Retail Store Stock Inventory Analytics

A PROJECT REPORT

Submitted by

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IN

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Rajas Institute of Technology

CONTENT TABLE

ABSTRACT

Inventory Management System is important to ensure quality control in businesses that handle transactions revolving around consumer goods. Without proper inventory control, a large retail store may run out of stock on an important item and it's also easy to lose its possible customer if theydo not have sufficient stocks in the store.

A good Inventory Management System will alert the retailerwhen it is time to reorder. Inventory Management System is also an important means of automatically tracking the stocks of their product. For example, if a business orders ten pairs of socks for retail resale, but only receives nine pairs, this will be obvious upon inspecting the contents of the package, and error is not likely. On the other hand, say a wholesaler orders 100,000 pairsof socks and 10,000 are missing. Manually counting each pair of socks is likely to result in error. An automated Inventory Management System helps to minimize the risk of error. In retail stores, an Inventory Management System also helps track theft of retail merchandise, providing valuable information about store profitsand the need for theft-prevention systems.

The product quantity is updated by the store operator every time a product is bought/received. This information is then tracked by a central computer system. 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. All of this data works in tandem to provide businesses with real-time inventory tracking information. Inventory Management Systems make it simple to locate and analyze inventory information in real-time with a simple database search.

OBJETIVES

By the end of this Project,you will:

Know fundamental concepts and can work on IBM Cognos Analytics. Gain a broad

understanding of plotting different visualization to provide suitable solution , able to create meaningful Visualization and Dashboard(s).

Retail inventory management is the process of ensuring you carry products that shoppers want, with neither too little nor too much on hand. By managing inventory, retailers meet customer demand without running out ofstockv or carrying excess supply. Inventory management is vital for retailers because the practice helps them increasev profits. They are more likely to have enough inventory to capture every possible sale whilev avoiding overstock because Too much inventory means working capital costs, operational costs, and a complex operation. Based on the inventory management analysis we can manage how much inventory isv required for selling the product based on which they can calculate the profit & losses.

PRIMARY OBJECTIVES:

Identifying Consumer Demands:

The first task that a retailer has to perform is to identify the consumer needs and wants. The retailer does not provide raw materials, but offers finished goods and services in a ready-to-use form that the consumers want. For this, from time-to-time, retailer gathers information about consumers' liking, disliking, tastes and preferences.

Management of Merchandise:

The second task that a retailer performs is the management of merchandise. The retailer performs the function of storing the merchandise and provides as and when required by the customer.

Convenience of timing:

The retailer creates time utility by keeping the store open and ready for sale according to consumers' convenience. The new trend in retailing to longer trade hours reflects the socio-cultural changes where over one in ten people work outside normal hours resulting in changing trading hours and panacea for small retailers against the cheaper prices of the super stores and other retail chains. By being available at a location that has easy access and convenient to shop, retailer creates place utility. Finally, when selected andboughtby customers, retailers create ownership utility.

In short, retailers are not only the final link between the consumers and the manufacturers but a vital part of modern business world. In the absence of retailing, one can easily imaging how difficult and costly for a consumer to approach a manufacturer for various things every time he wants. Retailers do not sell things in small quantities but make their shopping convenient and less risky.

Retailers have floor staff to answer their queries regarding how to use effectively and safely, guide them what to buy according to individual preferences and budget and give demonstration or display products so thatthe consumers should have a feel of the merchandise before buying. The successful retailer focuses its activities on meeting these objectives througheffective marketing.

RETAIL SALES GOALS:

Retail Sales measures the gross receipts of a retail store by selling durable and nondurable goods. The main components of retail sales are grocery, food & clothing and shoe retailing. In India, consumer spending roughly accounts for over 60% of GDP and is therefore, a vital element in the country's economic growth. Any change in retail sales

pattern is important and is seen as the timeliest indicator of wide consumption patterns. Retail sales may have short term and long term goals in nature. Short term retail sales goals are supposed to support and mergeinto long term goals.

Inventory Management System is important to ensure quality control in businesses that handle transactions revolving around consumer goods. Without proper inventory control, a large retail store may run out of stock on an important item and it's also easy to lose its possible customer if theydo not have sufficient stocks in the store.

A good Inventory Management System will alert the retailerwhen it is time to reorder. Inventory Management System is also an important means of automatically tracking the stocks of their product. For example, if a business orders ten pairs of socks for retail resale, but only receives nine pairs, this will be obvious upon inspecting the contents of the package, and error is not likely. On the other hand, say a wholesaler orders 100,000 pairsof socks and 10,000 are missing. Manually counting each pair of socks is likely to result in error. An automated Inventory Management System helps to minimize the risk of error. In retail stores, an Inventory Management System also helps track theft of retail merchandise, providing valuable information about store profitsand the need for theft-prevention systems.

The product quantity is updated by the store operator every time a product is bought/received. This information is then tracked by a central computer system. 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. All of this data works in tandem to provide businesses with real-time inventory tracking information. Inventory Management Systems make it simple to locate and analyze inventory information in real-time with a simple database search.

INTRODUCTION

Analytics is the discovery and communication of meaningful patterns in data. As a topic, analytics has found its way from being discussed at the sidelines of industry and technology conferences, to the top of the corporate agenda. With the existing promise of delivering performance improvements not seen since the redesign of core processes in the 1990s, these tools are likely to change the competitive landscape in many industries in the years to come. Big Data is all about the non-traditional ways of dealing with the modern digital data. We exist in an ocean of digital data. It includes data stored in piles of well-structured databases residing with organisations, streams of data generated from the dynamic social networks, various understandable and intngible signals generated by all kinds of digital equipment all over the place. For an organisation, Big Data can be about identifying the right datasets from large amount of data commonly defined by the three Vs - Volume, Velocity and Variety; transforming them into readily consumable models; and then extracting meaningful insights for devising business strategies. These insights can be used to improve different aspects of the business - from marketing and sales, to research and operations, and customer services. Big Data enables clients in the retail Industry to track and better understand a variety of information from many different sources like CRM, AdWord/AdSense analytics, inventory management system, e-mails, transactional data, sensors data etc. Industry can identify the current trends, re-order supplies for hot-selling items, adjust the prices in real time and also manage and control product distribution across different stores to channelise their sales in more effective manner. This provides retail industry with entirely different perspectives of looking towards the datasets available at their disposal. By collating these organisational datasets with social media data streams, they can also use it for better sales predictions, designing relevant campaigns to suit their profitable customers and thereby ensuring customer satisfaction.

PROJECT OVERVIEW

As retail market becomes extensively competitive, the ability to optimize on serving business processes while satisfying customer expectations has never been more important. Therefore, managing and channelizing data to work towards customer delight as well as generate healthy profits is crucial to survive prosperously. In the case of big retail players internationally as well as in India, data or rather big data analytics is now being applied at every stage of the retail process - tracking emerging popular products, forecasting sales and future demand through predictive simulation, optimising product placements and offers via customer heat-mapping and many more. Alongside this, identifying the customers likely to be interested in particular product types based on their previous purchase behaviours, working out the best way to approach them through targeted marketing efforts and finally working out what to sell them next is what forms the core of data analytics. This article is the outcome of a descriptive research on the past, present and future of retail industry and the application of business analytics in shaping appropriate marketing strategies.

PURPOSE

The purpose of inventory is to monitor the stocks movements as basis for daily stocks position, and levels for procurement purposes. Also it helps management on decision making when it comes on what is fast moving, slow moving and non-moving stocks . Inventory also is important if what we received or issued are accurate thru reconciliation if there variances against the records and actual inventory.

This includes all the materials, components, assemblies, subassemblies, etc. which are being incorporated into the system. They include all the materials from

the start till they are ready and are awaiting inspection before they form the completed product.

SURVEY LITERATURE

Literature Review Inventory management was first invented by Adam when he named all the animals or Noah when he counted the clean and unclean beasts for the Ark. But for the sake of brevity, we will jump ahead to modern times. Before the Industrial Revolution, merchants basically had to write down all of the products they sold every day. Then they had to order more products based on their hand-written notes and their gut feelings. This was an incredibly inefficient and inaccurate way of doing business. Merchants couldn't really account for stolen goods unless they did time-consuming physical counts on a regular basis. They also had trouble making sure they got the right number of products when orders came in because of sparse recordkeeping

EXISTING PROBLEM

Inventory is the largest business expense for many store owners. It's costly to get wrong, too—both under- and over-stocking can have disastrous consequences. Poor inventory management costs retailers $300 billion each year.

Inventory analytics helps prevent inventory errors from wreaking havoc with cash flow and customer experiences. Using inventory level data, you'll spot SKUs that should be prioritized for a restock before out of stock messages force potential customers into a competitor's store.

