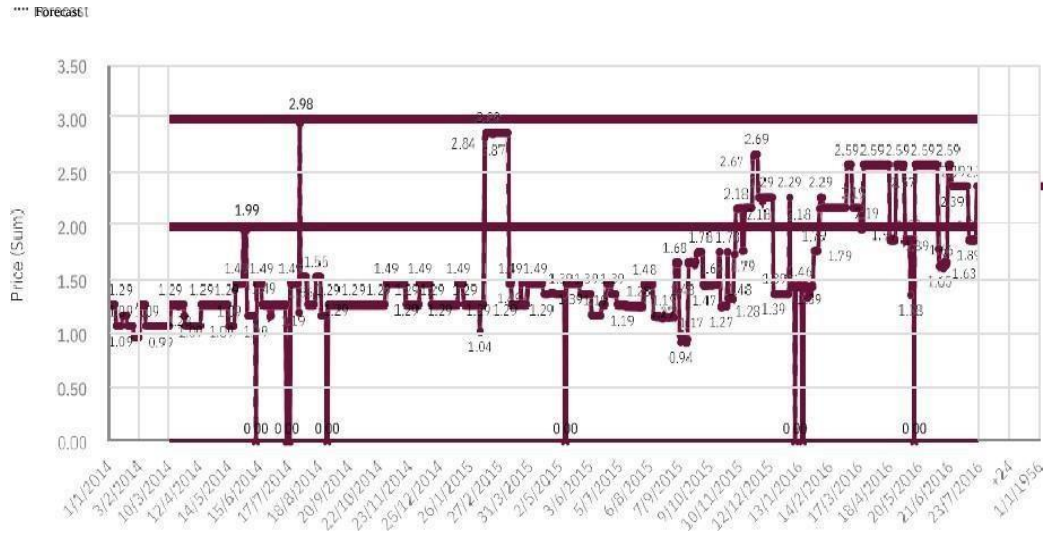
1) Forecast by years:



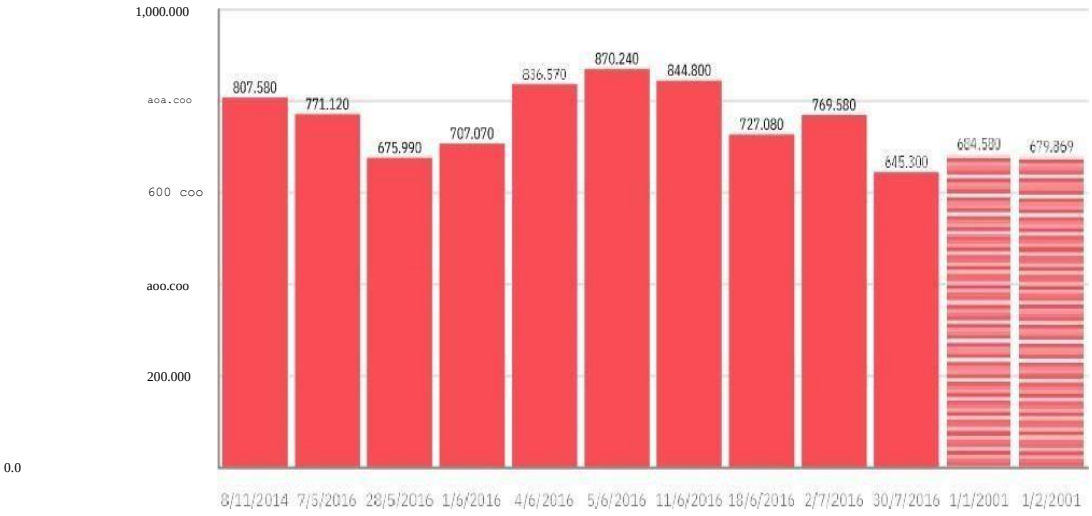
2) Stocks by years:



3) Price by years:

