Food Demand Forecasting For Food Delivery Company Using IBM Cloud

1 INTRODUCTION

1.1 Overview

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

Using IBM Watson Studio, we automate all of the tasks involved in building predictive models for different requirements. You see how IBM Watson studio generates great models quickly, which saves time and effort, and aids in a faster decision-making process. You create a model from a data set that includes the id,week,center_id,meal_id,checkout_price,base_price,email_for_promotion,homepage_featred,num_orders to predict the demand for the next 10 weeks. In this application.

The main aim of this project is to create an appropriate machine learning model to forecast then 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

Demand Forecasting is a process by which an individual or entity predicts the how much the consumer or customer would be willing to buy the product or use the service. Without Proper Demand forecasting it becomes impossible for any business to function. Improper Demand forecasting. would result in heavy loss. Different industry or company has different methods to predict the demands. In case of food industry, it is at most important that the demand needs to be on bulls' eye since the food materials gets perished easily and has the fixed time frame to be used. So, the daily and weekly demand needs to be precise to avoid wastage which would otherwise increase the operating cost.

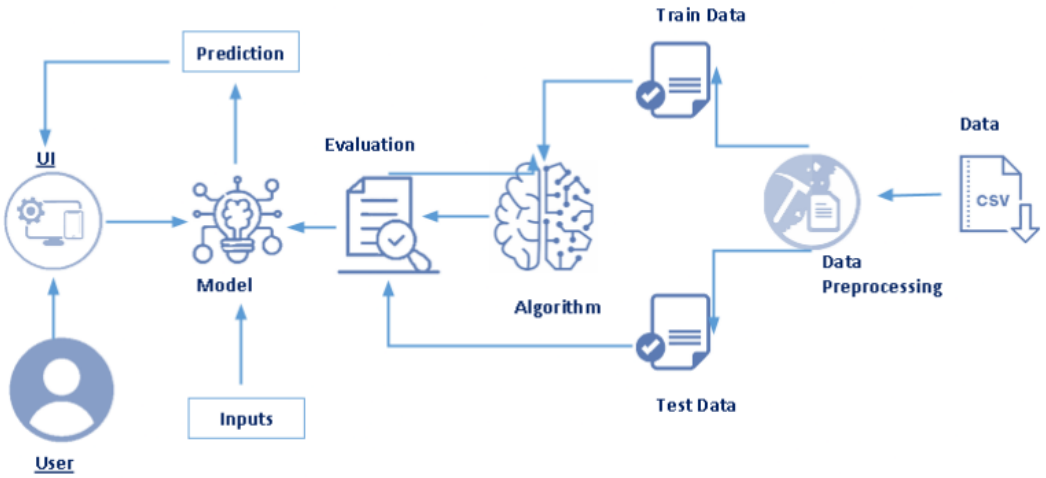
The replenishment of majority of raw materials is done on weekly basis and since the raw material is perishable, the procurement planning is of utmost importance. Secondly, staffing of the centers is also one area wherein accurate demand forecasts are really helpful. This is done through manual process.
The replenishment of raw materials is done only on weekly basis and since the raw material is perishable, the procurement planning is of utmost importance. Therefore predicting the Demand helps in reducing the wastage of raw materials which would result in the reduced cost of operation. Increased customer satisfaction by timely fulfilling their expectations and requirements.

2.2 Proposed solution

Given the following information, the task is to predict the demand for the next 10 weeks (Weeks: 146-155) for the center-meal combinations in the test set using machine learning model.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. Secondly, staffing of the centers is also one area wherein accurate demand forecasts are really helpful. This is done through manual process. The main aim of this project is to create an appropriate machine learning model to forecast then 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.