The best marketing campaigns solve the challenges your target customer is facing, using their natural language, on the channels they use to communicate with brands. It's impossible to do all three of these things if you don't understand your audience.

So use retail analytics to understand your consumers and plan marketing campaigns

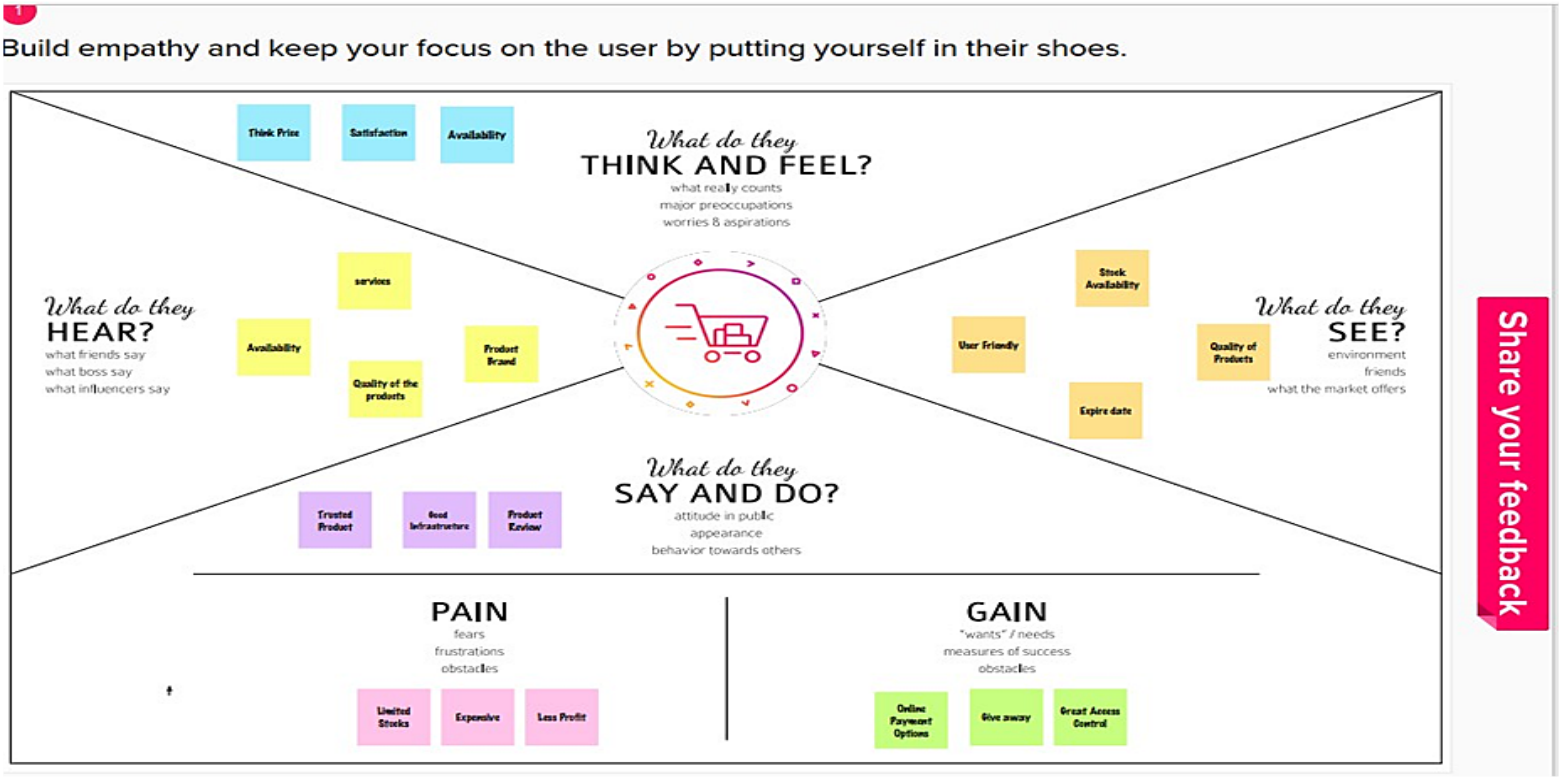
that reach them. For example, if 55% of people who open an email that contains parking instructions later visit a store, it makes sense to feature this information across other local marketing channels including your Google Business Profile and Instagram bio for other parking-conscious customers.

IDEATION & PROPOSED SOLUTION

Empathy Map Canvas:

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes.

It is a useful tool to helps teams better understand their users.
Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perpective along with his or her goals and challenges.



IDEATION AND BRAINSTORMING

STOCK HANDLING

Track all sales receivables and purchase payables	Track all sales receivables and purchase payables

Stock control for omnichannel retailin

Track all sales receivables and purchase payables	Track all sales receivables and purchase payables

ANALYSIS FOR STOCK MAINTENANCE

Practice 80/20 inventory rule	EOQ for optimal order quantities

Just in time inventory control method

Real time FIFO cost management helping to track cost of raw materials product accurately

Utilize open to buy(OTB) inventory planning

USER AMINITIES

Back ordering fow that allows to issue purchases directly from order of item you don't have in

LocationAllocation accross multiple warehouses

Verifed sellers and locate products

Live stock reports

Categorization of products in stock

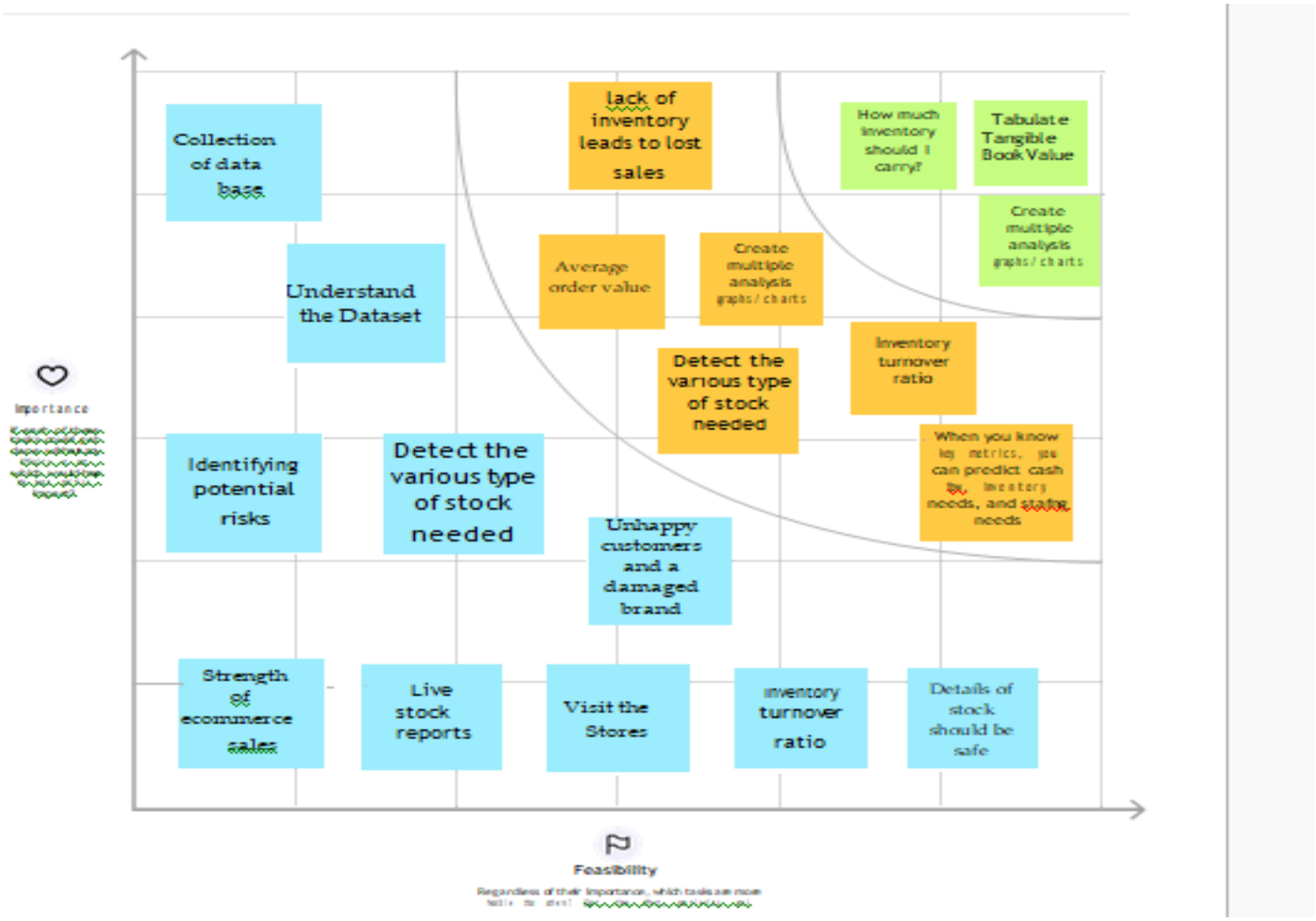
INVENTORY ALERT

Reduce the risk of stock in too little or too much on hand

Inventory of product history management

Keeping check over obsolescence and ensure control over movement of inventories

Real time dynmaic price list module	Season based product recommendation



PROPOSED SOLUTION

S. No	Parameter	Description
1	Problem statement	Due to poor inventory retailors are not able to provide write goods to consumer in write quantity at right place in right time.
2	Idea/Solution description	By using cognos analytics tool, the retailor can view all of his/her stock in a visualized and he can maintain his stock as per the demand of particular stock for particular scenario.
3	Novelty/Uniqueness	By using cognos tool, the retailor can prioritize the customer needs and visualize the salaes of produced by weekly,monthly using responsive.