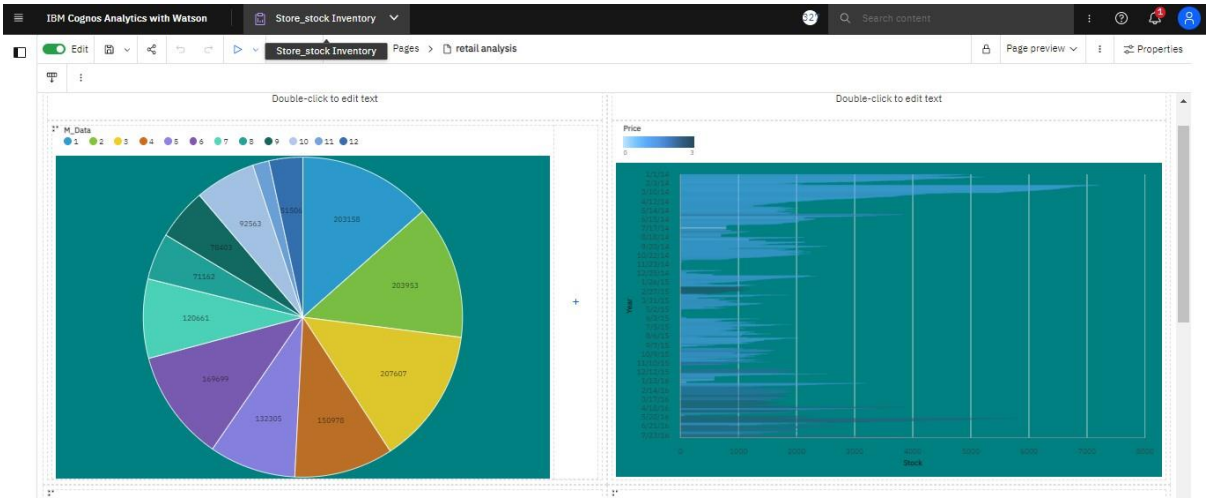


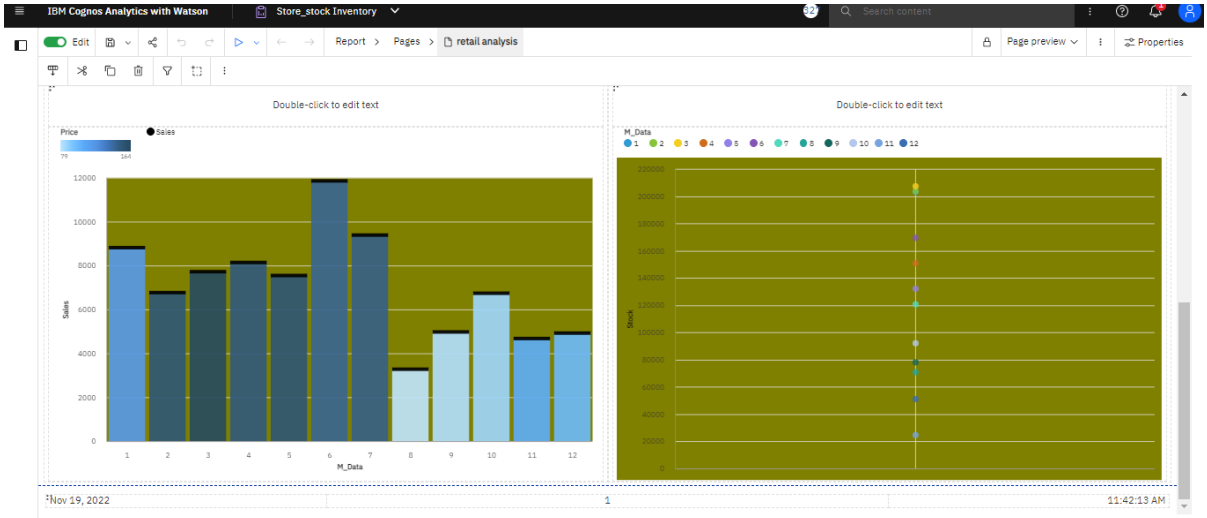
4)Revenue by year:



