DemandEst - AI powered Food Demand Forecaster

Project Id: PNT2022TMID03324

1.INTRODUCTION

A response to demand volatility is demand forecasting using Artificial Intelligence. Traditionally, demand forecasting is a form of predictive analytics, where the process of estimating customer Using demand is analysed using historical data .Typically, organisations use this form of AI to avoid inefficiencies caused by misalignment of demand and supply throughout the operational process. Honestly, this will never be 100% accurate . Yet it can offer companies the opportunity to significantly reduce supply chain costs and make improvements in financial planning, workforce planning, profit margins and risk assessment decisions.

1.1 PROJECT OVERVIEW

One of the biggest challenges for business executives today is demand volatility in relation to demand forecasting. Whereas data availability continues to increase, customer purchase patterns are becoming increasingly complex, and therefore harder to detect or predict There are too many factors influencing demand, ranging from weather fluctuations to posts by social media influencers, causing customers to frequently changing their minds. Traditional Forecasts are only as accurate as the data, models, resources and people that have to interpret them .

1.2 PURPOSE

Better forecasts will be made over time as machine learning algorithms learn from existing data. When products are ‘out of stock’, this will decrease customer satisfaction, whereas customer satisfaction will increase when products are always available. This improves customer loyalty and brand perceptionDemand forecasting can support the HR department in making efficient considerations between full-time or part-time staff mix, thus optimising HR costs and effectiveness.Cash-in-stock is a common situation for retail companies, where products remain unsold for a longer period than expected. This often causes higher expected inventory costs and the risk of products becoming obsolete and losing value. In this scenario, products are sold at lower selling prices. With demand forecasting, this scenario can be minimised

2. LITERATURE SURVEY

S.NO	AUTHOR	ABSTRACT
1.	Claudimar Pereira Da Veiga,cassia Rita Pereira Da veiga.	This paper concluded that the HWmodel Performs better than ARIMA
2.	Elcio Tarallo,getulio K.Akabane,Camilo I. Shimabukuro.	This paper uses a Support vector machine to Improve the sales management effectiveness Of computing products that are highly replacable and subject to dramatic changes in demad.
3.	N.de P.Barbosa,E.da S.Christo,and K.A.Costa.	The forecasts are evaluated using the error measure MAPE and compared to the demand Forecasting method.
4.	Takashi Tanizaki,tomohiro Hoshinoa,Takeshi Takenaka.	In this paper ,demand forecasting in restaurants using machine learning is proposed.
5.	Jakob Huber a,Alexander Gossman, Heiner Stucknesschmidt.	It uses multivariate ARIMA model to forecast the daily demand to support operational decisions.
6.	Ishtiyaq Otudi, Abdulaziz Almaktoom	There are multiple models such as Naïve approach,moving average,weighted moving And exponential smoothing.
7.	Emily J.Filesa,Barry W.Brooka,Linus Blomqvist.	Inded,time serious and simple income based Model often make similar predictions to Integrated assesments.

2.1 REFERENCE

- C. Waterfield

  Disaggregating food consumption parameters: designing targeted nutritional interventions

- H. Bouis *et al.*

  Does it matter how we survey demand for food? Evidence from Kenya and the Philippines

- H. Alderman

  Estimates of consumer price response in Pakistan using market prices as data
  Pakistan Development Review

- J. Behrman

  Household behavior, preschool child health and nutrition, and the role of information

  H. Bouis *et al.*

  Are estimates of calorie-income elasticities too high?: A recalibration of the plausible range

  Journal of Development Economics

2.2 EXISTING PROBLEM

The World Bank Group and the G7 Presidency co-convened Global Alliance for Food Security, which aims to catalyze an immediate and concerted response to the unfolding global hunger crisis. The Alliance has developed the publicly accessible Global Food and Nutrition Security Dashboard, which provides

timely information for global and local decision-makers to help improve coordination of the policy and financial response to the food crisis.