4	Social impact/Customer satisfication	The database for the inventory are maintained as seperated by using visualization.The detail of the stocks is updated periodically, so the user can access the resource anywhere,anytime as per his/her needs and go for shopping.
5	Business model(Revenue model)	Since it anaalysis the inventory needs from the sale,we are going to provide some premium subscription .For example if the user wants to store more then 100 product details are provide fill for more then 250 customers,then they need to subscribe.
6	Scalability of the solution	Our main focus is a small and medium level retail stores.So,everybody can account their sales and profit margin and it provide the solution for which the small retailors doesn't provide fills for the customers.The advantage in the system may attract more and more retailors to use the web applications.

PROBLEM SOLUTION FIT

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

- Excess Inventory leading to business and operational problems
- Sudden increases in price range
- Location of Warehouse leads transport charge.

9. PROBLEM ROOT CAUSE

RC

What is the real reason that this problem exists? What is the back story behind the need to do this job?

i.e. customers have to do it because of the change in regulations.

- Most of shopkeepers lose their customers because of insufficient stock storage with demand capacity

7. BEHAVIOUR

BE

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 benefit; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace)

- Identify customer demands and their buying products
- Understanding customer demands the stocks can be managed accordingly with it

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

Identify strong TR & EM

3. TRIGGERS

TR

What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news.

- Immense wastage of products due to less sales.

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.

Before :
Frustrated
Helplessness
After :
Satisfaction

10. YOUR SOLUTION

SL

If you are working on an existing business, write down your current solution first and fill in the canvas, and check how much it fits reality.
If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer context, solves a problem and matches customer behaviour.

- the shopkeeper can view the products availability in form of dashboard and buy product based on their need
- Do regular and accurate stock counts
- Combine Sales data with inventory data to simplify reporting
- Purchasing process description
- Establish process for markdown and promotions
- Create Stock Receiving procedures
- Provide description of return procedure
- Determine Dead stock procedure
- Provide Profitable inventory value
- Expiry date is displayed which helps shopkeeper to provide quantity and quality product to customer

8. CHANNELS of BEHAVIOUR

CH

ONLINE
What kind of actions do customers take online? Extract online channels from #7

OFFLINE
What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.

Online :
- ❖ Advertisement with financial influencers

Offline :
- ❖ Arranging most demanded products in front section

Identify strong TR & EM

REQUIREMENTS

FUNCTIONAL REQUIREMENTS

FR No.	Functional Requirement (Epic)	Sub Requirement(Story/ Sub-Task)
FR-1	User Registration	Registration through usingmail id, storename and password.
FR-2	User Confirmation	Confirmation via EmailOTP.
FR-3	User Login	Login at user front end web page.
FR-4	Profile update	Update the usercredentials.Update thestore details. Update the Contact details.
FR-5	Uploading Data	Collect the productdetails. Upload the product details and enters the customer purchased product details and thetrack the product.
FR-6	Ratings and Reviews	The user retailer of any shop can givetheir ratings and view of this models.
FR-7	Addmultiple accounts	The usercreates multiple accounts to addanother branch of store.
FR-8	Delete Accounts	The user canremove the branchesunwanted account.
FR-9	Track a product	If the product stock reaches the low levelit is intimates to the retailer.

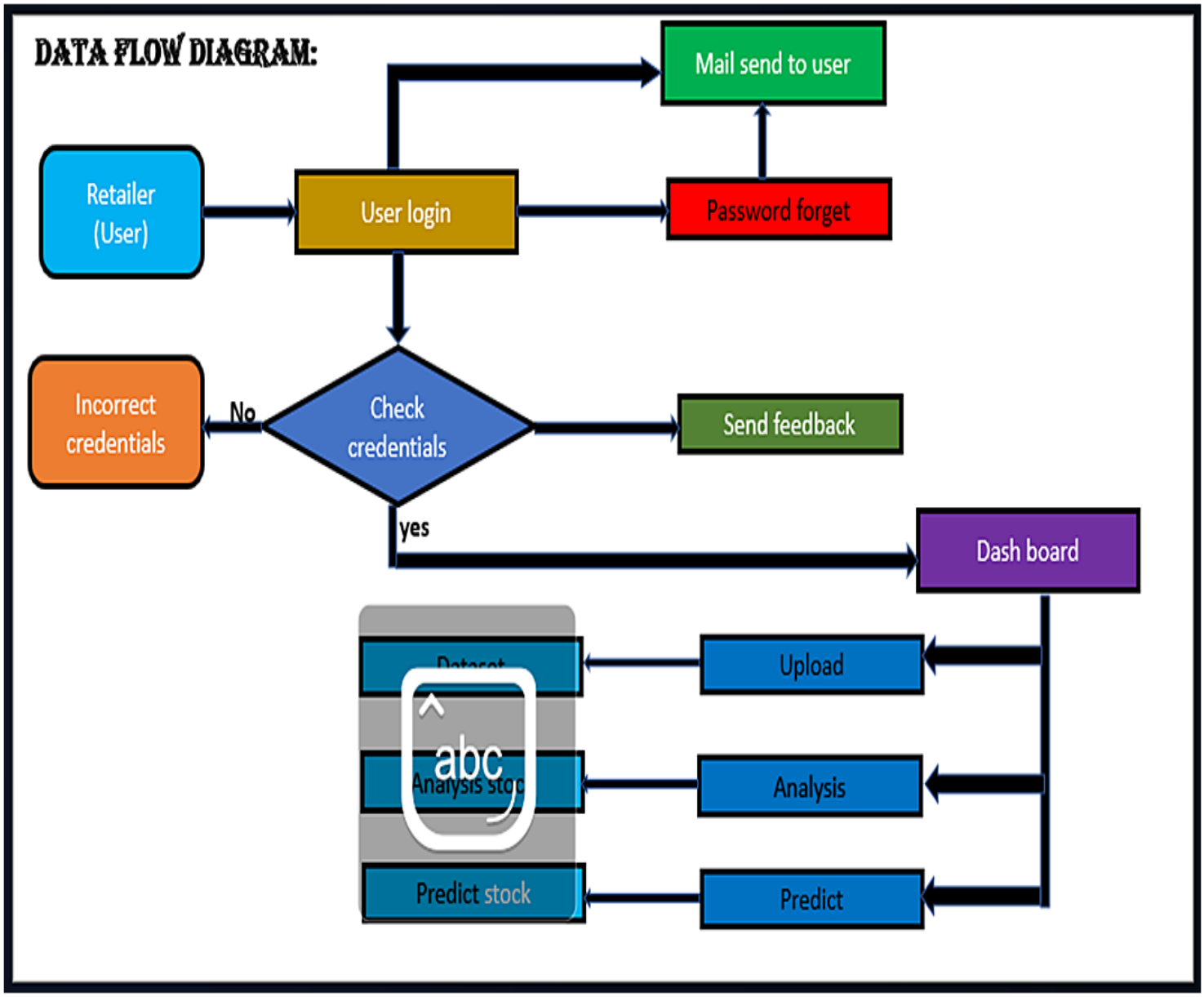
NON FUNCTIONAL REQUIREMENTS

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	They are more likely to have the right amountof inventory to take advantage ofevery potential sale while avoiding overstocking and cutting costs. Both desktop and mobile browsers can handle thesepages
NFR-2	**Security**	This can be usedonly by the user whohave theirproper login credentials.
NFR-3	**Reliability**	Avoid overor under stocking Ensure accurate inventory valuation The user can prevent stocklevel is low.
NFR-4	**Performance**	In a departmental store, the billingtechniqueis digitalized. From this, the model can predict thedeadstocks and highly profitable stocks.
NFR-5	**Availability**	The usercan access in devices phone, computer, tabsand laptop.
NFR-6	**Scalability**	Many users can access a product detail simultaneously without any glitch.