SPRINT 4

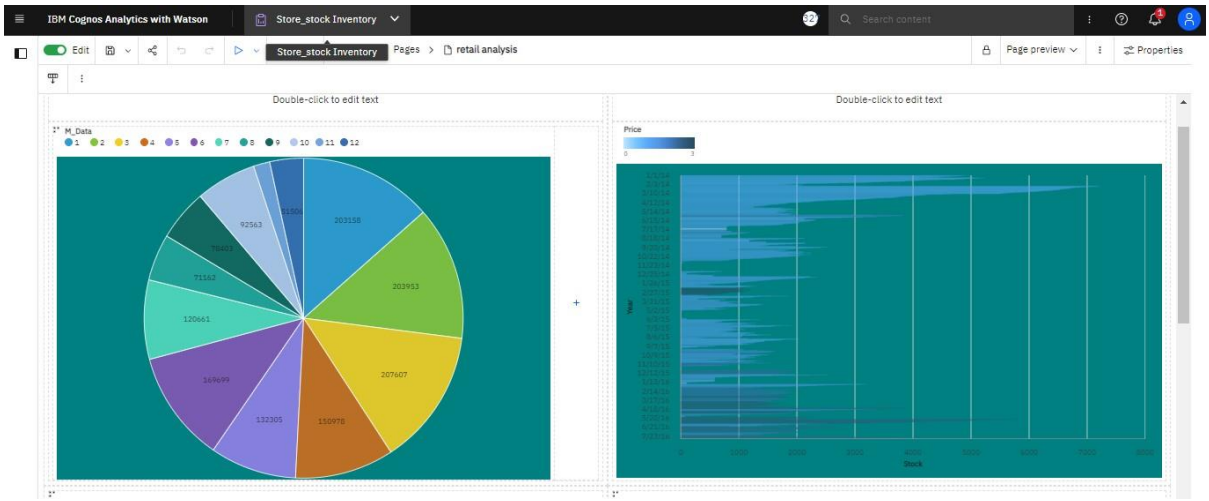
Retail store stock inventory analytics report



