Project Report Format

TEAM ID : PNT2022TMID23326

INTRODUCTION

1.1 Project Overview

Machine learning algorithms can be used by businesses to as accurately predict changes in consumer demand as feasible. These algorithms are capable of automatically recognising patterns, locating intricate links in big datasets, and picking up indications for changing demand. A food delivery service has to deal with a lot of perishable raw materials which makes it all, the most important factor for such a company is to accurately forecast daily and weekly demand. Too much inventory in the warehouse means more risk of wastage, and not enough could lead to out-of-stocks - and push customers to seek solutions from your competitors. The replenishment of majority of raw materials is done on weekly basis and since the raw material is perishable, the procurement planning is of utmost importance, the task is to predict the demand for the next 10 weeks

1.2 Purpose

The main aim of this project is to create an appropriate machine learning model to forecast the number of orders to gather raw materials for next ten weeks. To achieve this, we should know the information about of fulfilment center like area, city etc., and meal information like category of food sub category of food price of the food or discount in particular week. By using this data, we can use any classification algorithm to forecast the quantity for 10 weeks. A web application is built which is integrated with the model built.

2. LITERATURE SURVEY

2.1 Existing problem

There are lot more problems on ordering food over network and there is no proper demand for all the individual as well for the deployment, Consistent evaluation is also eradicated.

2.2 References

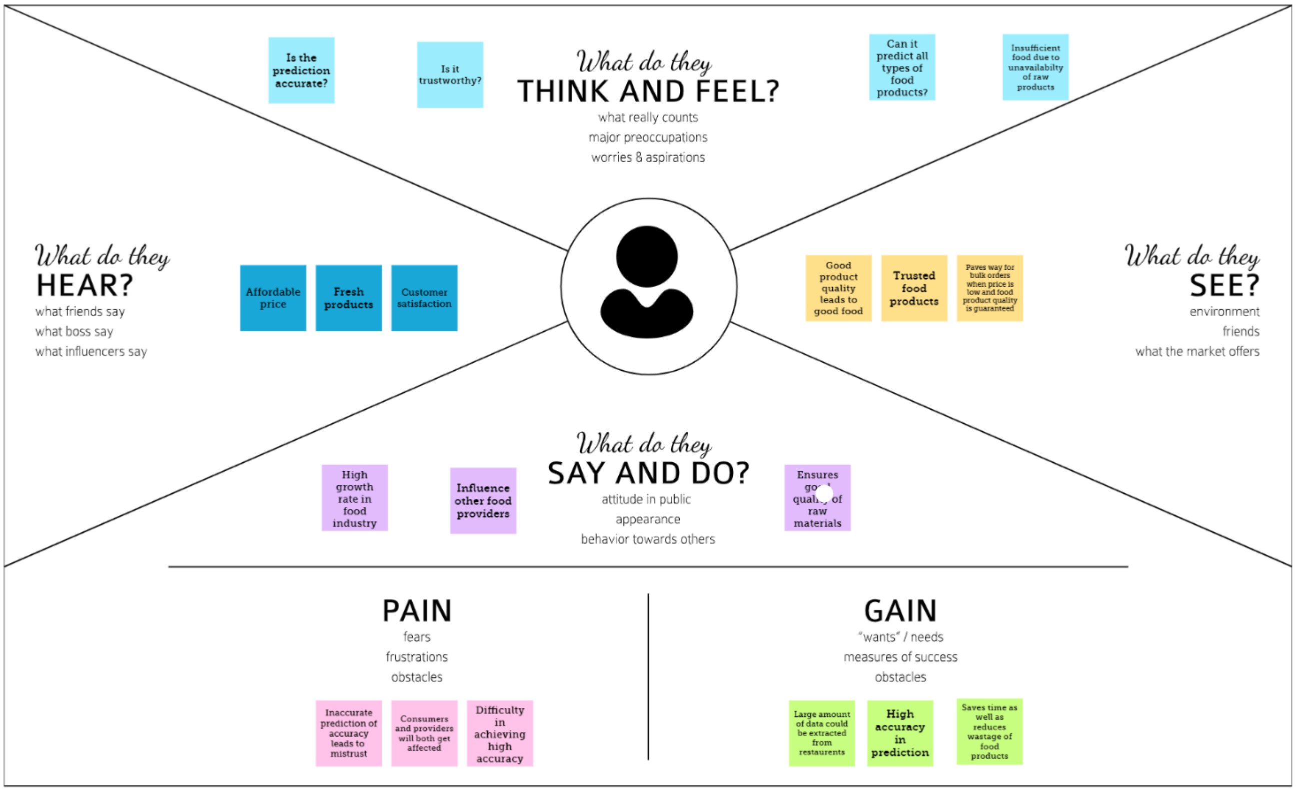
- AQUAREL
- 09Solution
- Kaggle

2.3 Problem Statement Definition

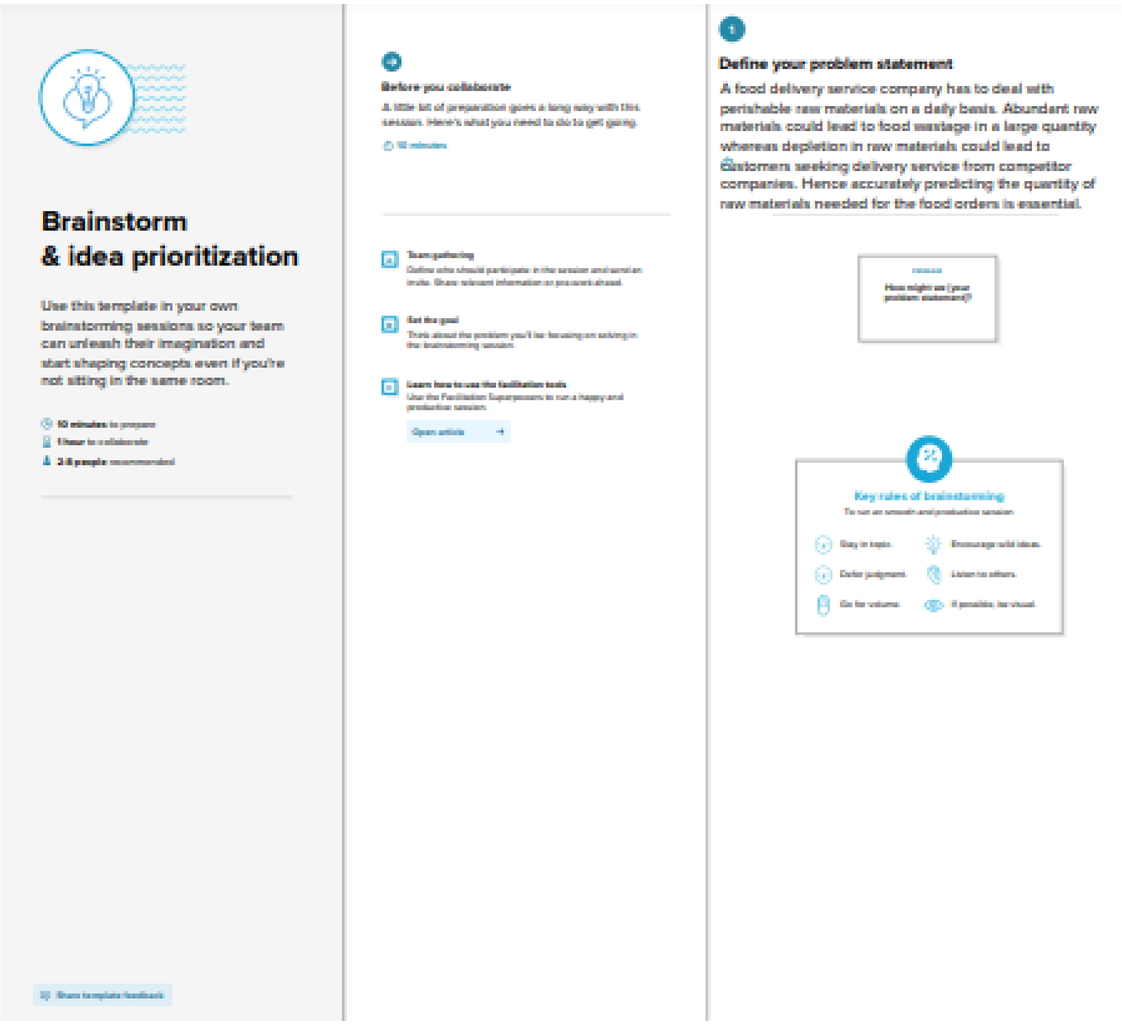
- The data set relates to a food delivery service that has operations throughout several cities. For delivering meal orders to clients, they have a number of fulfilment sites in these cities. The required raw materials are stocked appropriately at the fulfilment centers.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas


Is the prediction accurate?
Is it trustworthy?
What do they
THINK AND FEEL?
what really counts
major preoccupations
worries & aspirations
Can it predict all types of food products?
Insufficient food due to unavailabilty of raw products
What do they
HEAR?
what friends say
what boss say
what influencers say
Affordable price
Fresh products
Customer satisfaction
Good product quality leads to good food
Trusted food products
Paves way for bulk orders when price is low and food product quality is guaranteed
What do they
SEE?
environment
friends
what the market offers
High growth rate in food industry
Influence other food providers
What do they
SAY AND DO?
attitude in public
appearance
behavior towards others
Ensures good quality of raw materials
PAIN
fears
frustrations
obstacles
Inaccurate prediction of accuracy leads to mistrust
Consumers and providers will both get affected
Difficulty in achieving high accuracy
GAIN
"wants" / needs
measures of success
obstacles
Large amount of data could be extracted from restaurents
High accuracy in prediction
Saves time as well as reduces wastage of food products

3.2 Ideation & Brainstorming



Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

10 minutes to prepare
1 hour to collaborate
2-8 people recommended

Share template feedback

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

10 minutes

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

Set the goal
Think about the problem you'll be focusing on solving in the brainstorming session.

Learn how to use the facilitation tools
Use the Facilitation Superpowers to run a happy and productive session.

Open article →

1

Define your problem statement

A food delivery service company has to deal with perishable raw materials on a daily basis. Abundant raw materials could lead to food wastage in a large quantity whereas depletion in raw materials could lead to customers seeking delivery service from competitor companies. Hence accurately predicting the quantity of raw materials needed for the food orders is essential.