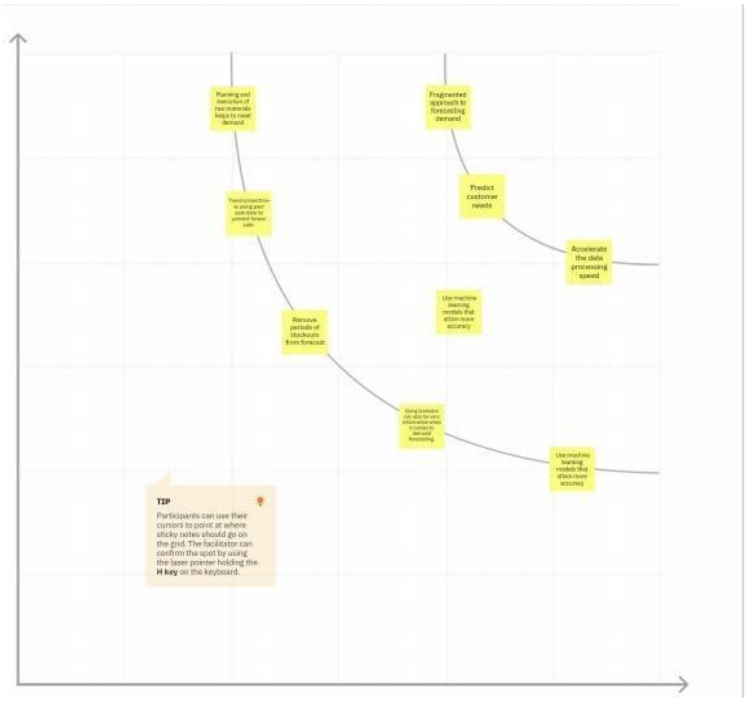
2.3 PROBLEM STATEMENT DEFINITION

problem of unreliable data on production and unrecorded trade is unavoidable, but may be serious for many of the most food insecure. The countries in sub-Saharan Africa. The current crisis in Southern Africa highlights this issue. Malawi appears to have been one of the twelve best-performing countries since the early 1990s in improving food security. However, there is currently much debate about the reliability of food production data, particularly for roots and tubers in this country. Trends for countries in which these are important staples, especially in subsistence, and comparisons between these and other countries are a source of ambiguity.

3.IDEATION AND PROPOSED SOLUTION

S.NO	PARAMETER	DESCRIPTION
• 1.	• Social impact	• Improvement in sales of the business • Analysing and understanding the demand for raw materials
2.	Business model	• Data analytics • Statistic • Future predication
3.	Scalability of the solution	The model is scalable from the architecture and data set training perspective.