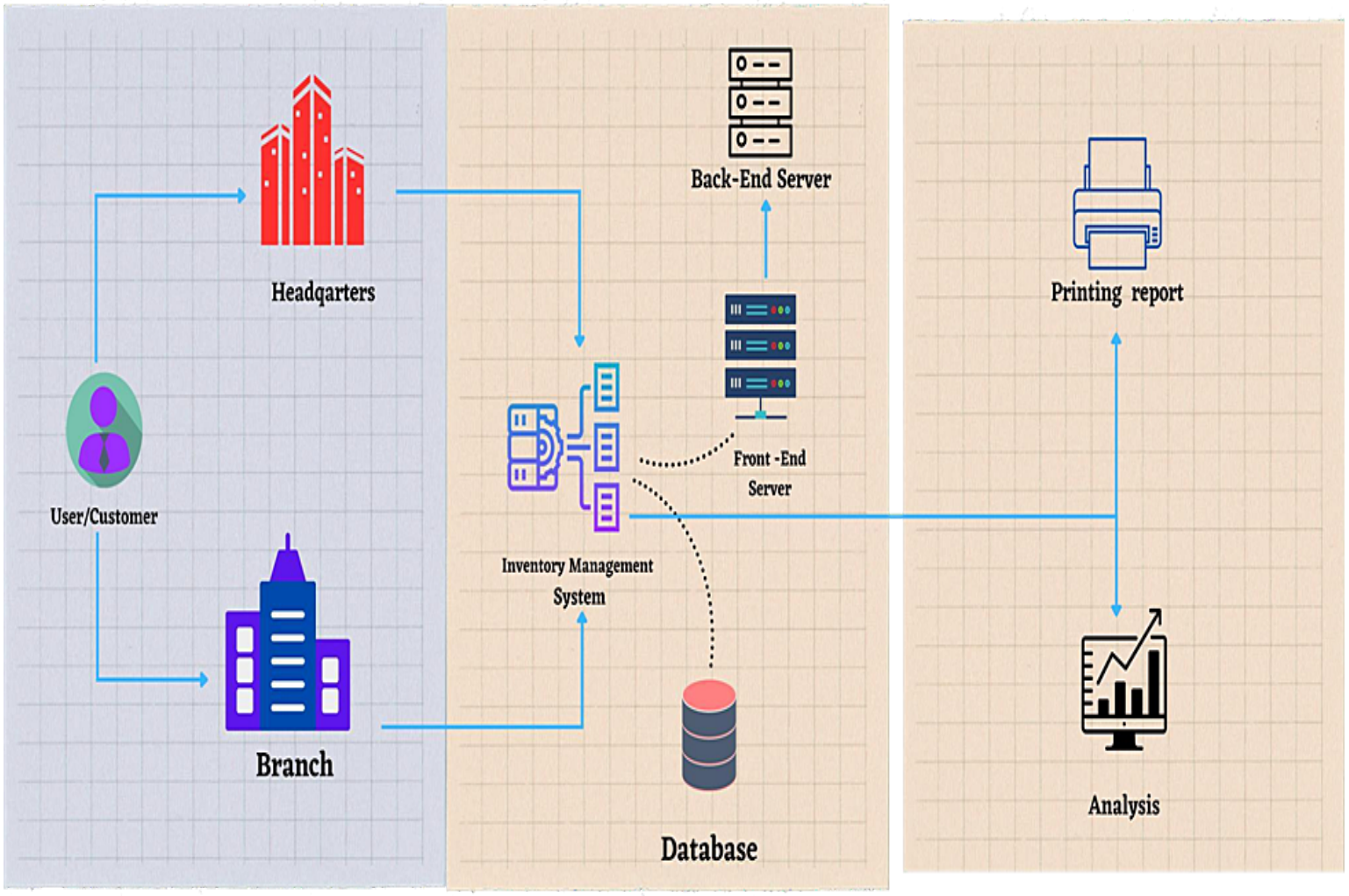
PROJETCT DESIGN

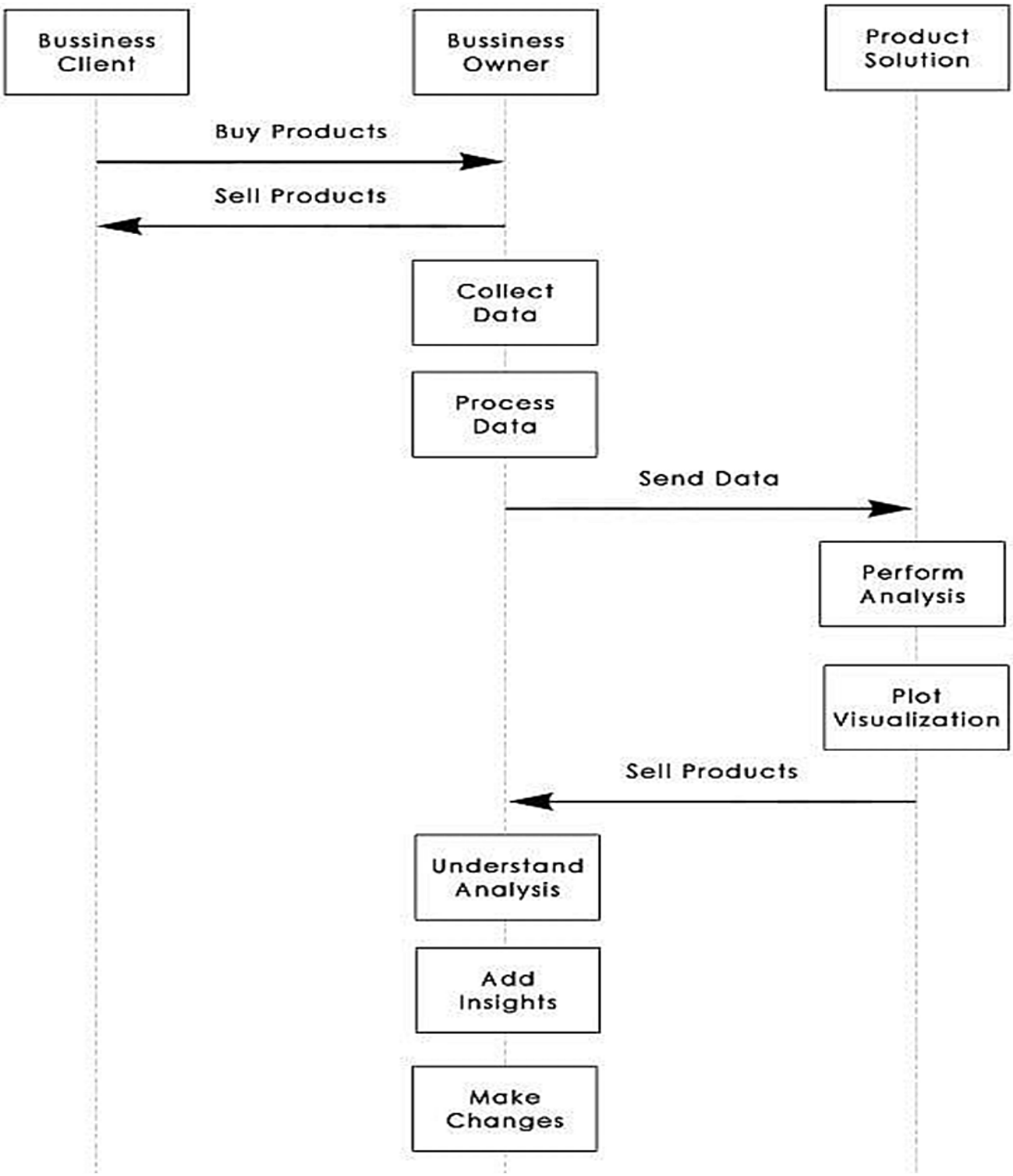
DATAFLOW DIAGRAM

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clearDFD candepict 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.