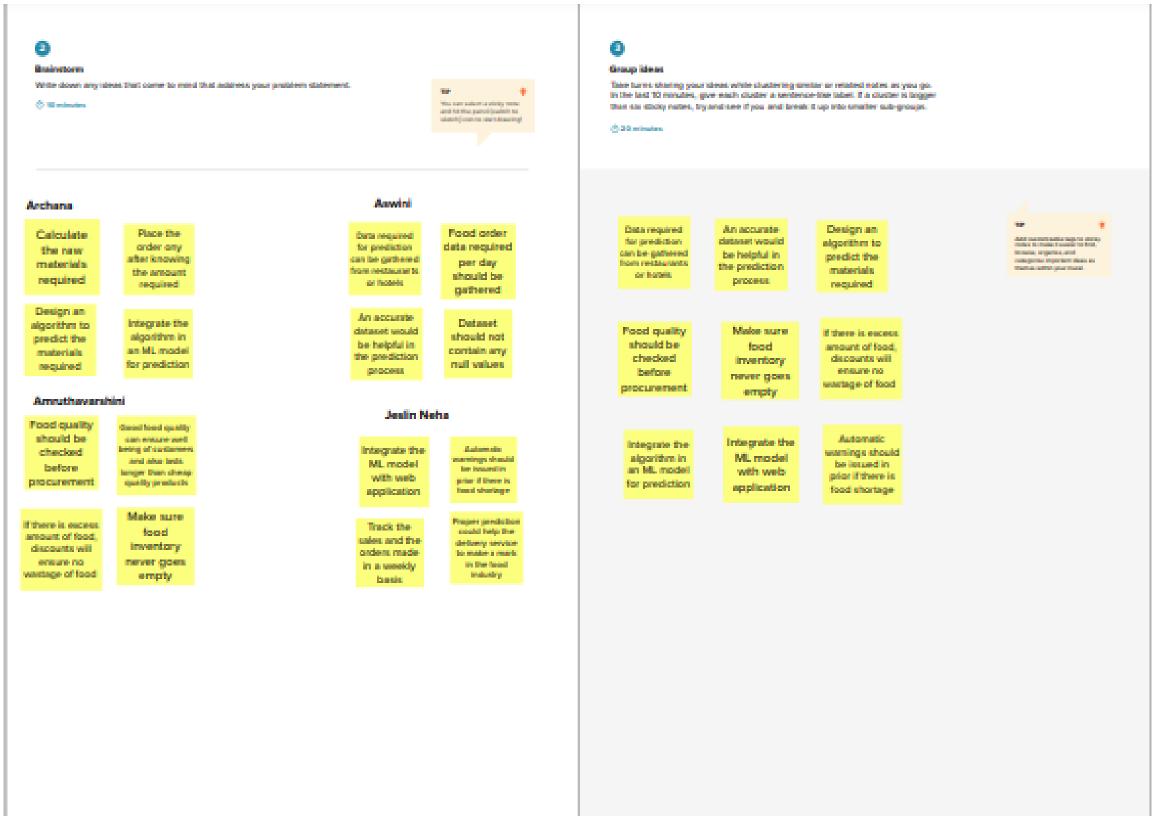
PROBLEM

How might we [your problem statement]?

Key rules of brainstorming

To run an smooth and productive session

Stay in topic.
Encourage wild ideas.
Defer judgment.
Listen to others.
Go for volume.
If possible, be visual.



Brainstorm

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

10 minutes

TIP

You can select a sticky note and hit the pencil [switch to sketch] icon to start drawing!

Archana

- Calculate the raw materials required
- Place the order only after knowing the amount required
- Design an algorithm to predict the materials required
- Integrate the algorithm in an ML model for prediction

Aswini

- Data required for prediction can be gathered from restaurants or hotels
- Food order data required per day should be gathered
- An accurate dataset would be helpful in the prediction process
- Dataset should not contain any null values

Amruthavarshini

- Food quality should be checked before procurement
- Good food quality can ensure well being of customers and also lasts longer than cheap quality products
- If there is excess amount of food, discounts will ensure no wastage of food
- Make sure food inventory never goes empty

Jaslin Neha

- Integrate the ML model with web application
- Automatic warnings should be issued in prior if there is food shortage
- Track the sales and the orders made in a weekly basis
- Proper prediction could help the delivery service to make a mark in the food industry

Group ideas

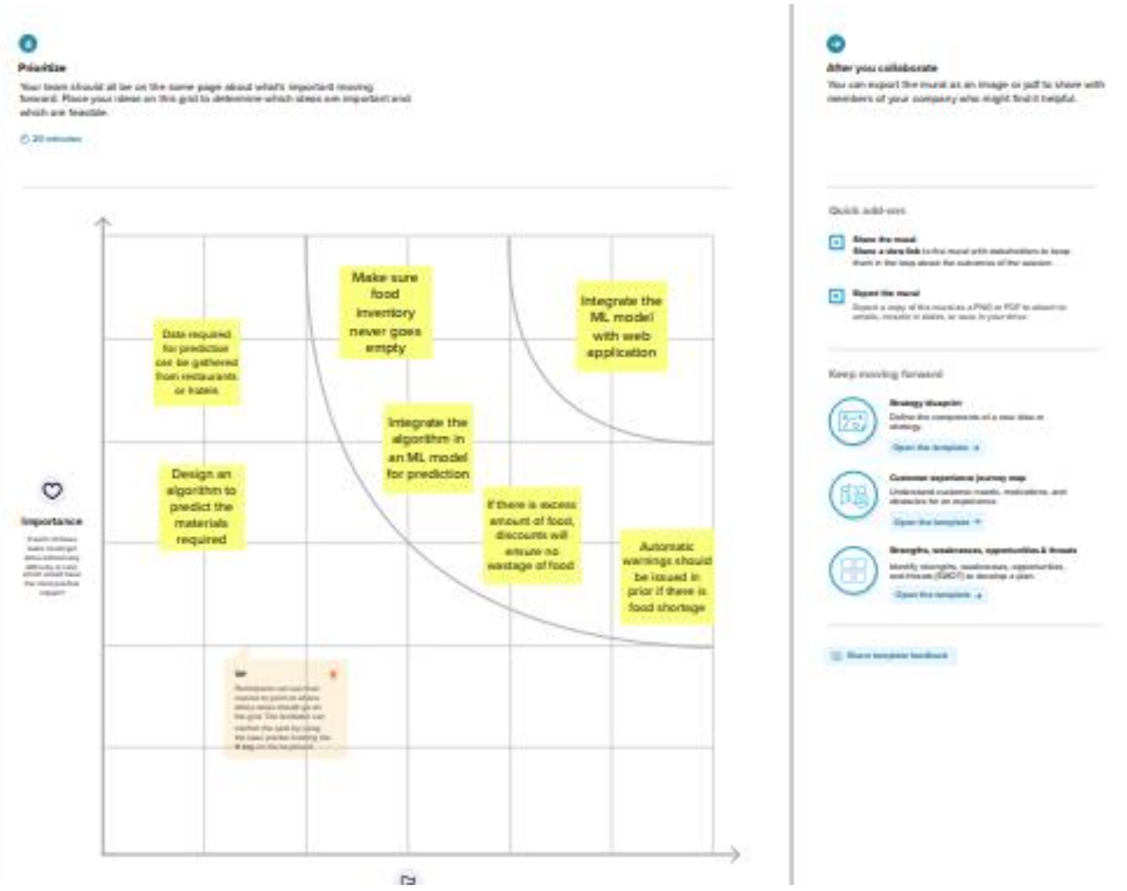
Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

20 minutes

- Data required for prediction can be gathered from restaurants or hotels
- An accurate dataset would be helpful in the prediction process
- Design an algorithm to predict the materials required
- Food quality should be checked before procurement
- Make sure food inventory never goes empty
- If there is excess amount of food, discounts will ensure no wastage of food
- Integrate the algorithm in an ML model for prediction
- Integrate the ML model with web application
- Automatic warnings should be issued in prior if there is food shortage

TIP

Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.



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

Importance
If each of these tasks could get done without any difficulty or cost, which would have the most positive impact?

- Data required for prediction can be gathered from restaurants or hotels
- Make sure food inventory never goes empty
- Integrate the ML model with web application
- Integrate the algorithm in an ML model for prediction
- Design an algorithm to predict the materials required
- If there is excess amount of food, discounts will ensure no wastage of food
- Automatic warnings should be issued in prior if there is food shortage

TIP

Participants can use their cursors to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the laser pointer holding the H key on the keyboard.

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

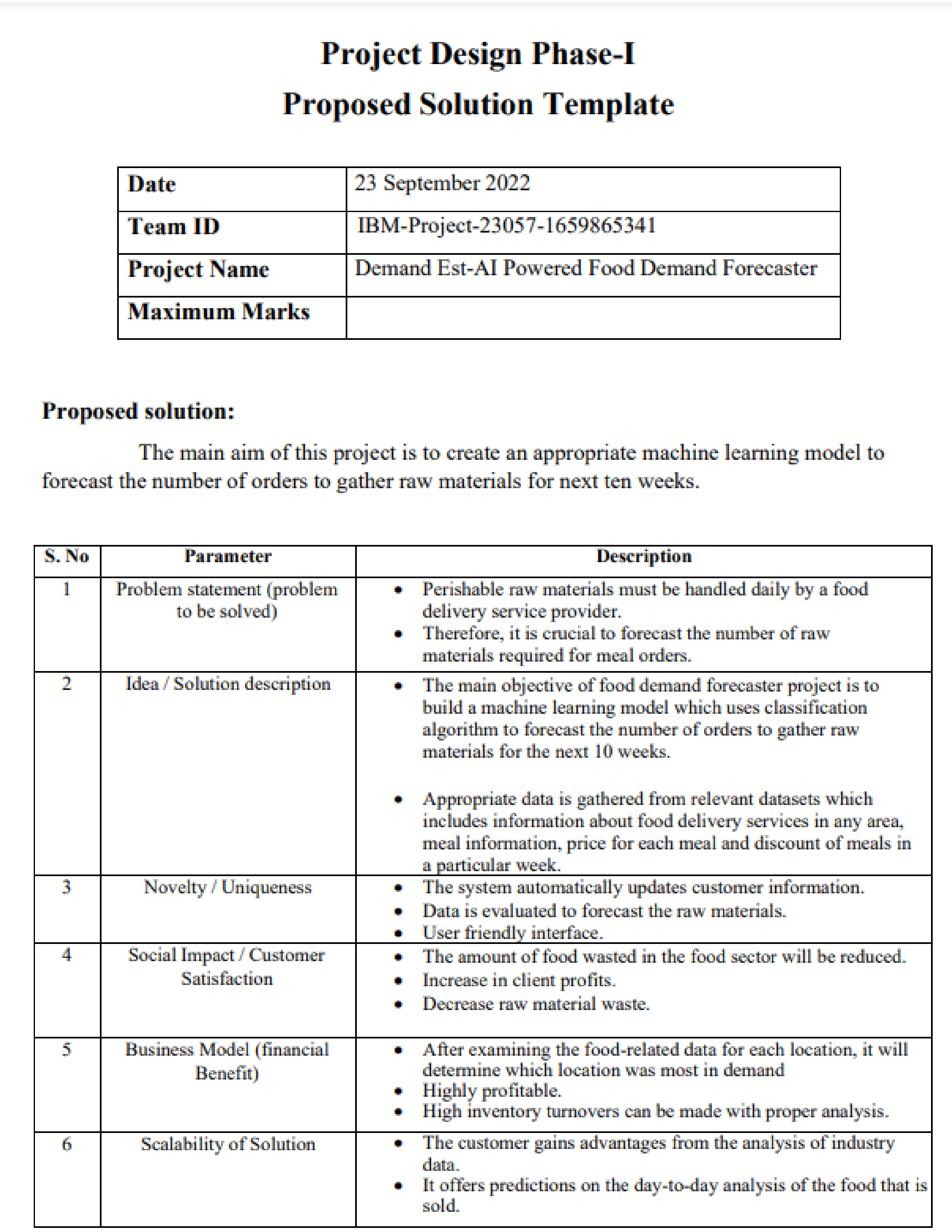
Strategy blueprint
Define the components of a new idea or strategy.
Open the template →