3 THEORITICAL ANALYSIS

3.1 Block diagram

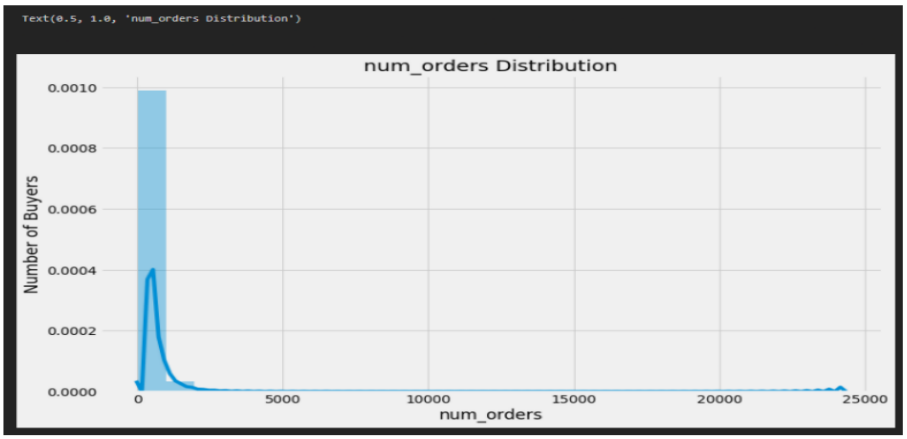


3.2 Hardware / Software designing

- Anaconda.
- Jupyter notebook.
- Spyder IDE.
- Numpy.
- Pandas.

- Matplotlib.
- Seaborn.
- Sklearn/Scikit-learn.
- Flask..

4 EXPERIMENTAL INVESTIGATIONS

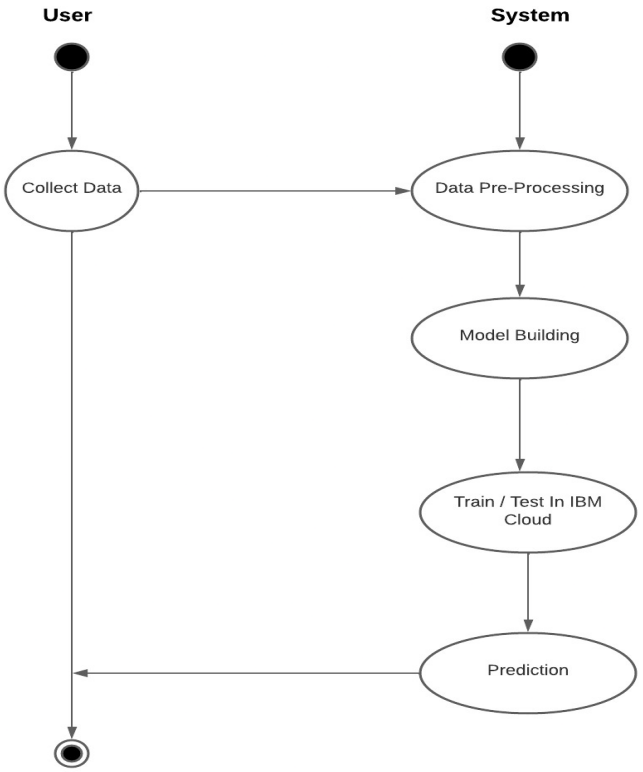


5 FLOWCHART

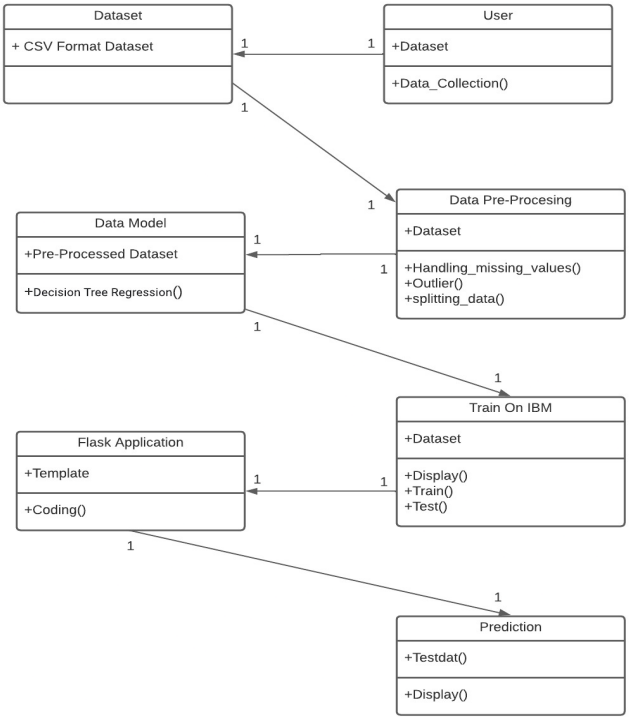
Project Work Flow:

- The user interacts with the UI (User Interface) to upload the input features.
- Uploaded features/input is analyzed by the model which is integrated.
- Once the model analyses the uploaded inputs, the prediction is showcased on the UI.

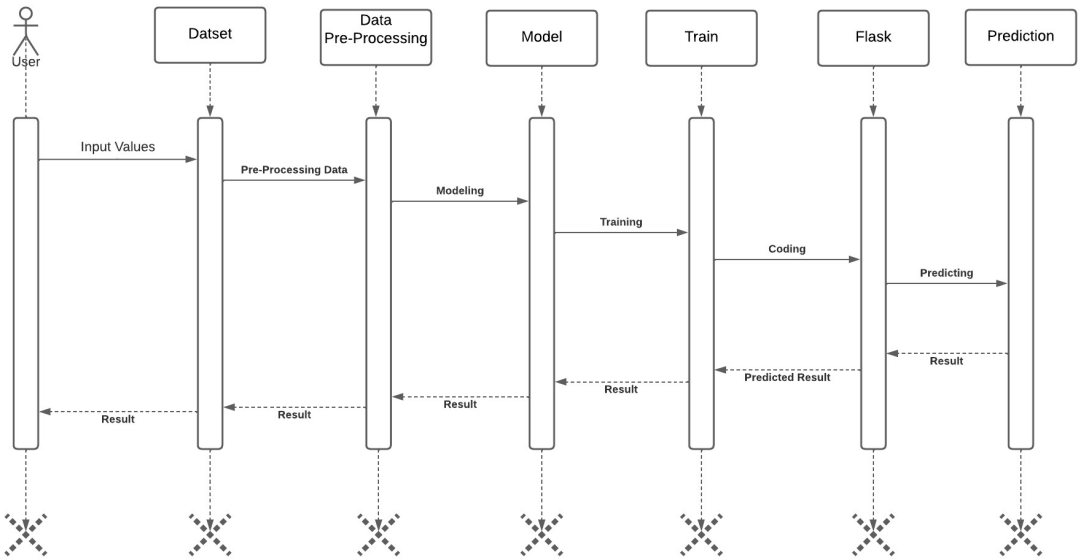
Activity Diagram



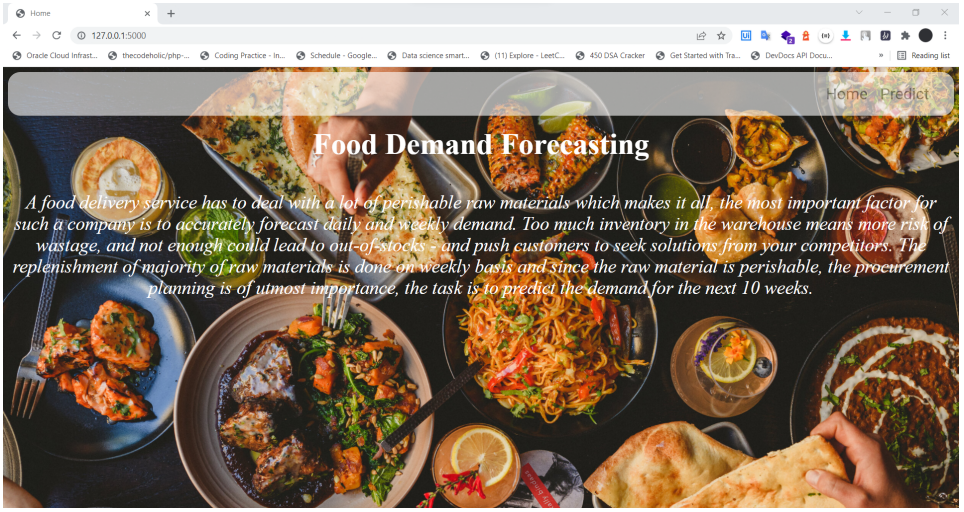
Class Diagram

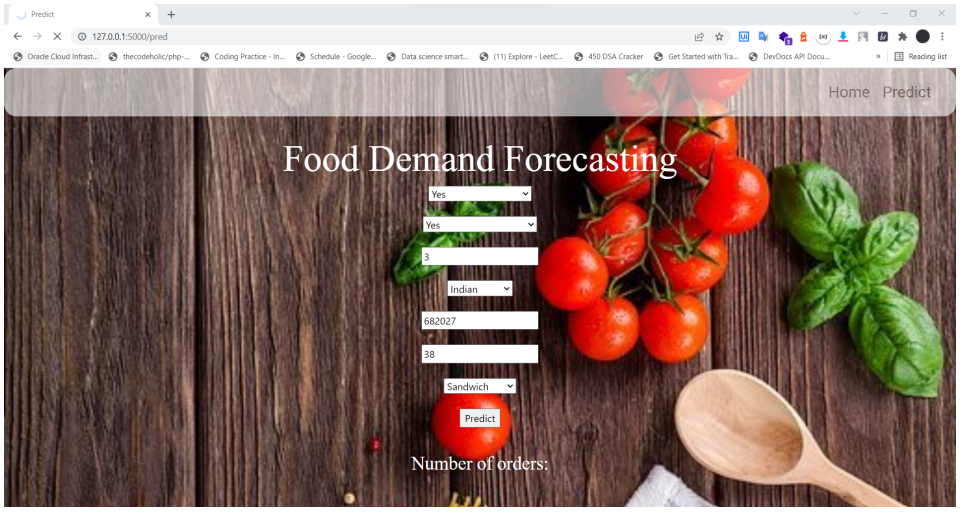


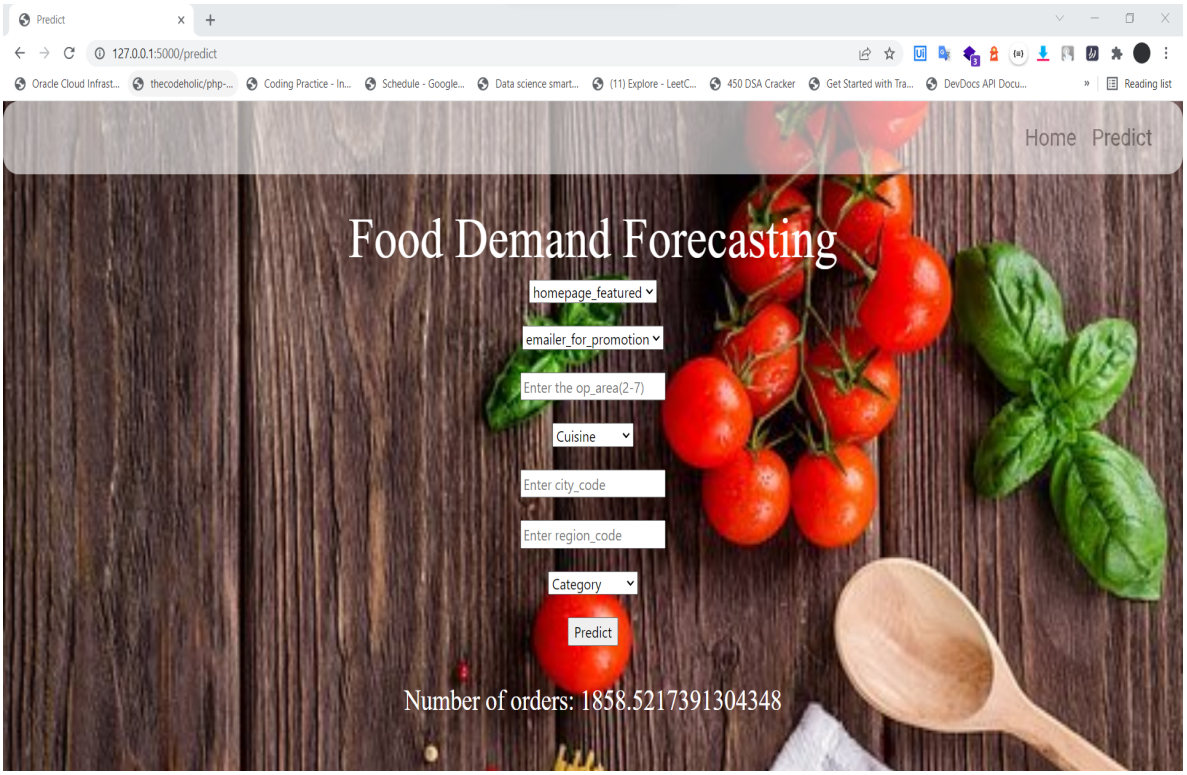
Sequence Diagram



6 RESULT







7 ADVANTAGES & DISADVANTAGES

7.1 Advantages

●Food demand forecasting for meal delivery company
●Helps reduce risks and make efficient financial decisions that impact profit margins
● cash flow
●allocation of resources
●opportunities for expansion
●Helps inventory accounting
●Helps operating costs and overall spend

7.2 Disadvantages
●Forecasts are never 100% accurate
●It can be time-consuming and resource-intensive
●It can also be costly

8 APPLICATIONS
While it might seem like more paperwork to determine something you're going to find out anyway, don't underestimate the importance of demand forecasting as it can save your company money and increase your profits. Many small business owners mistakenly believe that an annual budget that projects revenues is comparable to projecting demand. But a more thorough analysis of the market will help determine the timing of sales, which can help you better plan production, financing, labor and marketin