3.1 Ideation and brainstorming



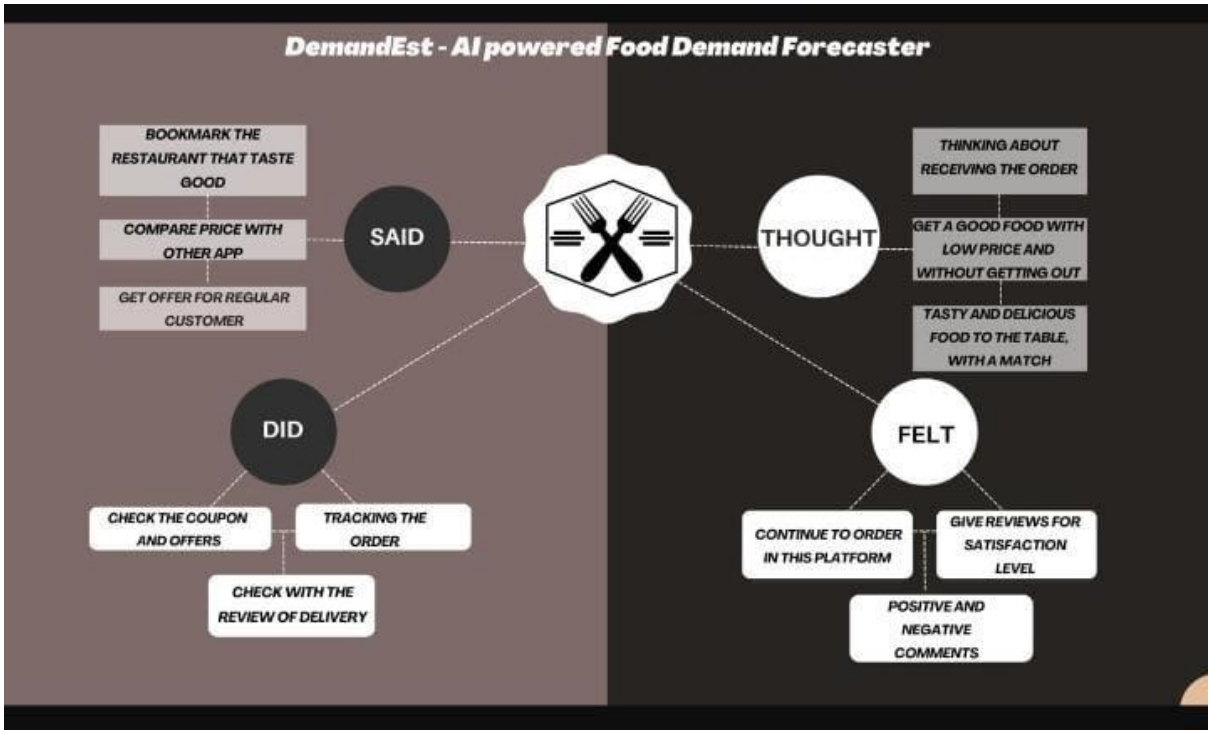
3.2 PROBLEM SOLUTION FIT

WHO IS YOUR CUSTOMER ? Different manufacturers Restaurant owners	EXPLORE LIMITATIONS TO BUY/USE YOUR PRODUCT OR SERVICE Price services or products Create and implement growth strategies	HOW ARE YOU GOING TO DIFFERENT THAN COMPETITION First father than focusing on other's we must improve ourse ves By implementing innovative ideas which is not used by
FOCUS ON FREQUENT,COSTLY OR URGENT PROBLEM TO SOLVE Have alternative solutions for the same problem Discuss with subordinates for different	. UNDERSTAND THE CAUSE OF THE PROBLEM Price change Change in customer preference	TAP INTO,RESEMBLE OR SUPPORT EXISTING BEHAVIOR Make better supply decisions See your market potential
DESIGN TRIGGERS THAT FIT REAL LIFE,SPARK ASSOCIATIONS,MAKE IT FAMILIAR Optimize inventory ADD EMOTIONS FOR STRONGER MESSAGE Thint in behalf of customer's place(empathy)	YOUR "DOWN TO EARTH" SOLUTION GUESS Ask help when it is needed Help small business to grow by buying raw materials	BE WHERE YOUR CUSTOMER ARE Analyse the customer requirements and specification If customer's Requirements are unsatisfiable then give them idea of other requirements

3.3 PROPOSED SOLUTION

S.No.	Parameter	Description
1	Problem Statement (Problem to be solved)	Your client is a meal delivery company which operates in multiple cities. They have various fulfillment centres in these cities for dispatching meal orders to their customers. The client wants you to help these centres with demand forecasting for upcoming weeks so that these centres will plan the stock of raw materials accordingly. 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 centres is also one area wherein accurate demand forecasts are really helpful.
2	Idea / Solution description	The data set is related to a meal delivery company which operates in multiple cities. They have various fulfilment centres in these cities for dispatching meal orders to their customers. The dataset consists of historical data of demand for a product-centre combination for weeks 1 to 145.With the given data and information, the task isto predict the demand for the next 10 weeks(Weeks: 146-155) for the centre-meal combinations, so that these fulfilment centres stock the necessary raw materials accordingly.
3	Novelty / Uniqueness	As an alternative to the traditional demand forecast format, there are opportunities to use market and AI data to assist managers in the S&OP (Sales & Operations Planning) process, as well as in the S&OE (Sales and Operations Execution) process. During the S&OP process, demand forecasting supported by AI facilitates the work of the marketing and sales areas, as well as reducing uncertainty .