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



Project Design Phase-I
Proposed Solution Template

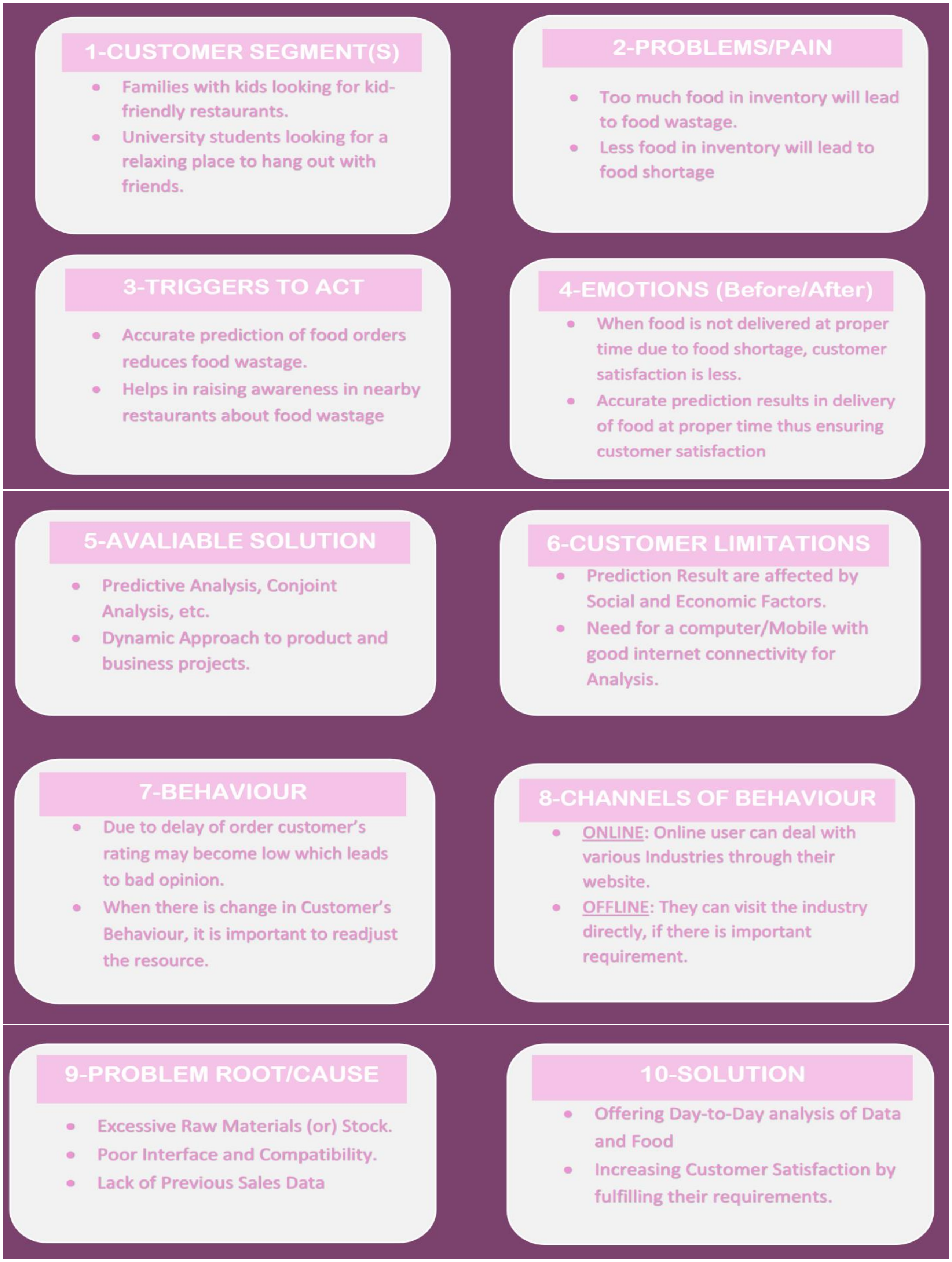
Date	23 September 2022
Team ID	IBM-Project-23057-1659865341
Project Name	Demand Est-AI Powered Food Demand Forecaster
Maximum Marks	

Proposed solution:

The main aim of this project is to create an appropriate machine learning model to forecast the number of orders to gather raw materials for next ten weeks.

S. No	Parameter	Description
1	Problem statement (problem to be solved)	• Perishable raw materials must be handled daily by a food delivery service provider. • Therefore, it is crucial to forecast the number of raw materials required for meal orders.
2	Idea / Solution description	• The main objective of food demand forecaster project is to build a machine learning model which uses classification algorithm to forecast the number of orders to gather raw materials for the next 10 weeks. • Appropriate data is gathered from relevant datasets which includes information about food delivery services in any area, meal information, price for each meal and discount of meals in a particular week.
3	Novelty / Uniqueness	• The system automatically updates customer information. • Data is evaluated to forecast the raw materials. • User friendly interface.
4	Social Impact / Customer Satisfaction	• The amount of food wasted in the food sector will be reduced. • Increase in client profits. • Decrease raw material waste.
5	Business Model (financial Benefit)	• After examining the food-related data for each location, it will determine which location was most in demand • Highly profitable. • High inventory turnovers can be made with proper analysis.
6	Scalability of Solution	• The customer gains advantages from the analysis of industry data. • It offers predictions on the day-to-day analysis of the food that is sold.

3.4 Problem Solution fit



1-CUSTOMER SEGMENT(S)

- Families with kids looking for kid-friendly restaurants.
- University students looking for a relaxing place to hang out with friends.

2-PROBLEMS/PAIN

- Too much food in inventory will lead to food wastage.
- Less food in inventory will lead to food shortage

3-TRIGGERS TO ACT

- Accurate prediction of food orders reduces food wastage.
- Helps in raising awareness in nearby restaurants about food wastage

4-EMOTIONS (Before/After)

- When food is not delivered at proper time due to food shortage, customer satisfaction is less.
- Accurate prediction results in delivery of food at proper time thus ensuring customer satisfaction

5-AVALIABLE SOLUTION

- Predictive Analysis, Conjoint Analysis, etc.
- Dynamic Approach to product and business projects.

6-CUSTOMER LIMITATIONS

- Prediction Result are affected by Social and Economic Factors.
- Need for a computer/Mobile with good internet connectivity for Analysis.

7-BEHAVIOUR

- Due to delay of order customer's rating may become low which leads to bad opinion.
- When there is change in Customer's Behaviour, it is important to readjust the resource.

8-CHANNELS OF BEHAVIOUR

- ONLINE: Online user can deal with various Industries through their website.
- OFFLINE: They can visit the industry directly, if there is important requirement.

9-PROBLEM ROOT/CAUSE

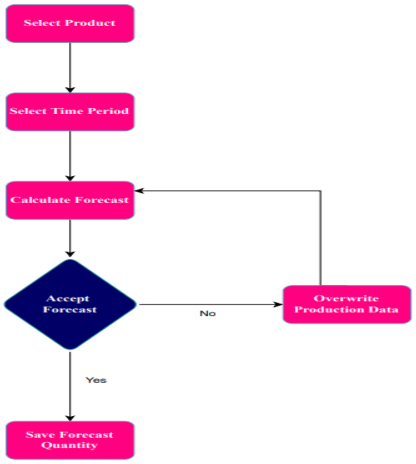
- Excessive Raw Materials (or) Stock.
- Poor Interface and Compatibility.
- Lack of Previous Sales Data

10-SOLUTION

- Offering Day-to-Day analysis of Data and Food
- Increasing Customer Satisfaction by fulfilling their requirements.

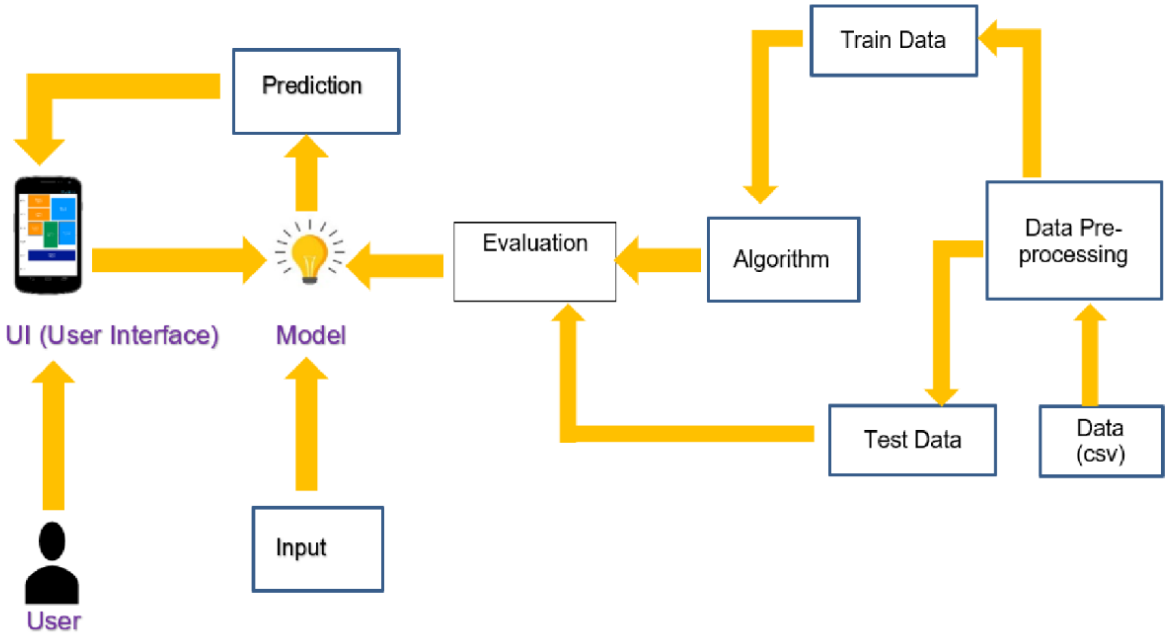
4. PROJECT DESIGN

4.1 Data Flow Diagrams



4.2 Solution & Technical Architecture

Solution Architecture Diagram:



Project Design Phase-II

Technology Stack (Architecture & Stack)

Date	15 October 2022
Team ID	IBM-Project-23057-1659865341
Project Name	DemandEst - AI powered Food Demand Forecaster
Maximum Marks	4 Marks

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the given tables.