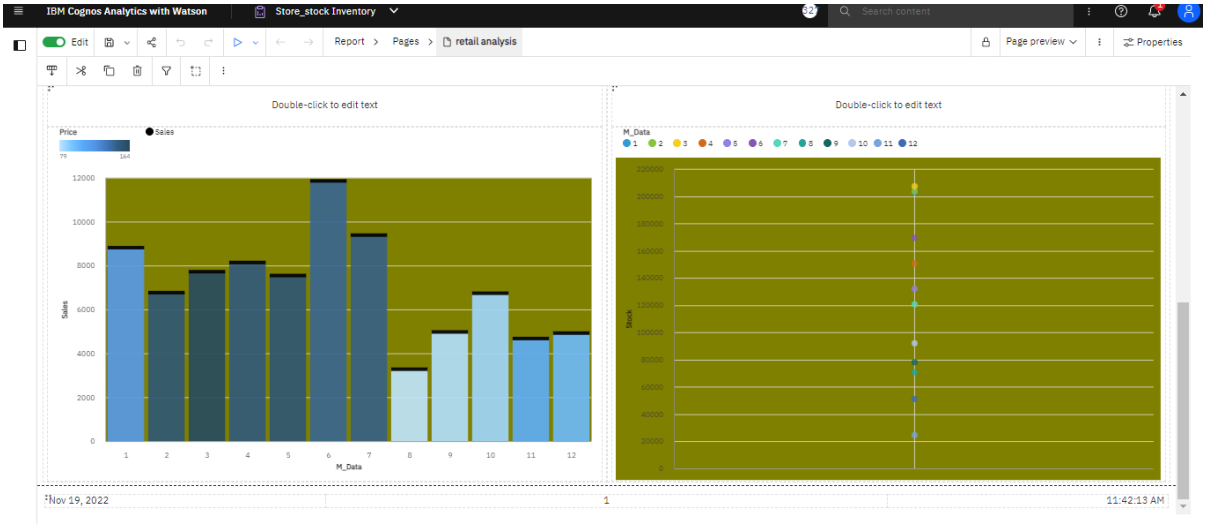


Report creation

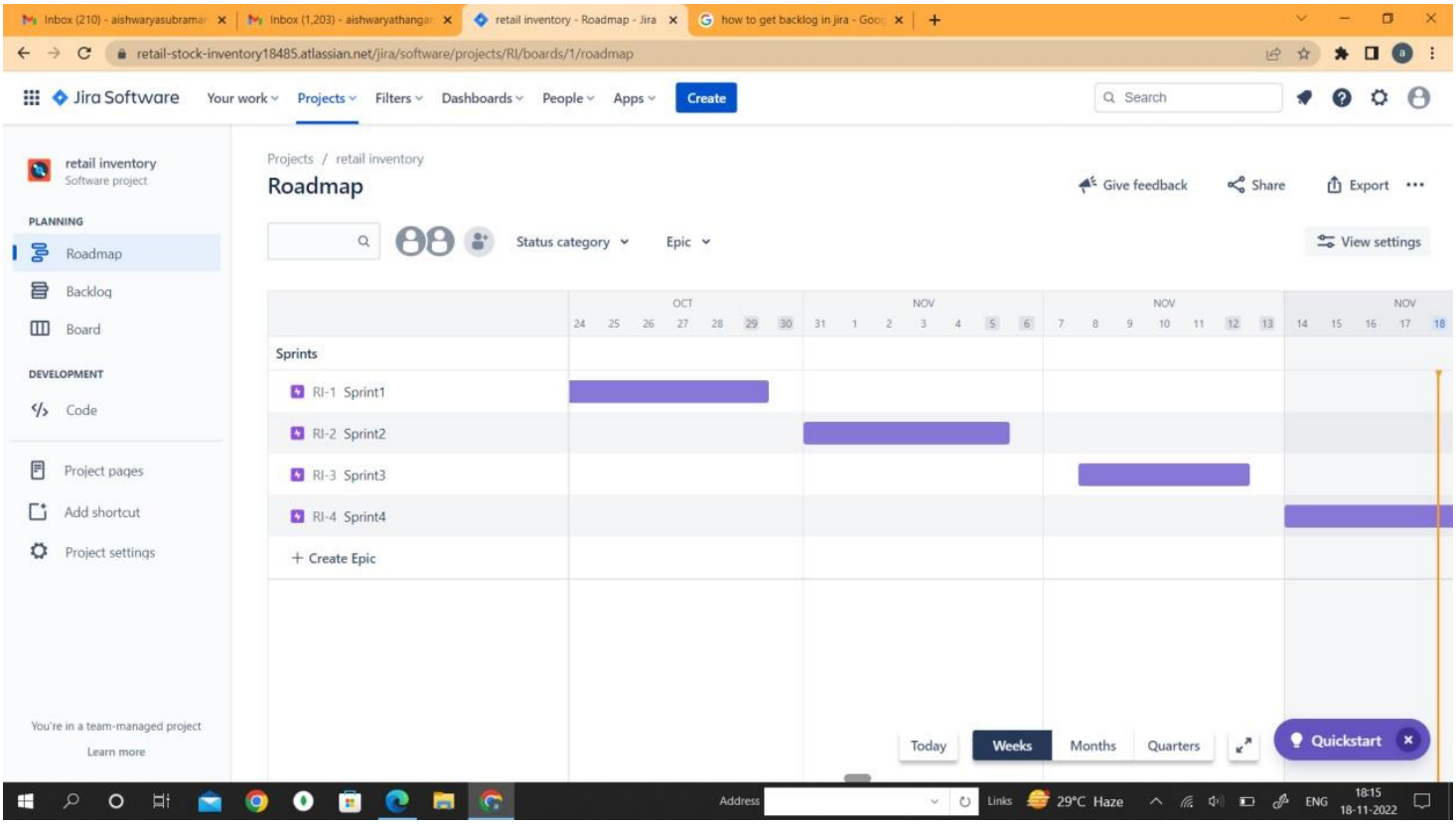
Sales By Year, Monthly Revenue, Revenue By Year



Monthly Stocks And Revenue



6.3 REPORT FROM JIRA



7.CODING & SOLUTIONING

7.1 FEATURE 1

Centralized inventory management

One of the most important functions of the inventory management system is that it tracks all of the information about the inventory. An inventory management system effectively keeps a good track of the stock levels, history of the product as well as many other product specifications. One of the greatest features of the inventory management system software is that it syncs with other modules of the inventory system. This assists in the operation of the inventory system accurately.

Tagging and Barcoding

Another great feature of the inventory management system is the elimination of standard human errors. Manual data functioning can cause errors, but scanning the barcode saves ample time for workers. The barcoding feature reduces employee training sessions and budget value. Traditionally, recording the data of the products requires so much effort. The inventory management system has made it easier by offering barcoding and tagging features. Now, the bulkiest work is completed in the least amount of time.Thus, inventory management system software lets you track the products efficiently with the help of tagging and barcoding.

Reporting of the business activities

One of the most advantageous tools of an inventory management system is the reporting of various business activities. Management of an inventory business demands people in charge to remain updated regarding various business activities such as the driver's location, the status of the product, information regarding the shipment of the order, etc. You can integrate many tools in the inventory management app for carrying out the reporting of tasks efficiently.