SOLUTION AND TECHNICAL ARCHITECTURE




Bussiness Client
Bussiness Owner
Product Solution
Buy Products
Sell Products
Collect Data
Process Data
Send Data
Perform Analysis
Plot Visualization
Sell Products
Understand Analysis
Add Insights
Make Changes

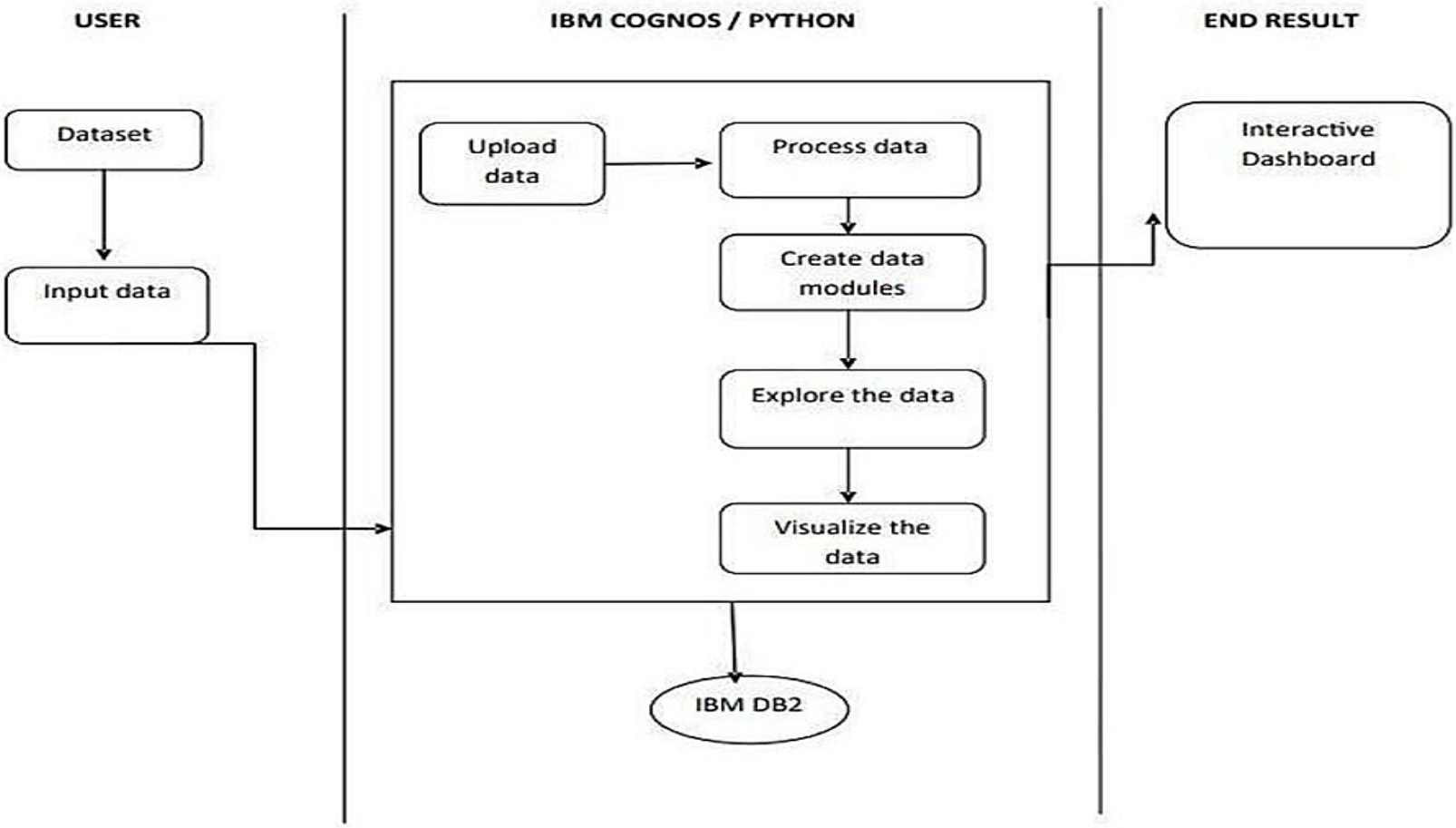


Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	The user interacts with application using WebUI	HTML, CSS, JavaScript
2.	Data Processing	Thedata from the dataset is pre-processed	IBMCognos Analytics
3.	Cloud Database	Theclean dataset is stored on IBM Cloud	IBMCloud
4.	Data visualization	Thedata is visualized intodifferent forms	IBMCognos Analytics, Python
5.	Prediction	These Algorithm techniques are used to predict the properway to make thestock instore.	ML algorithms –Logistic Regression,Linear Regression, RandomForest, ABC Techniques.

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, JavascriptApplication Server– Python Database Server – IBM Cloud
4	Availability	The application is available forcloud users	IBM Cloud Hosting
5.	Performance	The user can know how to maintain the inventory to increase profits.	ML algorithms

USER STORIES:

User Type	Functional Requirement (Epic)	UserStory Number	User Story/ Task	Acceptance criteria	Priority	Release
Customer (Mobileuser)	Registration	USN-1	As a user, I can register for the web application by entering my email, password, and confirming my password.	I can access my account /dashboard	High	Sprint-1
		USN-2	As a user, after completing the registration I will receive confirmation email once I have registered for theweb application	I can receive confirmation email&click confirm	High	Sprint-1

		USN-3	As a user,I can register for the web application through LinkedIn	I can register &access the dashboard with LinkedIn Login	Low	Sprint-2
		USN-4	As a user,I can register for the web application through Google account	I can register & access the dashboard withGmail login	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email &password after installing the webapplication	I canaccess the dashboard by login into the application	High	Sprint-1
	Dashboard	USN-6	As a user, I can view the chartsand graphs representation of the dataset and the information shown in thedashboard	I can analyse thestocks in my retail store.	High	Sprint-1
Customer (Web user)		USN-1	As a user, I canregister for the web application entering my email, password, confirming mypassword.	I can access my account / dashboard	High	Sprint-1
Customer Care Executive		USN-2	As a user, aftercompleting the registration I will receive confirmation email once I have registeredfor the webapplication	I can receive confirmation email &click confirm	High	Sprint-1

User Type	Functional Requirement(Epic)	User Story Number	User Story/ Task	Acceptance criteria	Priority	Release
Administrator		USN-3	As a user, I can register for the webapplication through LinkedIn	I can register &accessthe dashboard with LinkedIn Login	Low	Sprint-2
		USN-4	As a user, I can register for the webapplication throughGoogle account	I can register &accessthe dashboard with Gmail login	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the web applicationby entering email & password after installing the application.	I can access the dashboard by login into the application	High	Sprint-1
	Dashboard	USN-6	As a user, I can viewthe charts and graphsrepresentation of the dataset and the information shown in thedashboard.	I can analyse the stocksin my retailstore.	High	Sprint-1
Customer Care Executive		CCE-1	As a customer care executive, I will alwaysbe available for the interaction with the customer to clarify the queries.	An executive will analyse the customer complaints, rectify their problems	High	Sprint-2
Administrator		ADMIN-1	As an administrator, I will manage backupand recovery, data modeling and design, distributed computing, database system, and a data security	Administrator can evaluate, design, reviewand implementing a data, they are also responsible for updating andmaintaining the data.	High	Sprint-2

PROJECT PLANNING AND SCHEDULING

SPRINT PLANNING AND ESTIMATION

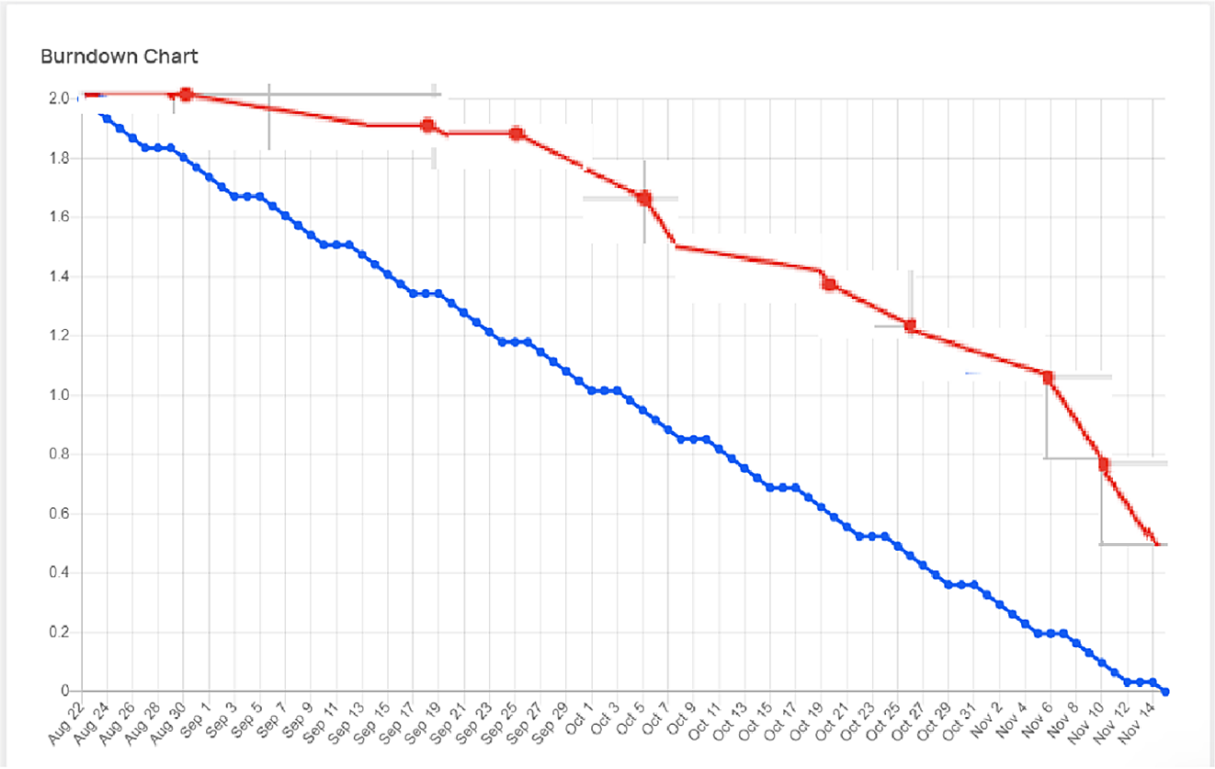
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirmingmy password.	2	High	M.Subashini D.Dharshini K.Vaitheeswari R.Sangeethaselvi
Sprint-1	Registration	USN-2	As a user, I will receiveconfirmation email onceI have registered for the application	1	High	M.Subashini D.Dharshini K.Vaitheeswari R.Sangeethaselvi
Sprint-2	Registration	USN-3	As a user, I can register for the application through google account or the one provided bythe service provider.	2	Low	M.Subashini D.Dharshini K.Vaitheeswari R.Sangeethaselvi
Sprint-1	Registration	USN-4	As a user, I can register using the collaborated Gmail ID as well.	2	Medium	M.Subashini D.Dharshini K.Vaitheeswari R.Sangeethaselvi