3.4 EMPATHY MAP CANVAS



4. REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENT

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIn
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Executive administration	Regulation of monitoring the water environment status and regulatory compliance like pollution event emergency management, and it includes two different

		functions: early warning/forecast monitoring.
FR-4	Data handling	File contains water quality metrics for different water bodies.
FR-5	Quality analysis	Analyze with the acquired information of the water across various water quality indicator like (PH, Turbidity, TDS, Temperature) using different models.
FR-6	Model prediction	Confirming based on water quality index and shows the machine learning prediction (Good, Partially Good, Poor) with the percentage of presence of various parameter.
FR-7	Remote Visualization	Visualization through charts based on present and past values of all the parameter for future forecast.
FR-8	Notification services	Confirming through notification of water status prediction with parameter presence along with timestamp.

4.2 NON- FUNCTIONAL REQUIREMENT

FR No.	**Non-Functional Requirement**	**Description**
NFR-1	**Usability**	The system provides a natural interaction with the users. Accurate water quality prediction with short time analysis and provide prediction safe to drink or not using some parameters and provide a great significance for water environment protection.
NFR-2	**Security**	The model enables with the high security system as the user's data will not be shared to the other

		sources. The system is protected with the user name and password throughout the process.

NFR-3	**Reliability**	The system is very reliable as it can last for long period of time when it is well maintained. The model can be extended in large scale by increasing the datasets.
NFR-4	**Performance**	Our system should run on 32 bit (x86) or 64 bit (x64) Dual-core 2.66-GHZ or faster processor. It should not exceed 2 GB RAM.
NFR-5	**Availability**	The system should be available for the duration of the user access the system until the user terminate the access. The system response to request of the user in less time and the recovery is done is less time.
NFR-6	**Scalability**	It provides an efficient outcome and has the ability to increase or decrease the performance of the system based on the datasets.

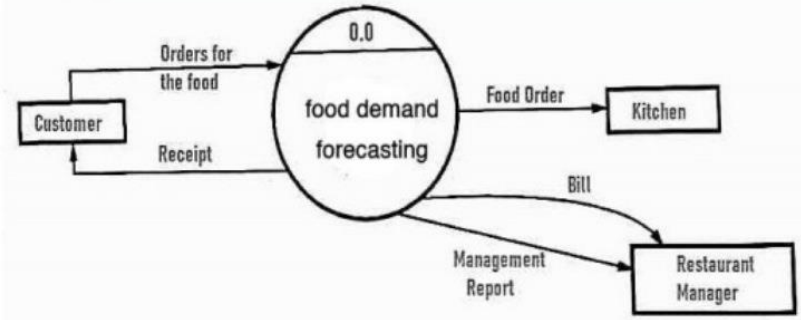
5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS

Project Design Phase 2

Data Flow Diagram

Date	15 October 2022
Team ID	PNT2022TMID03324
Project Name	DemandEst-AI Powered Food Demand Forecaster
Maximum Marks	4 Marks



Level 0 DFD (Context Level

5.2 SOLUTION & TECHNICAL ARCHITECTURE

Technology Stack (Architecture & Stack)

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Technical Architecture:

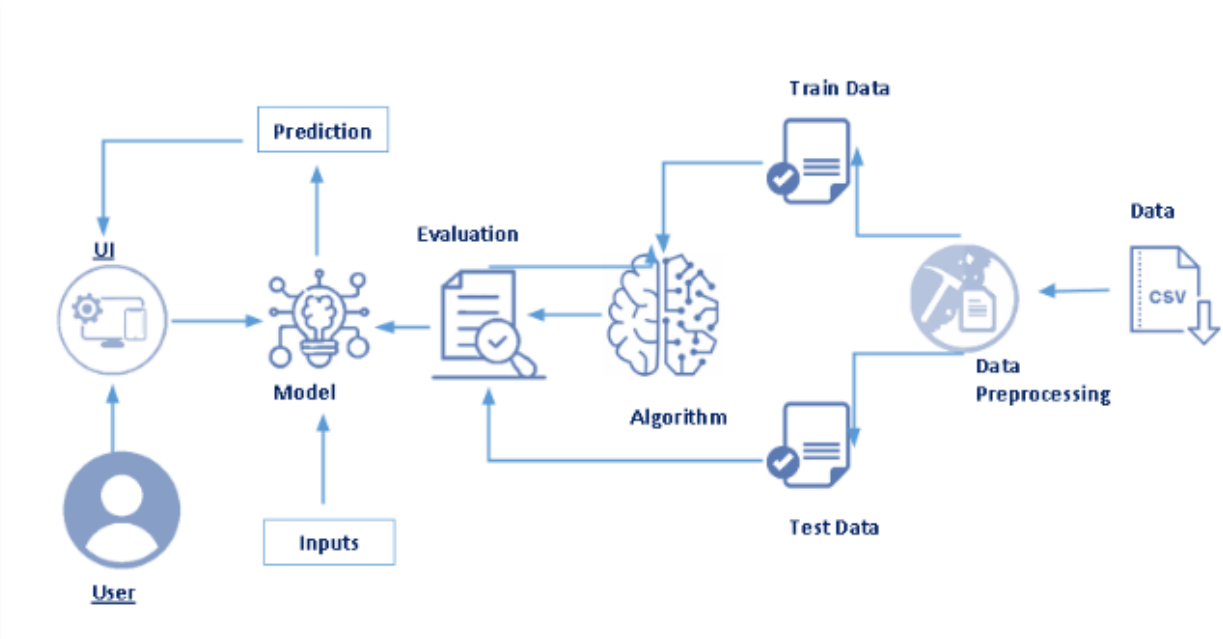


Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	The user interface (UI) is the point of human-computer interaction and communication in a device	HTML, CSS, JavaScript, React JS
2.	Application Logic-2	To provide the train for the developed application using the dataset and to provide interaction between web app and the python codes.	IBM Watson STT service
3.	Application Logic-1	Google Collab is used for coding in the development of application.	Python
4.	Database	The database is used for storing the history of the client requirement and the services provided b the web app	MySQL
5.	Cloud Database	Database Service on Cloud for accessing the database whenever it is needed.	IBM DB2
6.	File Storage	File storage requirements	IBM Block Storage or Local Filesystem
7.	Machine Learning Model	Fueled by data, machine learning (ML) models are the mathematical engines of artificial intelligence.	Cross-sectional forecasting, Statistical analysis.

8.	Infrastructure (Server / Cloud)	Application Deployment on Local System	Local

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Open source software is different. Its authors make its source code available to others who would like to view that code, copy it, learn from it, alter it, or share it.	Anaconda, IBM
2.	Security Implementations	Software security is the concept of implementing mechanisms in the construction of security to help it remain functional (or resistant) to attacks.	OWASP, Firewall
3.	Scalable Architecture	Scalability is the property of a system to handle a growing amount of work by adding resources to the system.	Cloud based product like IBM Cloud
4.	Availability	Demand forecasting allows businesses to optimize inventory by predicting future sales. By analysing historical sales data, demand managers can make informed business decisions	Statistical Analysis
5.	Performance	Application	React JS