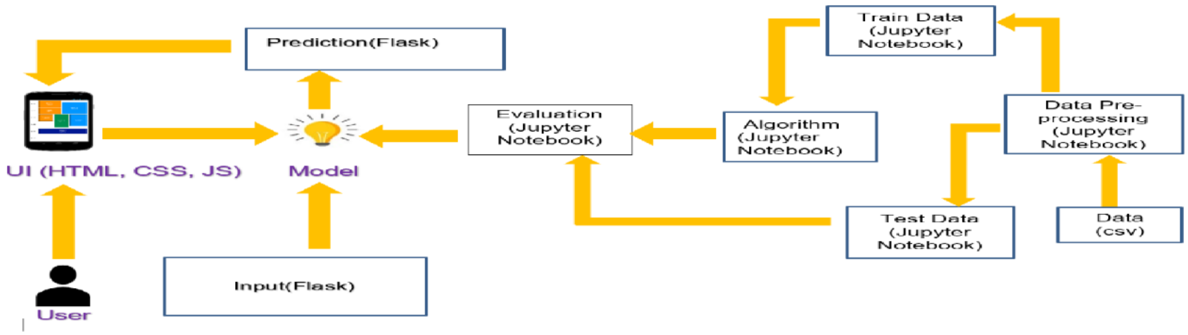
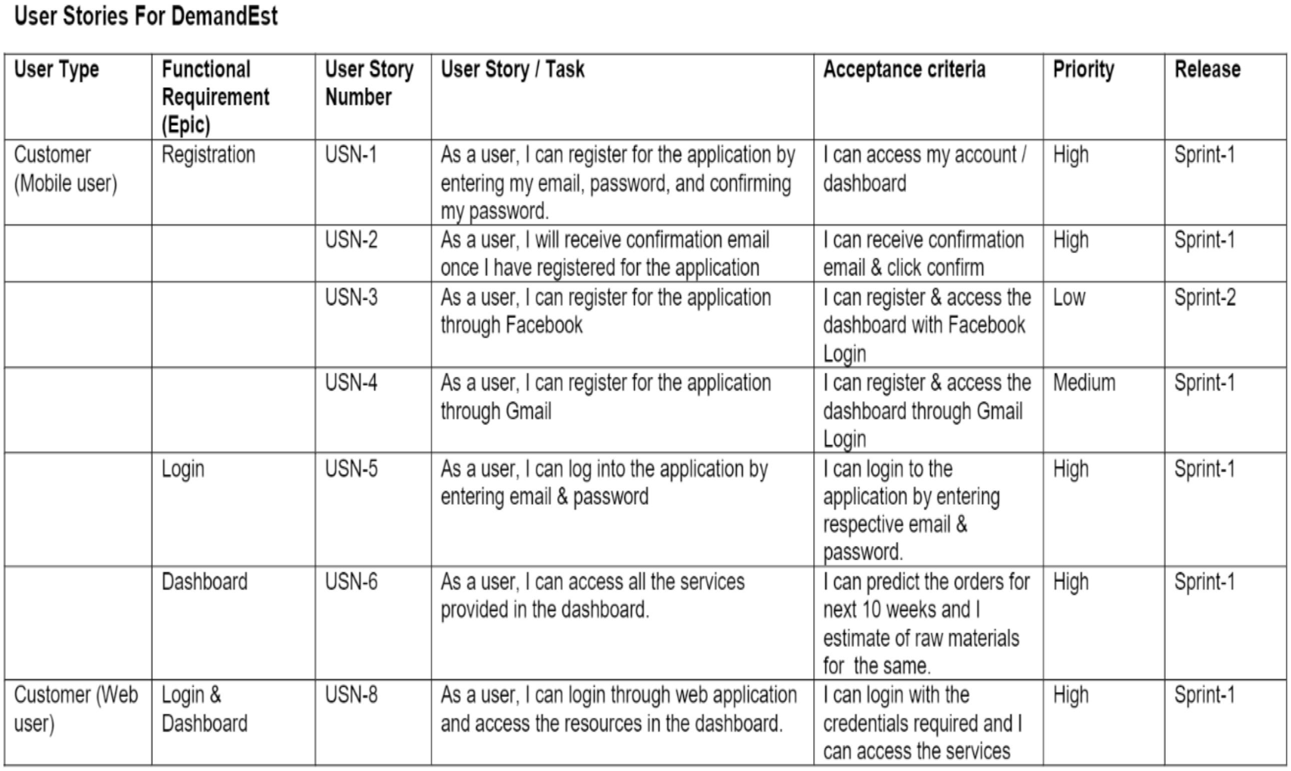

Prediction(Flask)
Train Data (Jupyter Notebook)
Data Pre-processing (Jupyter Notebook)
UI (HTML, CSS, JS)
Model
Evaluation (Jupyter Notebook)
Algorithm (Jupyter Notebook)
Test Data (Jupyter Notebook)
Data (csv)
Input(Flask)
User

Table-1 : Components & Technologies:

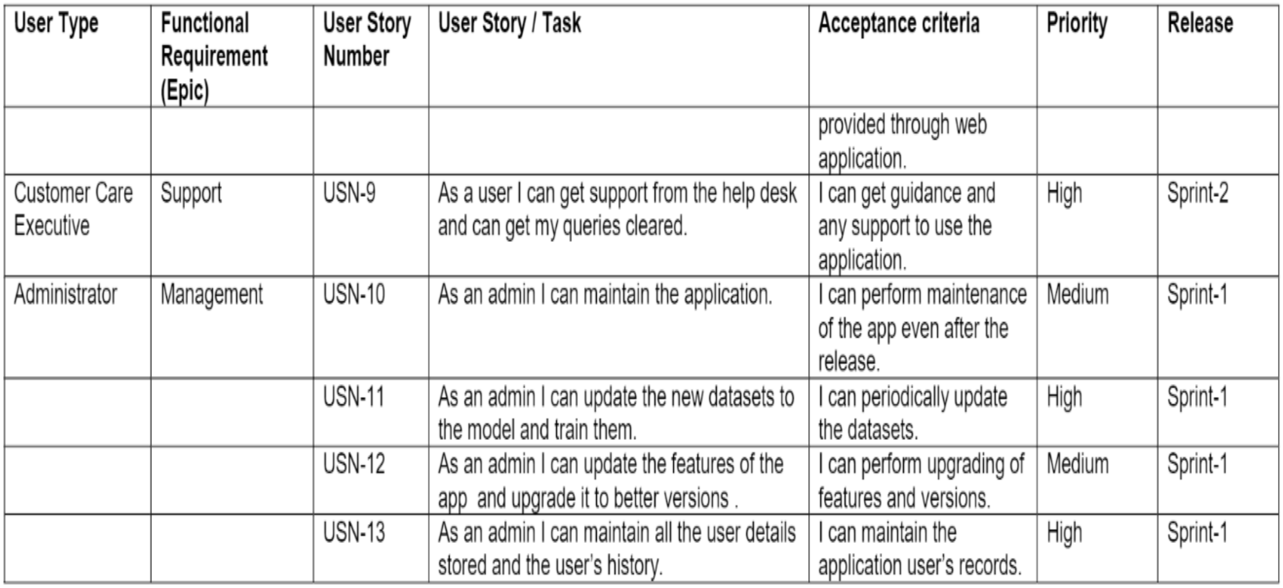
S.No	Component	Description	Technology
1.	UI	User Interface for Food demand estimation	HTML, CSS, JavaScript
2.	Input and Output	Gets input from user and displays the predicted output using Flask. It uses Get and Post HTTP methods to backend for processing	Flask
3.	Evaluation and algorithm	Uses python libraries like NumPy, pandas, matplotlib, Sklearn, seaborn for processing, training and testing data from .csv files	Jupyter notebook

4.3 User Stories



User Stories For DemandEst

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 / dashboard	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 dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can register & access the dashboard through Gmail Login	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can login to the application by entering respective email & password.	High	Sprint-1
	Dashboard	USN-6	As a user, I can access all the services provided in the dashboard.	I can predict the orders for next 10 weeks and I estimate of raw materials for the same.	High	Sprint-1
Customer (Web user)	Login & Dashboard	USN-8	As a user, I can login through web application and access the resources in the dashboard.	I can login with the credentials required and I can access the services	High	Sprint-1



User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
				provided through web application.		
Customer Care Executive	Support	USN-9	As a user I can get support from the help desk and can get my queries cleared.	I can get guidance and any support to use the application.	High	Sprint-2
Administrator	Management	USN-10	As an admin I can maintain the application.	I can perform maintenance of the app even after the release.	Medium	Sprint-1
		USN-11	As an admin I can update the new datasets to the model and train them.	I can periodically update the datasets.	High	Sprint-1
		USN-12	As an admin I can update the features of the app and upgrade it to better versions .	I can perform upgrading of features and versions.	Medium	Sprint-1
		USN-13	As an admin I can maintain all the user details stored and the user's history.	I can maintain the application user's records.	High	Sprint-1

5. PROJECT PLANNING & SCHEDULING

5.1 Sprint Planning & Estimation

SPRINT 1:

(i)