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	1	High	M.Subashini D.Dharshini K.Vaitheeswari R.Sangeethaselvi
Sprint-2	Login	USN-6	As a user, for more secureprotection 2 step authentication will be used.	1	High	M.Subashini D.Dharshini K.Vaitheeswari R.Sangeethaselvi
Sprint-2	Login	USN-7	As a user, it will be redirected to the dashboard interface.	2	Medium	M.Subashini D.Dharshini K.Vaitheeswari R.Sangeethaselvi
Sprint-3	Dashboard	USN-8	As a user, The dashboard will provide suitable information for us the userto decide on the next move for the retail inventory.	2	High	M.Subashini D.Dharshini K.Vaitheeswari R.Sangeethaselvi
Sprint-3	Dashboard	USN-9	As a user, The dashboard willrecommend orders to be placed for the right season.	2	High	M.Subashini D.Dharshini K.Vaitheeswari R.Sangeethaselvi

Sprint-4	Server &Data Analysis	USN-10	As a user, The data willbe entered usinga Barcode scanner or through analysis the itemswill be then processed and analysis will be done with the given data and a suitable output will be given.	2	High	M.Subashini D.Dharshini K.Vaitheeswari R.Sangeethaselvi
Sprint-4	Server &Data Analysis	USN-11	As a user, The server will itself place the most suitable order and analyse if the stock will saleas soon as possible.	2	High	M.Subashini D.Dharshini K.Vaitheeswari R.Sangeethaselvi

SPRINT DELIVERY AND SCHEDULE

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned EndDate)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	10	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	10	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	10	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	10	19 Nov 2022



REPORT FROM JIRA

Jira Software has a range of reports that you can use to show information about your project, versions, epics, sprints, and issues. Areas in red show periods where more issues were created than resolved. Areas in green show periods where more were resolvedthan created.

1. Navigate to the projectyou want to reporton.
2. From the project sidebar, select Reports. The reports overview page displays.
3. Select a report from the overview or from the project sidebar to begin generating the report.

CODING AND SOLUTIONING

```
 # This Python 3 environment comes with many helpful analytics libraries
installed
# It is defined by the kaggle/python docker image:
https://github.com/kaggle/docker-python
# For example, here's several helpful packages to load in

 import numpy as np # linear algebra
 import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)
from datetime import datetime
from datetime import date
import seaborn as sns
import matplotlib.pyplot as plt



# Input data files are available in the "../input/" directory.
# For example, running this (by clicking run or pressing Shift+Enter) will list
all files under the input directory
import os
for dirname, _, filenames in os.walk('/kaggle/input'):
    for filename in filenames:
        print(os.path.join(dirname, filename))

# Any results you write to the current directory are saved as output.
```

```
/kaggle/input/retail-shop-case-study-dataset/Transactions.csv
/kaggle/input/retail-shop-case-study-dataset/Customer.csv
/kaggle/input/retail-shop-case-study-dataset/prod_cat_info.csv
```

```
Transactions = pd.read_csv('..//input/retail-shop-case-study-dataset/Transactions.csv')
Transactions.head()
```

OUTPUT

transaction_id	cust_id	tran_date	prod_subcat_code	prod_cat_code	Qty	Rate	Tax	total_amt	Store_type	
0	80712190438	270351	28-02-2014	1	1	-5	-772	405.300	-4265.300	e-Shop
1	29258453508	270384	27-02-2014	5	3	-5	-1497	785.925	-8270.925	e-Shop
2	51750724947	273420	24-02-2014	6	5	-2	-791	166.110	-1748.110	TeleShop
3	93274880719	271509	24-02-2014	11	6	-3	-1363	429.345	-4518.345	e-Shop
4	51750724947	273420	23-02-2014	6	5	-2	-791	166.110	-1748.110	TeleShop

```
Transactions.dtypes
```

OUTPUT

```
transaction_id        int64
cust_id               int64
tran_date            object
```

```
prod_subcat_code      int64
prod_cat_code         int64
Qty                   int64
Rate                  int64
Tax                 float64
total_amt           float64
Store_type           object
dtype: object
```

```
Customer = pd.read_csv('..//input/retail-shop-case-study-dataset/Customer.csv')
Customer.head()
```

customer_Id	DOB	Gender	city_code	
0	268408	02-01-1970	M	4.0
1	269696	07-01-1970	F	8.0
2	268159	08-01-1970	F	8.0
3	270181	10-01-1970	F	2.0
4	268073	11-01-1970	M	1.0

```
Cat = pd.read_csv('..//input/retail-shop-case-study-dataset/prod_cat_info.csv')
Cat.head(50)
```

prod_cat_code	prod_cat	prod_sub_cat_code	prod_subcat	
0	1	Clothing	4	Mens
1	1	Clothing	1	Women
2	1	Clothing	3	Kids
3	2	Footwear	1	Mens
4	2	Footwear	3	Women
5	2	Footwear	4	Kids
6	3	Electronics	4	Mobiles
7	3	Electronics	5	Computers
8	3	Electronics	8	Personal Appliances
9	3	Electronics	9	Cameras
10	3	Electronics	10	Audio and video
11	4	Bags	1	Mens
12	4	Bags	4	Women
13	5	Books	7	Fiction
14	5	Books	12	Academic
15	5	Books	10	Non-Fiction
16	5	Books	11	Children
17	5	Books	3	Comics
18	5	Books	6	DIY

19	6	Home and kitchen	2	Furnishing
20	6	Home and kitchen	10	Kitchen

```
Sub_Cat = Cat[['prod_sub_cat_code', 'prod_subcat']]
Sub_Cat.head()
```

prod_sub_cat_code	prod_subcat	
0	4	Mens
1	1	Women
2	3	Kids
3	1	Mens
4	3	Women

```
Cat_New = Cat[['prod_cat_code', 'prod_cat']]
Cat_New.head()
```

```
#df.drop(df.columns[[0,1,3]], axis=1, inplace=True)
```

prod_cat_code	prod_cat	
0	1	Clothing
1	1	Clothing
2	1	Clothing
3	2	Footwear
4	2	Footwear

```
Trans = pd.merge(Transactions, Cat_New, how = 'outer')


Trans.head()
```

transaction_id	cust_id	tran_date	prod_subcat_code	prod_cat_code	Qty	Rate	Tax	total_amt	Store_type	prod_cat	
0	80712190438	270351	28-02-2014	1	1	-5	-772	405.30	-4265.30	e-Shop	Clothing
1	80712190438	270351	28-02-2014	1	1	-5	-772	405.30	-4265.30	e-Shop	Clothing
2	80712190438	270351	28-02-2014	1	1	-5	-772	405.30	-4265.30	e-Shop	Clothing
3	79792372943	275108	22-02-2014	3	1	-3	-908	286.02	-3010.02	MBR	Clothing
4	79792372943	275108	22-02-2014	3	1	-3	-908	286.02	-3010.02	MBR	Clothing

```
Trans = pd.merge(Transactions, Sub_Cat, how = 'outer',
left_on="prod_subcat_code", right_on="prod_sub_cat_code")
Trans.head()
```

transaction_id	cust_id	tran_date	prod_subcat_code	prod_cat_code	Qty	Rate	Tax	total_amt	Store_type	prod_sub_cat_code
0	80712190438	270351	28-02-2014	1	1	-5	-772	405.300	-4265.300	e-Shop
1	80712190438	270351	28-02-2014	1	1	-5	-772	405.300	-4265.300	e-Shop
2	80712190438	270351	28-02-2014	1	1	-5	-772	405.300	-4265.300	e-Shop
3	171839290 85	266863	20-02-2014	1	2	1	1359	142.695	1501.695	TeleShop
4	171839290 85	266863	20-02-2014	1	2	1	1359	142.695	1501.695	TeleShop

```
Trans.head()
```

transaction_id	cust_id	tran_date	prod_subcat_code	prod_cat_code	Qty	Rate	Tax	total_amt	Store_type	prod_sub_cat_code
0	80712190438	270351	28-02-2014	1	1	-5	-772	405.300	-4265.300	e-Shop
1	807121	2703	28-02-	1	1	-5	-	405.3	-	e-Shop