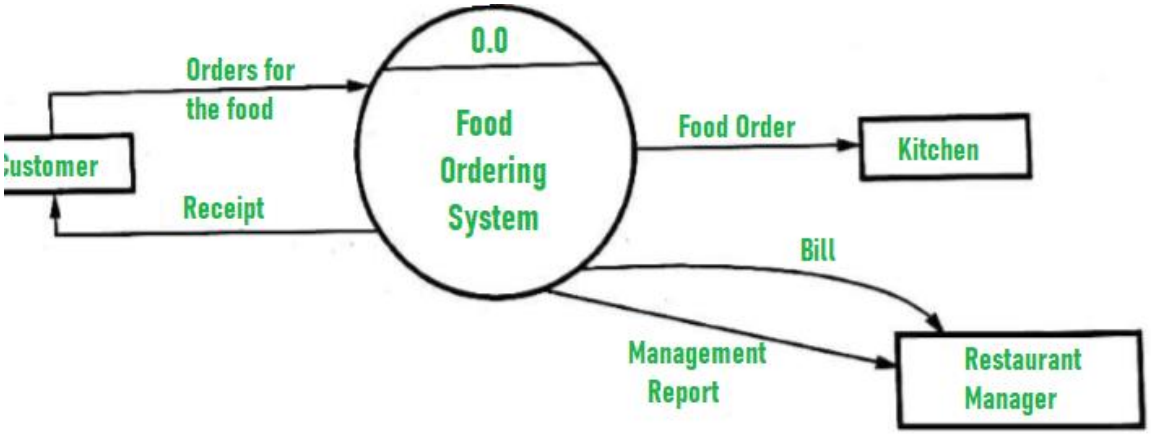
S.No	Characteristics	Description	Technology
		performance indicates how the app is functioning and how responsive the app is to the end-user.	