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Home</title>
    <link type="text/css" rel="stylesheet" href="/Flask/static/style.css">
    <link rel="preconnect" href="https://fonts.googleapis.com">
<link rel="preconnect" href="https://fonts.gstatic.com" crossorigin>
<link
href="https://fonts.googleapis.com/css2?family=Poppins:wght@200;300;400;600;800&display=swap"
rel="stylesheet">
<link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/6.0.0-
beta2/css/all.min.css">
<link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/6.0.0-beta2/css/v4-
shims.min.css">
<style>

*{
    margin: 0;
    padding: 0;
    font-family: 'Poppins', sans-serif;
}
.bar
{
margin: 0px;
padding: 15px;
background-color:rgb(64, 100, 246);
font-family:'Poppins',sans-serif;
font-size:25px;
}
```

```
a{
color:#fff;
float:right;
text-decoration:none;
padding-right:20px;
}
a:hover{
    padding: 3.5px;
    background: #FAAE42;
}

.text-box{
    width: 90%;
    color:rgba(51, 210, 249, 0.905);
    text-shadow: #0c0d0e;
    position:absolute;
    top: 45%;
    left: 50%;
    transform: translate(-50%,-50%);
    text-align: center;
}
.text-box h1{
    font-size: 70px;
    text-shadow: 2px 2px 40px #ffffff;
}
.text-box p{
    margin: 10px 0 40px;
    font-size: 25px;
    color: rgba(0, 0, 0, 0.946);
}
h2{
    color:red;
}
</style>
</head>
<body>
   <section class="header">
```

```
    <div class="bar">
        <a href="/pred">Predict</a>
        <a href="/home">Home</a>
    <br>
         </div>
       <div class="text-box">
        <h1>
            DemandEst - AI powered Food Demand Forecaster</h1>
        <h2>Everyday forecaster around the clock!</h2>

    </div>
   </section>
</body>
</html>
```

(ii)

```
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Predict</title>
    <link rel="preconnect" href="https://fonts.googleapis.com">
<link rel="preconnect" href="https://fonts.gstatic.com" crossorigin>
<link
href="https://fonts.googleapis.com/css2?family=Poppins:wght@200;300;400;600;800&display=swap"
rel="stylesheet">
<link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/6.0.0-
beta2/css/all.min.css">

<style>
.bar
{
margin: 0px;
padding: 15px;
```

```
background-color:rgb(100, 5, 29);
/* opacity:0.6; */
font-family:'Poppins',sans-serif;
font-size:25px;
}
a
{
color:#fff;
float:right;
text-decoration:none;
padding-right:20px;
}
a:hover{
    padding: 3.5px;
    background: #FAAE42;

}
h1{
    color:rgb(100, 5, 29);
    font-family:Poppins;
    font-size:30
}
h2{
    color:rgb(100, 5, 29);
    font-family: Poppins;
    font-size:60;
    margin-bottom: 10px;

}
.my-cta-button{

    font-size: 20px;
    color: rgb(15, 15, 15);
    border: 1px solid #0e0e0ccf;
    padding: 3.5px;
    cursor: pointer;
}
.my-cta-button:hover{
    border: 2px solid #faae42;
    padding: 3.5px;
    background: #FAAE42;
}
p
{
color:white;
font-family: Poppins;
font-size:30px;
}
</style>
</head>

<body>
    <div class="bar">
      <a href="/pred">Predict</a>
      <a href="/home">Home</a>
     <br>
        </div>
    <div class="container">
            <center> <div id="content" style="margin-top:2em">
            <h2><center>Food Demand Forecasting</center></h2>
                 <form action="{{ url_for('predict') }}" method="POST">

     <select id="homepage_featured" name="homepage_featured">
      <option value="">homepage_featured</option>
         <option value="0">No</option>
         <option value="1">Yes</option>

       </select><br><br>
     <select id="emailer_for_promotion" name="emailer_for_promotion">
      <option value="">emailer_for_promotion</option>
         <option value="0">No</option>
      <option value="1">Yes</option>

     </select><br><br>



    <input class="form-input" type="text" name="op_area" placeholder="Enter the op_area(2-7)"><br><br>
    <select id="cuisine" name="cuisine">
    <option value="">Cuisine</option>
      <option value="0">Continental</option>
      <option value="1">Indian</option>
      <option value="2">Italian</option>
      <option value="3">Thai</option>

     </select><br><br>
     <input class="form-input" type="text" name="city_code" placeholder="Enter city_code"><br><br>
    <input class="form-input" type="text" name="region_code" placeholder="Enter region_code"><br><br>
    <select id="category" name="category">
    <option value="">Category</option>
      <option value="0">Beverages</option>
      <option value="1">Biryani</option>
      <option value="2">Desert</option>
      <option value="3">Extras</option>
      <option value="4">Fish</option>
      <option value="5">Other Snacks</option>
      <option value="6">Pasta</option>
      <option value="7">Pizza</option>
      <option value="8">Rice Bowl</option>
      <option value="9">Salad</option>
      <option value="10">Sandwich</option>
      <option value="11">Seafood</option>
      <option value="12">Soup</option>
      <option value="13">Starters</option>
     </select><br><br>
```

```
                    <input type="submit" class="my-cta-button" value="Predict">
                <form>

         <br>
          <h1 class="predict">Number of orders: {{ prediction_text }}</h1>
            </div></center>
         </div>
     </body>
</body>
```

5.2 Sprint Delivery Schedule

SPRINT 2:-

```
# import the necessary packages
import pandas as pd
import numpy as np
import pickle
import os
from flask import Flask, request, render_template
import sklearn

app = Flask(__name__, template_folder="templates")


@app.route('/', methods=['GET'])
def index():
    return render_template('home.html')


@app.route('/home', methods=['GET'])
def about():
    return render_template('home.html')


@app.route('/pred', methods=['GET'])
```

```
def page():
    return render_template('upload.html')



@app.route('/predict', methods=['GET', 'POST'])
def predict():
    print("[INFO] loading model...")
    model = pickle.load(open('fdemand.pkl', "rb"))
    input_features = [float(x) for x in request.form.values()]
    features_value = [np.array(input_features)]
    print(features_value)
    features_name = ['homepage_featured', 'emailer_for_promotion', 'op_area', 'cuisine',
                     'city_code', 'region_code', 'category']
    prediction = model.predict(features_value)
    output = prediction[0]
    print(output)
    return render_template('upload.html', prediction_text=output)



if __name__ == '__main__':
    app.run(debug=False)
```

(iii) ibmapp:

```
 # import the necessary packages
from flask import Flask, request, render_template
import pandas as pd
import numpy as np
import pickle
import os
import requests

# NOTE: you must manually set API_KEY below using information retrieved from your IBM Cloud
account.
API_KEY = "gQKptWaYIQFpIY14P2Q3FR5mSyWlkwDtcC9ovkqllYdA"
token_response = requests.post('https://iam.cloud.ibm.com/identity/token',
                                 data={"apikey": API_KEY, "grant_type": 'urn:ibm:params:oauth:grant-type:apikey'})
mltoken = token_response.json()["access_token"]

header = {'Content-Type': 'application/json',
          'Authorization': 'Bearer ' + mltoken}


app = Flask(__name__, template_folder="templates")


@app.route('/', methods=['GET'])
def index():
    return render_template('home.html')


@app.route('/home', methods=['GET'])
def about():
    return render_template('home.html')


@app.route('/pred', methods=['GET'])
def page():
    return render_template('upload.html')


@app.route('/predict', methods=['GET', 'POST'])
def predict():
    print("[INFO] loading model...")
    # model = pickle.load(open('fdemand.pkl', 'rb'))
    input_features = [int(x) for x in request.form.values()]
    print(input_features)
    features_value = [[np.array(input_features)]]
    print(features_value)

    payload_scoring = {"input_data": [{"field": [['homepage_featured', 'emailer_for_promotion', 'op_area', 'cuisine',
                                                  'city_code', 'region_code', 'category']],
                                        "values": [input_features]}]}

    response_scoring = requests.post(
        'https://us-south.ml.cloud.ibm.com/ml/v4/deployments/07706ceb-d908-4138-b5f8-a649a9ad3f07/predictions?version=2022-11-24',
        json=payload_scoring, headers={'Authorization': 'Bearer ' + mltoken})
    print("Scoring response")
    print(response_scoring.json())
    predictions = response_scoring.json()
    print(predictions)
    print('Final Prediction Result',
          predictions['predictions'][0]['values'][0][0])
    pred = predictions['predictions'][0]['values'][0][0]

    # prediction = model.predict(features_value)
    # output=prediction[0]
    # print(output)
    print(pred)
    return render_template('upload.html', prediction_text=pred)


if __name__ == '__main__':
    app.run(debug=False)
```

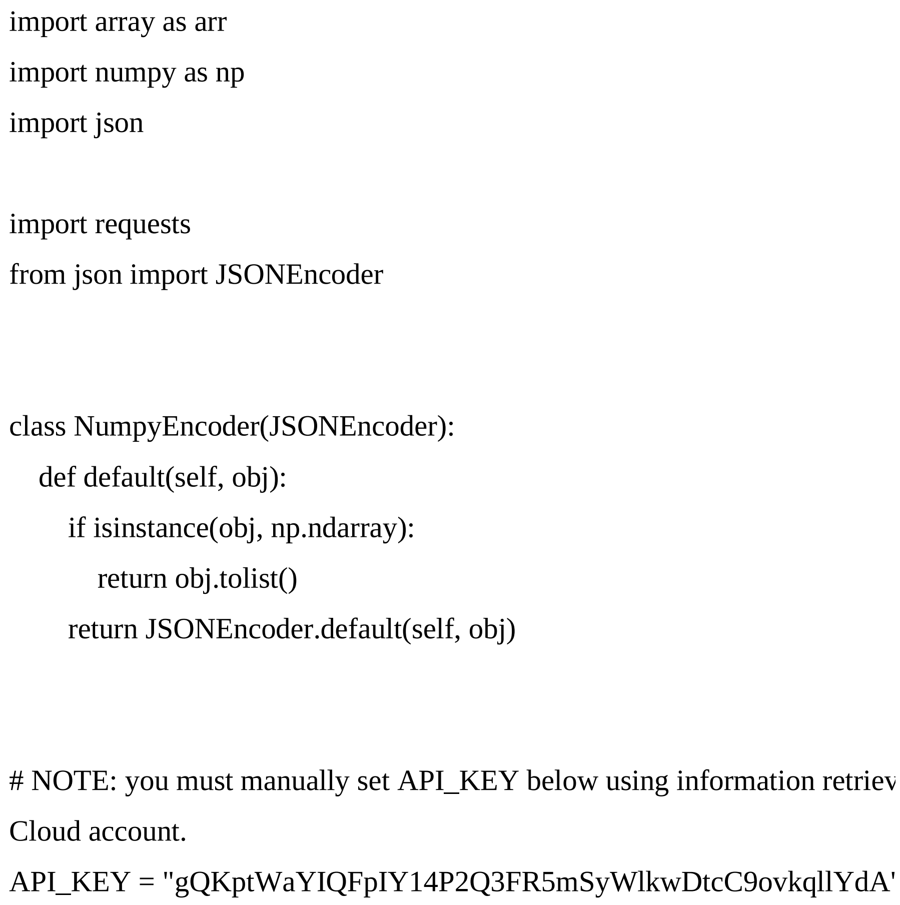
ii) main.py:-