Forecasting of the inventory

It is a quite discomforting situation when company products go out of stock. An inventory management system allows you to check what products get out of stock, and what products are abundantly available in the stock of the company. This is a uniquely beneficial way of maintenance of a good user experience as well as spending resources wisely. Consequently, business owners purchase the business inventory smartly and intelligently.This feature of the inventory management system helps managers in meeting customer expectations and reduction of stock out risks.

7.2 FEATURE 2

Alerts regarding the inventory details

The manual work inventory supervision days are bygone. Now, managers do not have to spend a good amount of time and energy on the management of the stock data. A great inventory management system is one with a stock-out alert feature. In the alerts, the software describes various consequential issues that may occur due to reduced stock of a particular item.

Backup and security of the inventory

No matter the type of your business, proper backup, and security of the inventory is critical for the functioning of the inventory. Inventory management systems software has good security layers that make hacking impossible. In case inventory software gets hacked, the data has a backup that business operators can access and use. So, backup and security of the inventory prevent any hiccups.

Integration of inventory management software with other systems

Nowadays, companies have installed an ERP system that has increased the productiveness of the companies to a greater extent. If inventory management systems software can be integrated with ERP, the company can benefit a lot from the integration. Data can be retrieved relentlessly from the system.

Optimized inventory

Another great feature of the inventory management software system is that it optimizes and organizes the inventory of companies. It becomes easier for the managers to function and meet deadlines with the optimized inventory.

8. TESTING

8.1 TEST CASES

Model Performance testing

S.No	Parameters		Screenshots/Values
1.	Dashboard Design		The dashboard is created with three category i.e. Overview, Sales, Price.
2.	Data Responsiveness		The data is downloaded from an external API and uploaded in the IBM Cognos analytics with Watson and a data module is created
3.	Amount Data to Rendered		The dataset which is downloaded from the external API and uploaded is rendered from the DB2.

4.	Utilisation of Data Filters		The data filters are used for preprocessing the data i.e cleaning of data , removing the null value.The unwanted columns are removed from the dataset and the additional data which are required are added to the dataset.
5.	Effective User Story		The story is created with two scenes i.e. Introduction, sales by year & stock.
6.	Descriptive Reports		The report is created with two visualisations i.e.result, sales greater than 350.

8.2 USER ACCEPTANCE TESTING

Purpose of document

The purpose of the document is to give a clear view on what needs to be done i.e. the target and what is done and what are the things required to achieve the goal.The functional and User Application Interface is given under the feature type.The objective is given under the components column.The steps which need to be performed to achieve the goal is given under the Steps to execute column.The data which need to be tested is given under the test data column.The result or final objective which need to be achieved or attained are given under the expected result.The outcome which is actually attained is given under the actual result column.The status column contains whether the test is passed or fail.If in case the test failed the details of it has to be filled in the comments column.The automation of the test case has to be filled in the TC for automation which is denoted by “yes” or “no”.If in case the test failed the bug which occurred has to be given with its ID in the bug ID column.The person who performed the respective action is given under the executed by column

Test Case Analysis

Section	Test Cases	Not Tested	Fail	Pass
Dataset	8	0	0	8
Dashboard	8	0	0	8
Report	2	0	0	2
Story	10	0	0	10
Embed dashboard, report and story in simple .html file	12	0	0	12
Embed dashboard, report and Story in web app	15	0	0	15

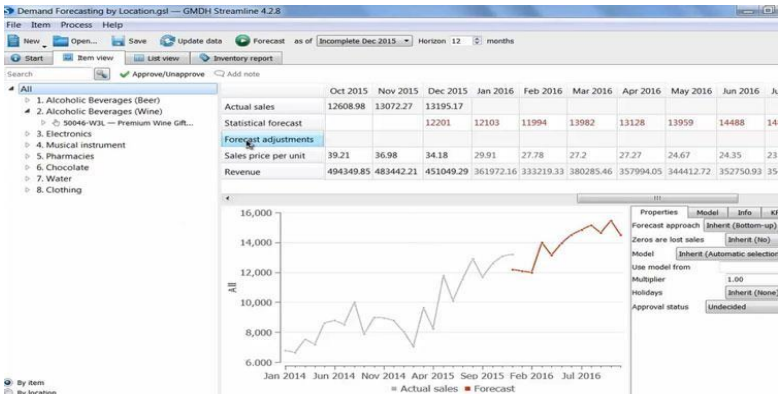
9. RESULTS

9.1 PERFORMANCE METRICS

The following are the five most effective inventory KPIs and metrics:

1. Demand Forecast Accuracy

An excellent inventory management metric for determining how strong collaboration is in a manufacturing operation, demand forecasting reflects the variation in real or actual demand and what is estimated at the factory level. Inventory metrics for manufacturing can make operations more effective by closing the gaps between forecasted demand and actual demand.