	90438	51	2014				7 72	00	4265. 300	
2	807121 90438	2703 51	28-02- 2014	1	1	-5	- 7 72	405.3 00	- 4265. 300	e-Shop
3	171839 29085	2668 63	20-02- 2014	1	2	1	13 59	142.6 95	1501. 695	TeleShop
4	171839 29085	2668 63	20-02- 2014	1	2	1	13 59	142.6 95	1501. 695	TeleShop

```
Trans = pd.merge(Transactions, Customer,  left_on="cust_id",
right_on="customer_Id")
Trans.head()
```

transa ction_ id	cust_id	tran_d ate	prod_subcat _code	prod_ca t_code	Qty	Ra te	T ax	total_ amt	Store_t ype	custo mer_Id	DOB
0	807121 90438	2703 51	28-02- 2014	1	1	-5	- 7 72	405.3 00	- 4265. 300	e- Shop	270 51
1	807121 90438	2703 51	20-02- 2014	1	1	5	7 72	405.3 00	4265. 300	e- Shop	270 51
2	369574 41426	2703 51	16-09- 2013	3	2	3	3 61	113.7 15	1196. 715	Flagsh ip store	270 51
3	122362 77258	2703 51	18-03- 2013	8	3	3	10 30	324.4 50	3414. 450	e- Shop	270 51
4	131815 63739	2703 51	13-12- 2011	6	5	1	10 48	110.0 40	1158. 040	e- Shop	270 51

```
Trans = Trans.drop(['prod_subcat_code', 'prod_cat_code','customer_Id'] , 1)
#drop cust_id column
Trans.head()
```

transaction_id	cust_id	tran_date	Qty	Rate	Tax	total_amt	Store_type	DOB	Gender	city_code	
0	80712190438	270351	28-02-2014	-5	-772	405.300	-4265.300	e-Shop	26-09-1981	M	5.0
1	80712190438	270351	20-02-2014	5	772	405.300	4265.300	e-Shop	26-09-1981	M	5.0
2	36957441426	270351	16-09-2013	3	361	113.715	1196.715	Flagship store	26-09-1981	M	5.0
3	12236277258	270351	18-03-2013	3	1030	324.450	3414.450	e-Shop	26-09-1981	M	5.0
4	13181563739	270351	13-12-2011	1	1048	110.040	1158.040	e-Shop	26-09-1981	M	5.0

```
Trans.Qty = Trans.Qty.abs()
Trans.Rate = Trans.Rate.abs()
Trans.total_amt = Trans.total_amt.abs()
Trans.head()
```

transaction_id	cust_id	tran_date	Qty	Rate	Tax	total_amt	Store_type	DOB	Gender	city_code	
0	80712190438	270351	28-02-2014	5	772	405.300	4265.300	e-Shop	26-09-1981	M	5.0
1	80712190438	270351	20-02-2014	5	772	405.300	4265.300	e-Shop	26-09-1981	M	5.0
2	36957441426	270351	16-09-2013	3	361	113.715	1196.715	Flagship store	26-09-1981	M	5.0
3	12236277258	270351	18-03-2013	3	1030	324.450	3414.450	e-Shop	26-09-1981	M	5.0
4	13181563739	270351	13-12-2011	1	1048	110.040	1158.040	e-Shop	26-09-1981	M	5.0

```
Trans.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 23053 entries, 0 to 23052
Data columns (total 12 columns):
transaction_id    23053 non-null int64
cust_id           23053 non-null int64
tran_date         23053 non-null object
Qty               23053 non-null int64
Rate              23053 non-null int64
Tax               23053 non-null float64
total_amt         23053 non-null float64
```

```
Store_type        23053 non-null object
DOB               23053 non-null object
Gender            23044 non-null object
city_code         23045 non-null float64
Age               23053 non-null int64
dtypes: float64(3), int64(5), object(4)
memory usage: 2.3+ MB
```

```
print("# unique values in STore Type:
{0}".format(len(Trans['Store_type'].unique().tolist())))
print("# unique values in City:
{0}".format(len(Trans['city_code'].unique().tolist())))
print("# unique values in Customer :
{0}".format(len(Trans['cust_id'].unique().tolist())))
print("# unique values in Age:
{0}".format(len(Trans['Age'].unique().tolist())))
```

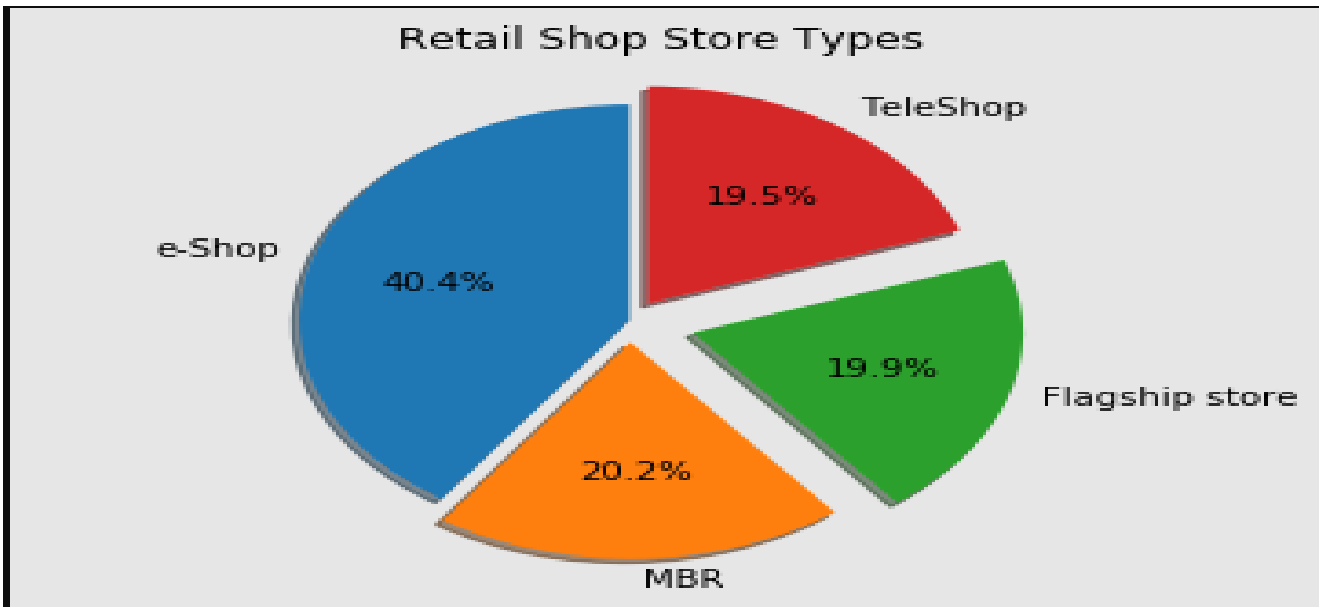
```
# unique values in STore Type: 4
# unique values in City: 11
# unique values in Customer : 5506
# unique values in Age: 24
```

```
labels = Trans['Store_type'].value_counts().index
sizes = Trans['Store_type'].value_counts().values
explode = (0, 0.1, 0.2, 0.1)  # only "explode" the 2nd and 3rd slices (i.e.
'Hogs')
```

```
fig1, ax1 = plt.subplots()
ax1.pie(sizes, explode=explode, labels=labels, autopct='%1.1f%%',
        shadow=True, startangle=90)
ax1.axis('equal')  # Equal aspect ratio ensures that pie is drawn as a circle.

ax1.set_title("Retail Shop Store Types")

plt.show()
```



FEATURE 1

- Simple attribute of good code. If comes down to one programming principle.That is the code must be readable.

  § The code must be scalable.