```
import pandas as pd
    import plotly.express as px
    import matplotlib.pyplot as plt
    import seaborn as sns


    from sklearn.preprocessing import OneHotEncoder, StandardScaler
    from sklearn.model_selection import train_test_split
    from sklearn import metrics
    from sklearn.pipeline import make_pipeline
    from sklearn.ensemble import RandomForestRegressor


    import warnings
    warnings.filterwarnings('ignore')


    # Importing Raw Files
    train_raw = pd.read_csv('train.csv')
    test_raw = pd.read_csv('test.csv')
    meal = pd.read_csv('meal_info.csv')
    centerinfo = pd.read_csv('fulfilment_center_info.csv')
    # Analyzing Data
    print("The Shape of Demand dataset :", train_raw.shape)
    print("The Shape of Meal information dataset :", meal.shape)
print("The Shape of Test dataset :", test_raw.shape)
train_raw.head()
centerinfo.head()
meal.head()
test_raw.head()
# Check for missing values
train_raw.isnull().sum().sum()
test_raw.isnull().sum().sum()
# Analysis report
print("The company  has", centerinfo["center_id"].nunique(), " warehouse ",
"spreed into  ",
centerinfo["city_code"].nunique(), "City and ",
centerinfo["region_code"].nunique(), "Regions")
print("The products of the company are ", meal["meal_id"].nunique(),
"unique meals , divided into  ",
meal["category"].nunique(), "category and ", meal["cuisine"].nunique(),
"cuisine")
# Merge meal,center-info data with train and test data
train = pd.merge(train_raw, meal, on="meal_id", how="left")
train = pd.merge(train, centerinfo, on="center_id", how="left")
print("Shape of train data : ", train.shape)
train.head()
# Merge test data with meal and center info
test = pd.merge(test_raw, meal, on="meal_id", how="outer")
test = pd.merge(test, centerinfo, on="center_id", how="outer")
print("Shape of test data : ", test.shape)
test.head()
# Typecasting to assign appropriate data type to variables
col_names = ['center_id', 'meal_id', 'category', 'cuisine', 'city_code',
'region_code', 'center_type']
train[col_names] = train[col_names].astype('category')
test[col_names] = test[col_names].astype('category')
print("Train Datatype\n", train.dtypes)
print("Test Datatype\n", test.dtypes)
# Orders by centers
center_orders = train.groupby("center_id", as_index=False).sum()
center_orders = center_orders[["center_id",
"num_orders"]].sort_values(by="num_orders",
ascending=False).head(10)
fig = px.bar(x=center_orders["center_id"].astype("str"),
y=center_orders["num_orders"], title="Top 10
Centers by Order",
labels={"x": "center_id", "y": "num_orders"})
fig.show()
# Pie chart on food category
fig = px.pie(values=train["category"].value_counts(),
names=train["category"].unique(),
title="Most popular food category")
# Orders by Cuisine types
cuisine_orders = train.groupby(["cuisine"], as_index=False).sum()
cuisine_orders = cuisine_orders[["cuisine",
"num_orders"]].sort_values(by="num_orders",
ascending=False)
fig = px.bar(cuisine_orders, x="cuisine", y="num_orders", title="orders by
cuisine")
fig.show()
# Impact of check-out price on order
train_sample = train.sample(frac=0.2)
fig = px.scatter(train_sample, x="checkout_price", y="num_orders",
title="number of order change with
checkout price")
fig.show()
```

```
sns.boxplot(train["checkout_price"])
# Orders weekly trend
week_orders = train.groupby(["week"], as_index=False).sum()
week_orders = week_orders[["week", "num_orders"]]
fig = px.line(week_orders, x="week", y="num_orders", markers=True,
title="Order weekly trend")
fig.show()
# Deriving discount percent and discount y/n
train['discount percent'] = ((train['base_price'] - train['checkout_price']) /
train['base_price']) * 100
# Discount Y/N
train['discount y/n'] = [1 if x > 0 else 0 for x in (train['base_price'] -
train['checkout_price'])]
# Creating same feature in test dataset
test['discount percent'] = ((test['base_price'] - test['checkout_price']) /
test['base_price']) * 100
test['discount y/n'] = [1 if x > 0 else 0 for x in (test['base_price'] -
test['checkout_price'])]
train.head(2)
# Check for correlation between numeric features
plt.figure(figsize=(13, 13))
sns.heatmap(train.corr(), linewidths=.1, cmap='Reds', annot=True)
plt.title('Correlation Matrix')
plt.show()

# Define One hot encoding function
def one_hot_encode(features_to_encode, dataset):
encoder = OneHotEncoder(sparse=False)
encoder.fit(dataset[features_to_encode])
encoded_cols =
pd.DataFrame(encoder.transform(dataset[features_to_encode]),
columns=encoder.get_feature_names())
```

```
  dataset = dataset.drop(columns=features_to_encode)
      dataset[cols] = encoded_cols[cols]
   return dataset




# get list of categorical variables in data set
ls = train.select_dtypes(include='category').columns.values.tolist()
# Run one-hot encoding on all categorical variables
features_to_encode = ls
data = one_hot_encode(features_to_encode, train)
data = data.reset_index(drop=True)
# Train-Validation Data Split
y = data[["num_orders"]]
X = data.drop(["num_orders", "id", "base_price", "discount y/n"], axis=1)
X = X.replace((np.inf, -np.inf, np.nan), 0)  # replace nan and infinity values with 0
# 20% of train data is used for validation
X_train, X_val, y_train, y_val = train_test_split(X, y, test_size=0.20,
random_state=100)
# Prepare test data post applying onehot encoding
OH_test = one_hot_encode(features_to_encode, test)
test_final = OH_test.drop(["id", "base_price", "discount y/n"], axis=1)
# Create pipeline for scaling and modeling
RF_pipe = make_pipeline(StandardScaler(),
RandomForestRegressor(n_estimators=100, max_depth=7))
# Build Model
RF_pipe.fit(X_train, y_train)
# Predict Value
RF_train_y_pred = RF_pipe.predict(X_val)
# Model Evaluation-
print('R Square:', RF_pipe.score(X_val, y_val))
print('RMSLE:', 100 * np.sqrt(metrics.mean_squared_log_error(y_val,
RF_train_y_pred)))
# Applying algorithm to predict orders
test_y_pred = RF_pipe.predict(test_final)
Result = pd.DataFrame(test_y_pred)
print(Result.values)
Result = pd.DataFrame(test_y_pred)
Submission = pd.DataFrame(columns=['id', 'num_orders'])
Submission['id'] = test['id']
Submission['num_orders'] = Result.values
Submission.to_csv('My submission.csv', index=False)
print(Submission.shape)
print(Submission.head())
 for cols in encoded_cols.columns:
```

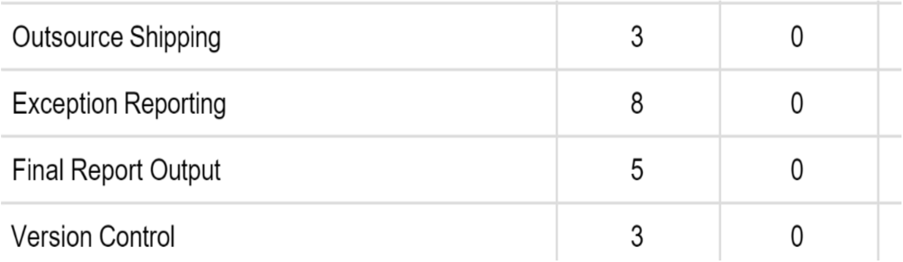
(iv) ibm.py:



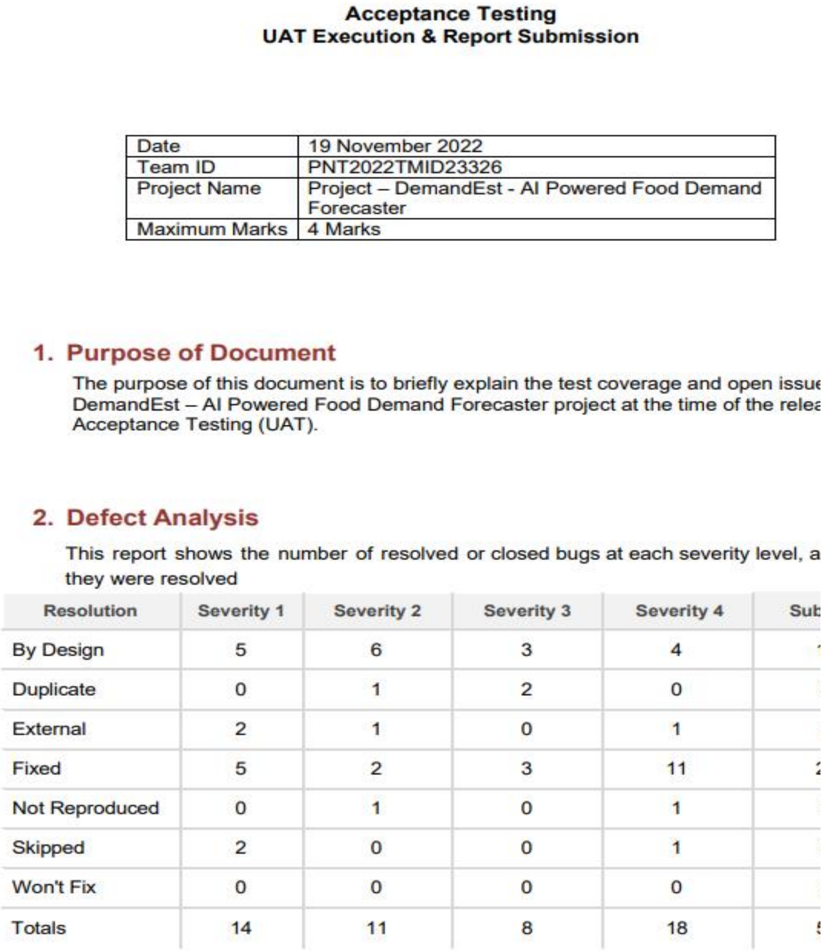
```
import array as arr
import numpy as np
import json

import requests
from json import JSONEncoder


class NumpyEncoder(JSONEncoder):
    def default(self, obj):
        if isinstance(obj, np.ndarray):
            return obj.tolist()
        return JSONEncoder.default(self, obj)