9 CONCLUSION

The largest benefit of food demand forecasting is the reduction of inventory, or food waste in the restaurant industry. Food is the highest cost for a restaurant, especially perishable food with a low shelf life. Therefore, reducing food waste has a large environmental and monetary effect for a given restaurant.

10 FUTURE SCOPE

While machine learning artificial intelligence may be seen as a data-hungry machine, the crucial aspect of a successful AI system that manages a succeful food demand forecasting machine and its ability to develop efficient reasoning and intuitively read and understand trends. So in the future we can add more parameters to predict and analyze the food demand easily.

11 BIBILOGRAPHY

●https://www.kaggle.com/datasets/kannanaikkal/food-demand-forecasting/discussion

APPENDIX
A.Git hub project link :

https://github.com/smartinternz02/SI-GuidedProject-6843-1638867881/tree/main/Food-Demand-Forecasting-main

B. Source Code

```
# -*- coding: utf-8 -*-

"""


@author: ajmal johnson

"""


# import the necessary packages

import pandas as pd

import numpy as np

import pickle

import os

from flask import Flask,request, render_template

import requests


# NOTE: you must manually set API_KEY below using information retrieved from your IBM Cloud account.

API_KEY = "MzTQWbyYQCgsad3xi9jal1QRs3pwGDSZt4OTz54OKsoU"

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}


# NOTE: manually define and pass the array(s) of values to be scored in the next line

#payload_scoring = {"input_data": [{"fields": [array_of_input_fields], "values": [array_of_values_to_be_scored, another_array_of_values_to_be_scored]}]}
```

```
#response_scoring = requests.post('https://eu-gb.ml.cloud.ibm.com/ml/v4/deployments/5648348a-0e2d-4935-b38e-b3523e07fb54/predictions?version=2022-03-05', json=payload_scoring, headers={'Authorization': 'Bearer ' + mltoken})

#print("Scoring response")

#print(response_scoring.json())



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)

        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/fceca4bb-5665-47f6-bb69-0d9
1eb60e1b4/predictions?version=2021-11-17',  json=payload_scoring,  headers={'Authorization':
'Bearer ' + mltoken})

   print("Scoring response")

   print(response_scoring.json())

   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)
```