  § The code must be testable.

§ The code does what is askedfor.

§ The code failsgracefully. The code is easy to extend.The code is reusable.

FEATURE 2

Can help you understand technology. It can enhance problem solving skills. 37 Coding can be applied to data visualization. Coding can complement creativity.Codingis a universal language.

DATABASE SCHEMA

A database schema is the skeleton structure that represents the logical view of the entire database. It defines how the data is organized and how the relations among them are associated. It formulates all the constraints that are to be applied on the data.

TESTING

TESTING CASES

1. Verify that there is a portal to addnew flights in the system.
2. Verify that on filling flight details like flight name, code, from and to destinations, capacity, timings, and frequency etc, new flights get successfullyadded in the system.

USER ACCEPTANCE TESTING

The User Acceptance Test Report is a document that identifies the status of Discrepancy Notices (DN) as UAT progresses. Note that even when a DN is 'Closed', it must be recorded here to ensure that the final status of any DN is available throughout the UAT period.

RESULTS

PERFORMANCE METRICS

Project metrics are used to track the progress and performance of a project. Monitoring parts of a project like productivity. Scheduling, and scope make it easier for team leaders to see what's on track .As a project evolves, manager need access to changing deadlines or budgets to meet their clients expectation. What makes project metrics so important is that they can give team leaders foot view of any project in their pipeline while it's in their pipeline while it's in progress. In fact the state the Project management report from wellington found 54% of workers don't have access to real time project data

- Solve problem during the project
- Evaluate and change courseif budget or resources are in danger
- Create forecasts to make future project spending and scheduling more accurate Instead of figuring out how the house burned down project metrics help you spot fire as it starts so youcan quickly extinguish it.

ADVANTAGES AND DISADVANTAGES

ADVANTAGES

A close review of each stage can help optimize each part of the process by making minor improvements. Sales analytics can also help automate some processes, such as prospecting, and give sales representatives the opportunity to focus only on closing sales.

i. Marketing teams and sales representatives can review each stage of the processand its successindividually.

ii. Using sales analytics helps to optimize the sales funnel and make improvements to the sales process, which leads to efficiency.

iii. Sales trends can help predict revenue and inform marketing departments of which techniques are effective among certain demographics in the business's target audience.

iv. Product sales analysis reviews all the products a business has on the market. It's important to track each product and focus on the productsthat are performing best.

v. This is an intuitiveanalytic and can be a great resource for representatives by providing data on prospects and customers to help make repeatsales.

DISADVANTAGES

This may breach privacy of the customers as their information such as purchases, online transactions, subscriptions are visibleto their parent companies. The companies may exchange these useful customerdatabases for their mutual benefits.

i. The cost of data analyticstools varies based on applications and features supported. Moreover, some of the data analytics tools are complex to use and require training. This increases cost to the company willing to adopt data analytics tools or software.

ii. The information obtainedusing data analytics can also be misused againstgroup of people ofcertain country or community or caste.

iii. It is very difficult to select the right data analytics tools. This is due to the fact that it requires knowledge of the tools and their accuracy in analyzing the relevant data as per applications. This increases time and cost to the company.

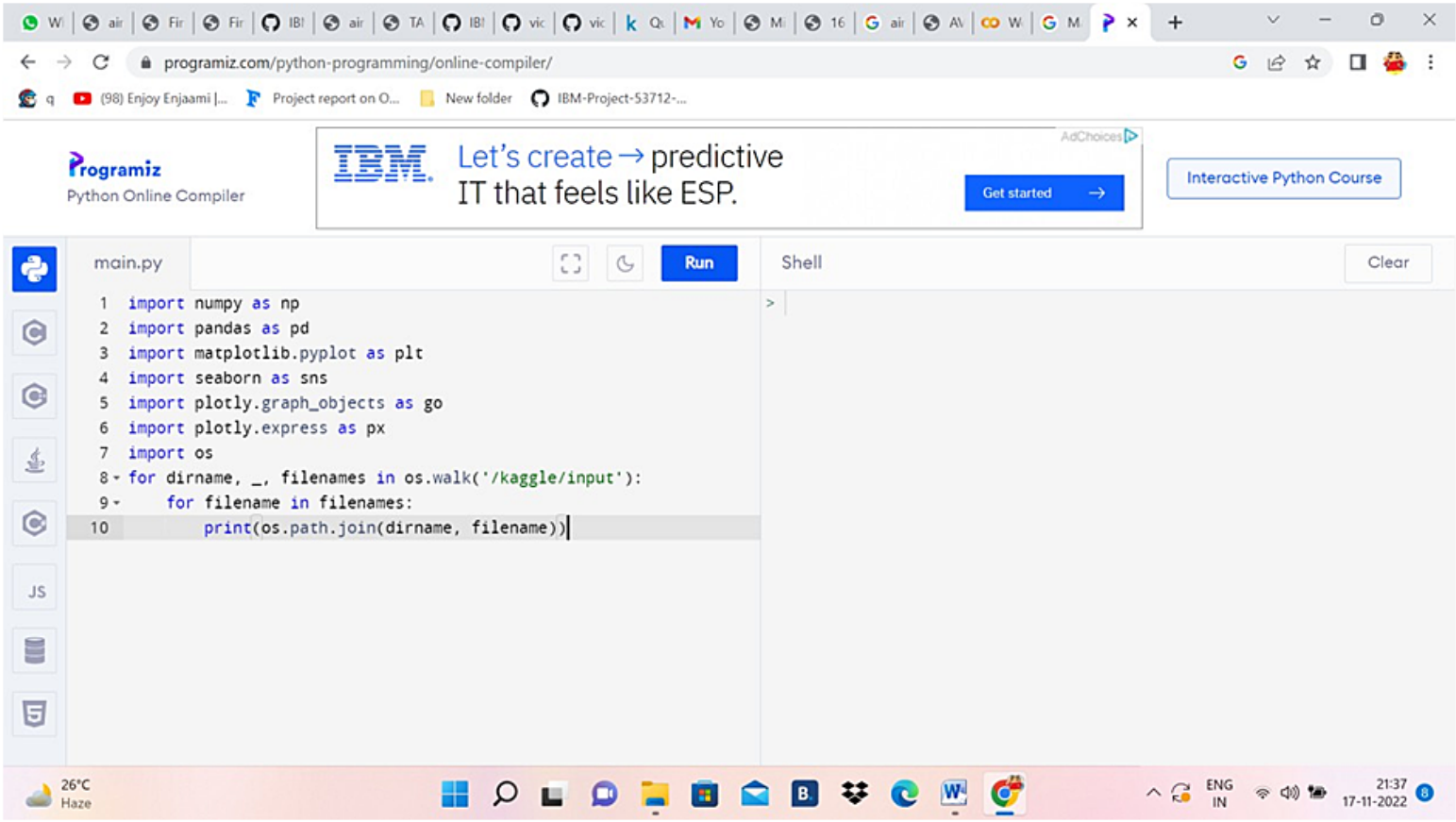
CONCLUSION

It is concluded that brief study on data visualization, it is clear that the field is rich in potential applications in diverse disciplines, at the same time we need to be aware of its practical and ethical complexities. In the previous chapters, this project presents some important theoretical and practical principles to keep in mind when designing a data visualization. We have also discussedand critiqued severalexamples of data visualizations, learning common pitfalls and helpful tricks along the way. As we have seen, developing an effective and ethical data visualization is a complex process. In this chapter we will touch upon the future of data visualization and additional resources for data visualizers. With the right data, sales success is far more achievable and, importantly, measurable. Sales data is enormously powerful and it’s something you come by just by tracking your activities effectively. Knowing how to fully utilizeit will revolutionize your sales process, leading to better lead generation, client engagement and retentionand, ultimately, more sales.

FEATURE SCOPE

Data analytics has a bright future ahead as it has more potential, which everyone can explore. There is no shortage of opportunities for those who want to explore this field and move forward with their career in this competitive market world. Today, data analytics is being used in many fields such as healthcare, retail, transportation, manufacturing, and many others. However, there are certain areas where it can be used more effectively. Data analytics is expected to radically change the way we live and do business in the future. Already today we use the analytics in our technology devices, for many decisions in ourlives. Changing technological landscape and newer business challenges compel companies today to look for strategies that ensure higher business returns as well as reducedoperational expenses. Companies may have large measures of data in every single area of research, showcasing, deals, creation customer service and so on. 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 careerand a subject for research.

APPENDIX



SOURCE CODE

https://www.kaggle.com/code/akpflow/retail-shop-data-analytics/notebook

GITHUB & PROJECT DEMOLINK

Demolink---https://youtu.be/VCx9FeuFmqo

Githublink---
https://careereducation.smartinternz.com/Student/guided_project_workspace/53019