# NOTE: you must manually set API_KEY below using information retriev
Cloud account.
API_KEY = "gQKptWaYIQFpIY14P2Q3FR5mSyWlkwDtcC9ovkqllYdA'
```

```
token_response = requests.post('https://iam.cloud.ibm.com/identity/token',
                data={"apikey": API_KEY, "grant_type": 'urn:ibm:params:oauth:grant-
type:apikey'})
mltoken = token_response.json()["access_token"]

header = {'Content-Type': 'application/json',
     'Authorization': 'Bearer ' + mltoken}

values = np.ndarray([0, 0, 3, 1, 647, 56, 11])
print(values.shape)



# NOTE: manually define and pass the array(s) of values to be scored in the next line
# payload_scoring = json.dumps({"input_data": [{"fields": [['homepage_featured',
'emailer_for_promotion', 'op_area', 'cuisine', 'city_code', 'region_code', 'category']], "values": [[0,
0, 3, 1, 647, 56, 11], [1, 1, 2, 3, 600, 46, 19]]}]}, cls=NumpyEncoder)

payload_scoring = {"input_data": [{"field": [['homepage_featured', 'emailer_for_promotion',
'op_area', 'cuisine',
                        'city_code', 'region_code', 'category']], "values": [[0, 0, 3, 1, 647, 56,
11], [1, 1, 2, 3, 600, 46, 19]]}]}

print(type(payload_scoring['input_data'][0]))

response_scoring = requests.post(
  'https://us-south.ml.cloud.ibm.com/ml/v4/deployments/07706ceb-d908-4138-b5f8-
a649a9ad3f07/predictions?version=2022-11-24',
  json=payload_scoring,
  headers={'Authorization': 'Bearer ' + mltoken})



print("Scoring response")
predictions = response_scoring.json()
for i in predictions:
    print(i, predictions[i])
```

5.3 Reports from JIRA



Outsource Shipping	3	0
Exception Reporting	8	0
Final Report Output	5	0
Version Control	3	0



Acceptance Testing
UAT Execution & Report Submission

Date	19 November 2022
Team ID	PNT2022TMID23326
Project Name	Project – DemandEst - AI Powered Food Demand Forecaster
Maximum Marks	4 Marks

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issue DemandEst – AI Powered Food Demand Forecaster project at the time of the relea Acceptance Testing (UAT).

2. Defect Analysis

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

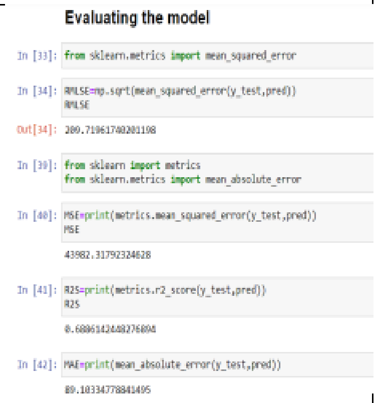
Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Sub
By Design	5	6	3	4	1
Duplicate	0	1	2	0	
External	2	1	0	1	
Fixed	5	2	3	11	2
Not Reproduced	0	1	0	1	
Skipped	2	0	0	1	
Won't Fix	0	0	0	0	
Totals	14	11	8	18	5

6 TESTING:

Project Development Phase
Model Performance Test

Date	16 November 2022
Team ID	PNT2022TMID23326
Project Name	Project – DemandEst-AI Powered Food Demand Forecaster
Maximum Marks	10 Marks

Model Performance Testing:

S.No.	Parameter	Values	Screenshot
1.	Metrics	**Regression Model:** MAE 89.10334778841495, MSE - 43129.82977026746, RMSLE - 207.67722496765856, R2 score - 0.6946496854280233,	 Evaluating the model In [33]: from sklearn.metrics import mean_squared_error In [34]: RMLSE=np.sqrt(mean_squared_error(y_test,pred)) RMLSE Out[34]: 209.71961740201198 In [39]: from sklearn import metrics from sklearn.metrics import mean_absolute_error In [40]: MSE=print(metrics.mean_squared_error(y_test,pred)) MSE 43982.31792324628 In [41]: R2S=print(metrics.r2_score(y_test,pred)) R2S 0.6886142448276894 In [42]: MAE=print(mean_absolute_error(y_test,pred)) 89.10334778841495

7. CODING & SOLUTIONING (Explain the features added in the project along with code)

a. Feature 1

```
   <!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Home</title>
    <link type="text/css" rel="stylesheet" href="/Flask/static/style.css">
    <link rel="preconnect" href="https://fonts.googleapis.com">
<link rel="preconnect" href="https://fonts.gstatic.com" crossorigin>
<link
href="https://fonts.googleapis.com/css2?family=Poppins:wght@200;300;400;600;800&display=
swap" rel="stylesheet">
<link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/6.0.0-
beta2/css/all.min.css">
<link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/6.0.0-
beta2/css/v4-shims.min.css">
<style>

*{
    margin: 0;
    padding: 0;
    font-family: 'Poppins', sans-serif;
}
.bar
{
margin: 0px;
padding: 15px;
background-color:rgb(64, 100, 246);
font-family:'Poppins',sans-serif;
font-size:25px;
}
a{
color:#fff;
float:right;
text-decoration:none;
padding-right:20px;
}
a:hover{
    padding: 3.5px;
    background: #FAAE42;
}

.text-box{
    width: 90%;
    color:rgba(51, 210, 249, 0.905);
    text-shadow: #0c0d0e;
    position:absolute;
    top: 45%;
    left: 50%;
    transform: translate(-50%,-50%);
    text-align: center;
}
.text-box h1{
    font-size: 70px;
    text-shadow: 2px 2px 40px #ffffff;
}
.text-box p{
    margin: 10px 0 40px;
    font-size: 25px;
    color: rgba(0, 0, 0, 0.946);
}
h2{
    color:red;
}
</style>
```

```
</head>
<body>
  <section class="header">
   <div class="bar">
       <a href="/pred">Predict</a>
       <a href="/home">Home</a>
   <br>
        </div>
      <div class="text-box">
       <h1>
           DemandEst - AI powered Food Demand Forecaster</h1>
       <h2>Everyday forecaster around the clock!</h2>

   </div>
  </section>
</body>
</html>
```

Upload.html:-

```
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Predict</title>
    <link rel="preconnect" href="https://fonts.googleapis.com">
<link rel="preconnect" href="https://fonts.gstatic.com" crossorigin>
<link
href="https://fonts.googleapis.com/css2?family=Poppins:wght@200;300;400;600;800&display=
swap" rel="stylesheet">
<link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/6.0.0-
beta2/css/all.min.css">

<style>
.bar
```

```
{
margin: 0px;
padding: 15px;
background-color:rgb(100, 5, 29);
/* opacity:0.6; */
font-family:'Poppins',sans-serif;
font-size:25px;
}
a
{
color:#fff;
float:right;
text-decoration:none;
padding-right:20px;
}
a:hover{
    padding: 3.5px;
    background: #FAAE42;

}
h1{
    color:rgb(100, 5, 29);
    font-family:Poppins;
    font-size:30
}
h2{
    color:rgb(100, 5, 29);
    font-family: Poppins;
    font-size:60;
    margin-bottom: 10px;

}
.my-cta-button{

    font-size: 20px;
    color: rgb(15, 15, 15);
    border: 1px solid #0e0e0ccf;
    padding: 3.5px;

    cursor: pointer;
}
.my-cta-button:hover{
    border: 2px solid #faae42;
    padding: 3.5px;
    background: #FAAE42;
}
p
{
color:white;
font-family: Poppins;
font-size:30px;
}
</style>
</head>

<body>
    <div class="bar">
      <a href="/pred">Predict</a>
      <a href="/home">Home</a>
     <br>
        </div>
    <div class="container">
            <center> <div id="content" style="margin-top:2em">
            <h2><center>Food Demand Forecasting</center></h2>
                 <form action="{{ url_for('predict') }}" method="POST">

     <select id="homepage_featured" name="homepage_featured">
      <option value="">homepage_featured</option>
         <option value="0">No</option>
         <option value="1">Yes</option>

       </select><br><br>
     <select id="emailer_for_promotion" name="emailer_for_promotion">
      <option value="">emailer_for_promotion</option>
```

```
        <option value="0">No</option>
        <option value="1">Yes</option>

      </select><br><br>



    <input class="form-input" type="text" name="op_area" placeholder="Enter the op_area(2-7)"><br><br>
    <select id="cuisine" name="cuisine">
    <option value="">Cuisine</option>
        <option value="0">Continental</option>
        <option value="1">Indian</option>
        <option value="2">Italian</option>
        <option value="3">Thai</option>

      </select><br><br>
      <input class="form-input" type="text" name="city_code" placeholder="Enter city_code"><br><br>
    <input class="form-input" type="text" name="region_code" placeholder="Enter region_code"><br><br>
    <select id="category" name="category">
    <option value="">Category</option>
        <option value="0">Beverages</option>
        <option value="1">Biryani</option>
        <option value="2">Desert</option>
        <option value="3">Extras</option>
        <option value="4">Fish</option>
        <option value="5">Other Snacks</option>
        <option value="6">Pasta</option>
        <option value="7">Pizza</option>
        <option value="8">Rice Bowl</option>
        <option value="9">Salad</option>
        <option value="10">Sandwich</option>
        <option value="11">Seafood</option>
        <option value="12">Soup</option>
        <option value="13">Starters</option>
      </select><br><br>
```

```
                    <input type="submit" class="my-cta-button" value="Predict">
                </form>

        <br>
         <h1 class="predict">Number of orders: {{ prediction_text }}</h1>
           </div></center>
        </div>
    </body>
</body>
```

App.py:

```
# import the necessary packages
import pandas as pd
import numpy as np
import pickle
import os
from flask import Flask, request, render_template
import sklearn

app = Flask(__name__, template_folder="templates")



@app.route('/', methods=['GET'])
def index():
    return render_template('home.html')



@app.route('/home', methods=['GET'])
def about():
    return render_template('home.html')



@app.route('/pred', methods=['GET'])
def page():
    return render_template('upload.html')
```