Use demand forecasting to plan inventory and forecast revenue.

This inventory metric also contributes directly to reducing inventory carrying costs, a key indicator of inventory management effectiveness. With demand forecasts on hand, you're less likely to order inventory beyond market demand. Further, demand forecasts can also clue you in on when to order more stock than normal, so you never miss a chance for growth.

2. Customer Satisfaction Levels

Often measured in net promoter scores (NPS), customer satisfaction levels need to be evaluated across all distribution and selling channels. Best-in-class manufacturers measure selling and distribution separately, determining an NPS for each channel. This is to index your customers' order-to-delivery times and check to see if they're consistent with what you originally expected.

3. Perfect Order Performance

Perfect order performance quantifies how effectively an organization delivers complete, accurate and damage-free orders to customers on time. The equation that defines the perfect order index (POI) or perfect order performance is: (percent of orders delivered on time) * (percent of orders complete) * (percent of orders damage free) * (percent of orders with accurate documentation) * 100.

DIFOT, or delivered in full and on time, is a critical KPI for purchase orders. But it can be a bit misleading if manufacturers assess it individually instead of using it in the POI formula above. The more configurable products are, the more difficult perfect order performance is to attain. However, the rapid growth of manufacturing intelligence is making perfect order performance more attainable than ever across the spectrum of production strategies.

4. Fill Rate Effectiveness as a Percentage of All Orders

Measuring supply chain collaboration needs to be a priority when selecting inventory metrics and KPIs to manage your operation. Tracking fill rate effectiveness as a percentage of all orders directly reflects how many orders or requests for material from production centers are fulfilled. Taking this metric a step further provides insights into how well production centers are managing inbound inventories to meet customer delivery dates.

5. Gross Contribution Margins by Product, Production Facility and Business Unit

Best-in-class inventory management solutions provide gross contribution margin (GCM) performance levels across several different dimensions of business. GCM is one of the most effective metrics a business can use to evaluate how well collaboration is happening across business units.f you know the GCM attributable to a given production center, you can track performance and effectiveness levels by location.

10.ADVANTAGES AND DISADVANTAGES

Advantages

- An advantage of the retail inventory method is that it does not require a physical inventory. The retail inventory method only requires an organization to record the retail prices of inventory items.
- If an organization has multiple locations in different cities and states, performing a physical inventory can become a costly and time-consuming undertaking. By using retail inventory, an organization can prepare an inventory for a centralized location.
- The retail inventory method also allows the organization to create an inventory value report for budgeting or the preparation of financial statements.

Disadvantages

- On the other hand, the retail inventory method is only accurate if all pricing across the board is the same and all pricing changes occur at the same rate. In most cases this is not realistic in retail because of the many variations that exist in merchandise pricing.
- For example, depreciation, markdowns, product damage and theft can affect the price of the retail inventory.
- For this reason, any calculations made using the retail inventory method should serve only as an estimate.

11. CONCLUSION

For the success of the program, the managers of the retail stores must formulate a modern way of managing the inventory by instituting electronic systems to take care of the resources of the company. This ensures that they can be accounted for and there are proper records available all the time for reference to be made when the need arises. Besides, the retail management system is necessary for ensuring that there is accountability in the way the company handles its stock. It helps in saving time.

Retail companies have acquired significant importance within several countries due to their high economic contribution. Therefore, the need to analyze their KPIs becomes highly significant, as well as their different systems, methodologies, and tools used within inventory management and optimization. From the aspects mentioned above, the main trends in inventory management within companies were define.

12. FUTURE SCOPES

New inventory management skills

As stock control advances, inventory managers need new skills to match them.
Besides organizational skills and general computational skills in math, data analytics, and forecasting, inventory managers in 2019 will need to learn bits and pieces of topics like:

- Coding and algorithms (you may need to insert a few lines of codes here and there.)
- Application programming interfaces (APIs).
- Enterprise resource planning (ERP).
- New reporting technologies (they keep improving; you want to keep up with them.)