```
@app.route('/predict', methods=['GET', 'POST'])
def predict():
    print("[INFO] loading model...")
    model = pickle.load(open('fdemand.pkl', "rb"))
    input_features = [float(x) for x in request.form.values()]
    features_value = [np.array(input_features)]
    print(features_value)
    features_name = ['homepage_featured', 'emailer_for_promotion', 'op_area', 'cuisine',
                     'city_code', 'region_code', 'category']
    prediction = model.predict(features_value)
    output = prediction[0]
    print(output)
    return render_template('upload.html', prediction_text=output)


if __name__ == '__main__':
    app.run(debug=False)
```

Ibmapp.py:

```
# import the necessary packages
from flask import Flask, request, render_template
import pandas as pd
import numpy as np
import pickle
import os
import requests

# NOTE: you must manually set API_KEY below using information retrieved from your IBM Cloud account.
API_KEY = "gQKptWaYIQFpIY14P2Q3FR5mSyWlkwDtcC9ovkqllYdA"
token_response = requests.post('https://iam.cloud.ibm.com/identity/token',
                               data={"apikey": API_KEY, "grant_type": 'urn:ibm:params:oauth:grant-type:apikey'})
```

```
mltoken = token_response.json()["access_token"]

header = {'Content-Type': 'application/json',
          'Authorization': 'Bearer ' + mltoken}



app = Flask(__name__, template_folder="templates")



@app.route('/', methods=['GET'])
def index():
    return render_template('home.html')



@app.route('/home', methods=['GET'])
def about():
    return render_template('home.html')



@app.route('/pred', methods=['GET'])
def page():
    return render_template('upload.html')



@app.route('/predict', methods=['GET', 'POST'])
def predict():
    print("[INFO] loading model...")
    # model = pickle.load(open('fdemand.pkl', 'rb'))
    input_features = [int(x) for x in request.form.values()]
    print(input_features)
    features_value = [[np.array(input_features)]]
    print(features_value)

    payload_scoring = {"input_data": [{"field": [['homepage_featured', 'emailer_for_promotion',
'op_area', 'cuisine',
                                                  'city_code', 'region_code', 'category']],
                                       "values": [input_features]}]}
    response_scoring = requests.post(
        'https://us-south.ml.cloud.ibm.com/ml/v4/deployments/07706ceb-d908-4138-b5f8-
a649a9ad3f07/predictions?version=2022-11-24',
        json=payload_scoring, headers={'Authorization': 'Bearer ' + mltoken})
    print("Scoring response")
    print(response_scoring.json())
    predictions = response_scoring.json()
    print(predictions)
    print('Final Prediction Result',
          predictions['predictions'][0]['values'][0][0])
    pred = predictions['predictions'][0]['values'][0][0]

    # prediction = model.predict(features_value)
    # output=prediction[0]
    # print(output)
    print(pred)
    return render_template('upload.html', prediction_text=pred)


if __name__ == '__main__':
    app.run(debug=False)
```

main.py:

```
importnumpy
as np
        import pandas as pd



        import plotly.express as px
        import matplotlib.pyplot as plt
import seaborn as sns


from sklearn.preprocessing import OneHotEncoder, StandardScaler
from sklearn.model_selection import train_test_split
from sklearn import metrics
from sklearn.pipeline import make_pipeline
from sklearn.ensemble import RandomForestRegressor


import warnings
warnings.filterwarnings('ignore')


# Importing Raw Files
train_raw = pd.read_csv('train.csv')
test_raw = pd.read_csv('test.csv')
meal = pd.read_csv('meal_info.csv')
centerinfo = pd.read_csv('fulfilment_center_info.csv')
# Analyzing Data
print("The Shape of Demand dataset :", train_raw.shape)
print("The Shape of Fulfillment Center Information dataset :", centerinfo.shape)
print("The Shape of Meal information dataset :", meal.shape)
print("The Shape of Test dataset :", test_raw.shape)
train_raw.head()
centerinfo.head()
meal.head()
test_raw.head()
# Check for missing values
train_raw.isnull().sum().sum()
test_raw.isnull().sum().sum()
```

```
# Analysis report
print("The company  has", centerinfo["center_id"].nunique(), " warehouse ",
"spreed into  ",
centerinfo["city_code"].nunique(), "City and ",
centerinfo["region_code"].nunique(), "Regions")
print("The products of the company are ", meal["meal_id"].nunique(), "unique
meals , divided into  ",
meal["category"].nunique(), "category and ", meal["cuisine"].nunique(),
"cuisine")
# Merge meal,center-info data with train and test data
train = pd.merge(train_raw, meal, on="meal_id", how="left")
train = pd.merge(train, centerinfo, on="center_id", how="left")
print("Shape of train data : ", train.shape)
train.head()
# Merge test data with meal and center info
test = pd.merge(test_raw, meal, on="meal_id", how="outer")
test = pd.merge(test, centerinfo, on="center_id", how="outer")
print("Shape of test data : ", test.shape)
test.head()
# Typecasting to assign appropriate data type to variables
col_names = ['center_id', 'meal_id', 'category', 'cuisine', 'city_code',
'region_code', 'center_type']
train[col_names] = train[col_names].astype('category')
test[col_names] = test[col_names].astype('category')
print("Train Datatype\n", train.dtypes)
print("Test Datatype\n", test.dtypes)
# Orders by centers
  center_orders = train.groupby("center_id", as_index=False).sum()
  center_orders = center_orders[["center_id",
  "num_orders"]].sort_values(by="num_orders",
  ascending=False).head(10)
  fig = px.bar(x=center_orders["center_id"].astype("str"),
  y=center_orders["num_orders"], title="Top 10
  Centers by Order",
  labels={"x": "center_id", "y": "num_orders"})
  fig.show()
  # Pie chart on food category
  fig = px.pie(values=train["category"].value_counts(),
  names=train["category"].unique(),
  title="Most popular food category")
  fig.show()
```

```
# Orders by Cuisine types
cuisine_orders = train.groupby(["cuisine"], as_index=False).sum()
cuisine_orders = cuisine_orders[["cuisine",
"num_orders"]].sort_values(by="num_orders",
ascending=False)
fig = px.bar(cuisine_orders, x="cuisine", y="num_orders", title="orders by cuisine")
fig.show()
# Impact of check-out price on order
train_sample = train.sample(frac=0.2)
fig = px.scatter(train_sample, x="checkout_price", y="num_orders", title="number of
order change with
checkout price")
fig.show()
sns.boxplot(train["checkout_price"])
# Orders weekly trend
week_orders = train.groupby(["week"], as_index=False).sum()
week_orders = week_orders[["week", "num_orders"]]
fig = px.line(week_orders, x="week", y="num_orders", markers=True, title="Order
weekly trend")
fig.show()
# Deriving discount percent and discount y/n
train['discount percent'] = ((train['base_price'] - train['checkout_price']) /
train['base_price']) * 100
# Discount Y/N
train['discount y/n'] = [1 if x > 0 else 0 for x in (train['base_price'] -
train['checkout_price'])]
# Creating same feature in test dataset
test['discount percent'] = ((test['base_price'] - test['checkout_price']) / test['base_price'])
* 100
test['discount y/n'] = [1 if x > 0 else 0 for x in (test['base_price'] -
test['checkout_price'])]
train.head(2)
```

```
# Check for correlation between numeric features
plt.figure(figsize=(13, 13))
sns.heatmap(train.corr(), linewidths=.1, cmap='Reds', annot=True)
plt.title('Correlation Matrix')
plt.show()
```

```
# Define One hot encoding function
def one_hot_encode(features_to_encode, dataset):
    encoder = OneHotEncoder(sparse=False)
    encoder.fit(dataset[features_to_encode])
    encoded_cols = pd.DataFrame(encoder.transform(dataset[features_to_encode]),
columns=encoder.get_feature_names())
    dataset = dataset.drop(columns=features_to_encode)
    dataset[cols] = encoded_cols[cols]
    return dataset
```

```
    # get list of categorical variables in data set
     ls = train.select_dtypes(include='category').columns.values.tolist()
     # Run one-hot encoding on all categorical variables
     features_to_encode = ls
     data = one_hot_encode(features_to_encode, train)
     data = data.reset_index(drop=True)
     # Train-Validation Data Split
     y = data[["num_orders"]]
     X = data.drop(["num_orders", "id", "base_price", "discount y/n"], axis=1)
     X = X.replace((np.inf, -np.inf, np.nan), 0)  # replace nan and infinity values with 0
     # 20% of train data is used for validation
     X_train, X_val, y_train, y_val = train_test_split(X, y, test_size=0.20,
               random_state=100)
     # Prepare test data post applying onehot encoding
```

```
OH_test = one_hot_encode(features_to_encode, test)
test_final = OH_test.drop(["id", "base_price", "discount y/n"], axis=1)
# Create pipeline for scaling and modeling
RF_pipe = make_pipeline(StandardScaler(),
        RandomForestRegressor(n_estimators=100, max_depth=7))
# Build Model
RF_pipe.fit(X_train, y_train)
# Predict Value
RF_train_y_pred = RF_pipe.predict(X_val)
# Model Evaluation-
print('R Square:', RF_pipe.score(X_val, y_val))
print('RMSLE:', 100 * np.sqrt(metrics.mean_squared_log_error(y_val,
        RF_train_y_pred)))
# Applying algorithm to predict orders
test_y_pred = RF_pipe.predict(test_final)
Result = pd.DataFrame(test_y_pred)
print(Result.values)
Result = pd.DataFrame(test_y_pred)
Submission = pd.DataFrame(columns=['id', 'num_orders'])
Submission['id'] = test['id']
Submission['num_orders'] = Result.values
Submission.to_csv('My submission.csv', index=False)
print(Submission.shape)
print(Submission.head())
```

RESULTS

a. Performance Metrics – he evaluation metric for this competition is 100*RMSLE where RMSLE is Root of Mean Squared Logarithmic Error across all entries in the test set where our accuracy 92% , rsme – 0.8934\

8. ADVANTAGES & DISADVANTAGES

ADVANTAGE:

- In supply chain networks, demand forecasting with the aid of AI-based techniques cancut errors by 30 to 50 percent. By implementing these approaches, organisations may be able to forecast accurately at all levels.

DIS-ADVANTAGE:

- Not every situation can be predicted

9. CONCLUSION

Therefore, this complete representation shows the progress on the topic in an systematicallyview .This implementation along with several code has separate topics to evolve around for the best outcome as a report.

10. FUTURE SCOPE

Predictions , availability, Scalability , Demand , everything will be followed on a correctprocedure .

11.APPENDIX :

https://github.com/IBM-EPBL/IBM-Project-23057-1659865341