As an inventory manager or store operator or owner, you may not need to know these skills too in-depth, but a basic knowledge of them is necessary.

Inventories that power experiential retail

- Experiential retail is a trend that's catching fire — especially in the past few months.
- In fact, they keep popping up in the news section of Google search results:
- The concept of consumers being in an exciting and relaxed place because a brand is becoming one
  of the strongest arms of retailing today. But as experiential retail grows in prominence and usefulness, the inventories that power them grow as well.
- For example, Nordstrom launched "Nordstrom Local" — a new line of smaller stores, with its first in West Hollywood, California. They didn't design the store to sell anything; it's simply an inventory that powers experiential retail for Nordstrom.
- From brands like Amazon and Apple to backyard restaurants, every store is launching its own experiential retail initiatives in whatever way possible.

13. APPENDIX

SOURCE CODE

```
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<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>

<h2> 2.Data Preparations:</h2>

 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

<h2>3.Implementation Details:</h2>

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.

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

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

<h2>4.Data Visualization :</h2>

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


```
    <img src="pic3.png" width="800" height="500"/><br><br><br>
    <img src="pic4.png" width="800" height="500"/><br><br><br>
    <img src="pic5.png" width="800" height="500"/><br><br><br>
<img src="pic6.png" width="800" height="500"/><br><br><br>



    <!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"></scri
    pt>
      <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>Retail Store Stock Inventory Analytics</h1>


</div>

<nav class="navbar navbar-inverse">
  <div class="container-fluid">
    <div class="navbar-header">
      <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&id=i81F1B58295054C7381EAB4F0A6A38A13&objRef=i81F1B58295054C7381EAB4F0A6A38A13&options%5BdisableGlassPrefetch%5D=true&options%5Bcollections%5D%5BcanvasExtension%5D%5Bid%5D=com.ibm.bi.dashboard.canvasExtension&options%5Bcollections%5D%5BfeatureExtension%5D%5Bid%5D=com.ibm.bi.dashboard.core-features&options%5Bcollections%5D%5Bbuttons%5D%5Bid%5D=com.ibm.bi.dashboard.buttons&options%5Bcollections%5D%5Bwidget%5D%5Bid%5D=com.ibm.bi.dashboard.widgets&options%5Bcollections%5D%5BcontentFeatureExtension%5D%5Bid%5D=com.ibm.bi.dashboard.content-features&options%5Bcollections%5D%5BsaveServices%5D%5Bid%5D=com.ibm.bi.dashboard.saveServices&options%5Bcollections%5D%5Btemplate
```

s%5D%5Bid%5D=com.ibm.bi.dashboard.templates&options%5Bcollections%5D%5BvisualizationExtension%5D%5Bid%5D=com.ibm.bi.dashboard.visualizationExtensionCA&options%5Bcollections%5D%5BboardModel%5D%5Bid%5D=com.ibm.bi.dashboard.boardModelExtension&options%5Bcollections%5D%5BcontentTypes%5D%5Bid%5D=com.ibm.bi.dashboard.contentTypes&options%5Bcollections%5D%5BserviceExtension%5D%5Bid%5D=com.ibm.bi.dashboard.serviceExtension&options%5Bcollections%5D%5BlayoutExtension%5D%5Bid%5D=com.ibm.bi.dashboard.layoutExtension&options%5Bcollections%5D%5BcolorSetExtensions%5D%5Bid%5D=com.ibm.bi.dashboard.colorSetExtensions&options%5Bconfig%5D%5Bproduct%5D=CA&options%5Bconfig%5D%5BeditPropertiesLabel%5D=true&options%5Bconfig%5D%5BenableCustomVisualizations%5D=true&options%5Bconfig%5D%5BassetTags%5D%5B%5D=dashboard&options%5Bconfig%5D%5BfilterDock%5D=true&options%5Bconfig%5D%5BshowMembers%5D=true&options%5Bconfig%5D%5Bupgrades%5D=dashboard-core%2Fjs%2Fdashboard%2Fupgrades&options%5Bconfig%5D%5BassetType%5D=exploration&options%5Bconfig%5D%5BgeoService%5D=CA&options%5Bconfig%5D%5BsmartTitle%5D=true&options%5Bconfig%5D%5BnavigationGroupAction%5D=true&options%5Bconfig%5D%5BenableDataQuality%5D=false&options%5Bconfig%5D%5BmemberCalculation%5D=false&isAuthoringMode=true&boardId=i81F1B58295054C7381EAB4F0A6A38A13">DashBoard

<a class="navbar-brand" href="https://us1.ca.analytics.ibm.com/bi/?perspective=story&id=i92AAD86C404946D0BF979577F7BF7148&objRef=i92AAD86C404946D0BF979577F7BF7148&options%5BdisableGlassPrefetch%5D=true&options%5Bcollections%5D%5BcanvasExtension%5D%5Bid%5D=com.ibm.bi.dashboard.canvasExtension&options%5Bcollections%5D%5BfeatureExtension%5D%5Bid%5D=com.ibm.bi.dashboard.core-features&options%5Bcollections%5D%5Bbuttons%5D%5Bid%5D=com.ibm.bi.dashboard.buttons&options%5Bcollections%5D%5Bwidget%5D%5Bid%5D=com.ibm.bi.dashboard.widgets&options%5Bcollections%5D%5BcontentFeatureExtension%5D%5Bid%5D=com.ibm.bi.dashboard.content-

features&options%5Bcollections%5D%5BsaveServices%5D%5Bid%5D=com.ibm.bi.dashboard.saveServices&options%5Bcollections%5D%5Btemplates%5D%5Bid%5D=com.ibm.bi.dashboard.templates&options%5Bcollections%5D%5BvisualizationExtension%5D%5Bid%5D=com.ibm.bi.dashboard.visualizationExtensionCA&options%5Bcollections%5D%5BboardModel%5D%5Bid%5D=com.ibm.bi.dashboard.boardModelExtension&options%5Bcollections%5D%5BcontentTypes%5D%5Bid%5D=com.ibm.bi.dashboard.contentTypes&options%5Bcollections%5D%5BserviceExtension%5D%5Bid%5D=com.ibm.bi.dashboard.serviceExtension&options%5Bcollections%5D%5BlayoutExtension%5D%5Bid%5D=com.ibm.bi.dashboard.layoutExtension&options%5Bcollections%5D%5BcolorSetExtensions%5D%5Bid%5D=com.ibm.bi.dashboard.colorSetExtensions&options%5Bconfig%5D%5BliveWidgetExtras%5D%5B%5D=reveal&options%5Bconfig%5D%5Bproduct%5D=CA&options%5Bconfig%5D%5BeditPropertiesLabel%5D=true&options%5Bconfig%5D%5BenableCustomVisualizations%5D=true&options%5Bconfig%5D%5BassetTags%5D%5B%5D=story&options%5Bconfig%5D%5BfilterDock%5D=true&options%5Bconfig%5D%5BshowMembers%5D=true&options%5Bconfig%5D%5Bupgrades%5D=dashboard-core%2Fjs%2Fdashboard%2Fupgrades&options%5Bconfig%5D%5BassetType%5D=exploration&options%5Bconfig%5D%5BgeoService%5D=CA&options%5Bconfig%5D%5BsmartTitle%5D=true&options%5Bconfig%5D%5BnavigationGroupAction%5D=true&options%5Bconfig%5D%5BenableDataQuality%5D=false&options%5Bconfig%5D%5BmemberCalculation%5D=false&isAuthoringMode=false&boardId=i92AAD86C404946D0BF979577F7BF7148&sceneId=">Story

Report

About

```
      </ul>
    </div>


  </div>

</nav>

<div class="container">
  <div class="row">
    <div class="col-sm-4">
     <Pre> Team Id:PNT2022TMID18520
 TEAM MEMBERS:
            Abarna A
            Aishwarya S
            Deepaasree V K
            Thana Swvtha A</pre>


      <hr class="hidden-sm hidden-md hidden-lg">
    </div>
    <div class="col-sm-8">
      <h2>Retail Store Stock Inventory Analytics</h2>


      <p>Retail Store Stock Inventory management is a part of the supply chain where inventory and stock quantities are tracked as things move in and out of the warehouse.Inventory management systems aim to alert you to where your inventory is at any given time, and how much of it you have to manage levels correctly.</p>
      </div>
```

```
        </div>
      </div>


      </body>
</html>
```

GIT HUB LINK

https://github.com/IBM-EPBL/IBM-Project-4817-1658740635

PROJECT DEMO LINK:

https://drive.google.com/file/d/1ifF0lX4hD1wjZc1YDuQYAIm4-pSphznR/view?usp=sharing