5.3 USER STORIES

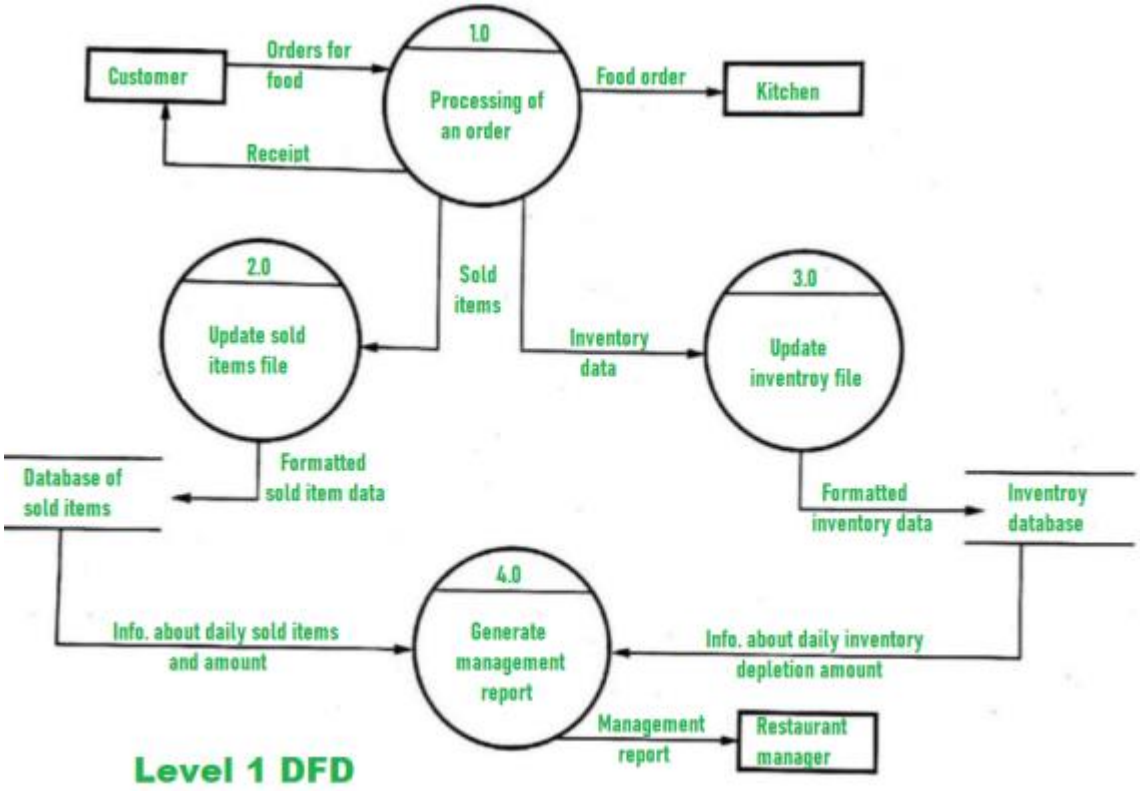
User Stories For DemandEst

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

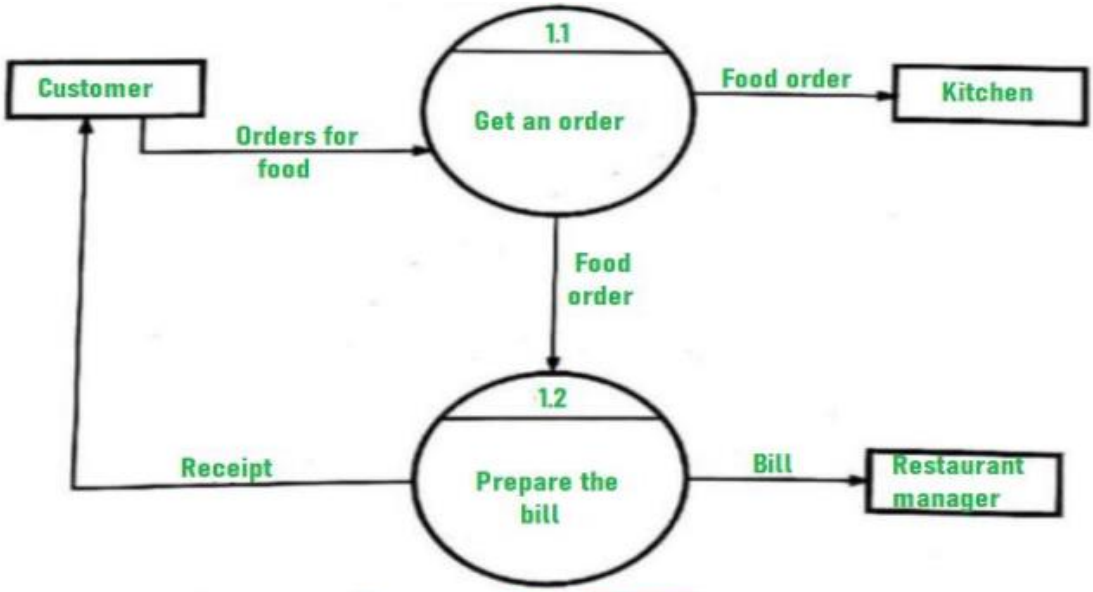
User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
				provided through web application.		
Customer Care Executive	Support	USN-9	As a user I can get support from the help desk and can get my queries cleared.	I can get guidance and any support 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



Level 0 DFD (Context Level



Level 1 DFD


1.1
Get an order
Customer
Orders for food
Food order
Kitchen
Food order
1.2
Prepare the bill
Receipt
Bill
Restaurant manager

Level 2 DFD

6. PROJECT PLANNING & SCHEDULING

6.1 SPRINT PLANNING & ESTIMATION

Project Planning Phase

Project Planning Template (Product Backlog, Sprint Planning, Stories, Story points)

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Project Tracker, Velocity & Burndown Chart: (4 Marks)

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

Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

Average velocity of sprint-1: AV = 20/6 = 3.33
Average velocity of sprint-2: AV = 20/6 = 3.33
Average velocity of sprint-3: AV = 20/6 = 3.33
Average velocity of sprint-4: AV = 20/6 = 3.33

6.2 SPRINT DELIVERY SCHEDULE

Creation, Release, Observing, and Adjustments

After the forecast is calculated, it is the schedule assignment stage where the OMs may need tocreate the Scheduled Hours slots. This process which is presented in Figure 14 is one of theapproaches to ensure the forecasted demands have sufficient courier supply and be planned outaccordingly. Some OMs may use less scheduled supply assignments to the couriers and use otherapproaches, e.g., surge pricing, bonus fee, where they see fit in their country. Then, the schedulesare released to the couriers to book the available slots via the Courier App. The last part is to observe the booked schedule and any alarming events that may impact the supply for the forecasted order number. The OMs need to ensure that the operation can run smoothly for all those order.

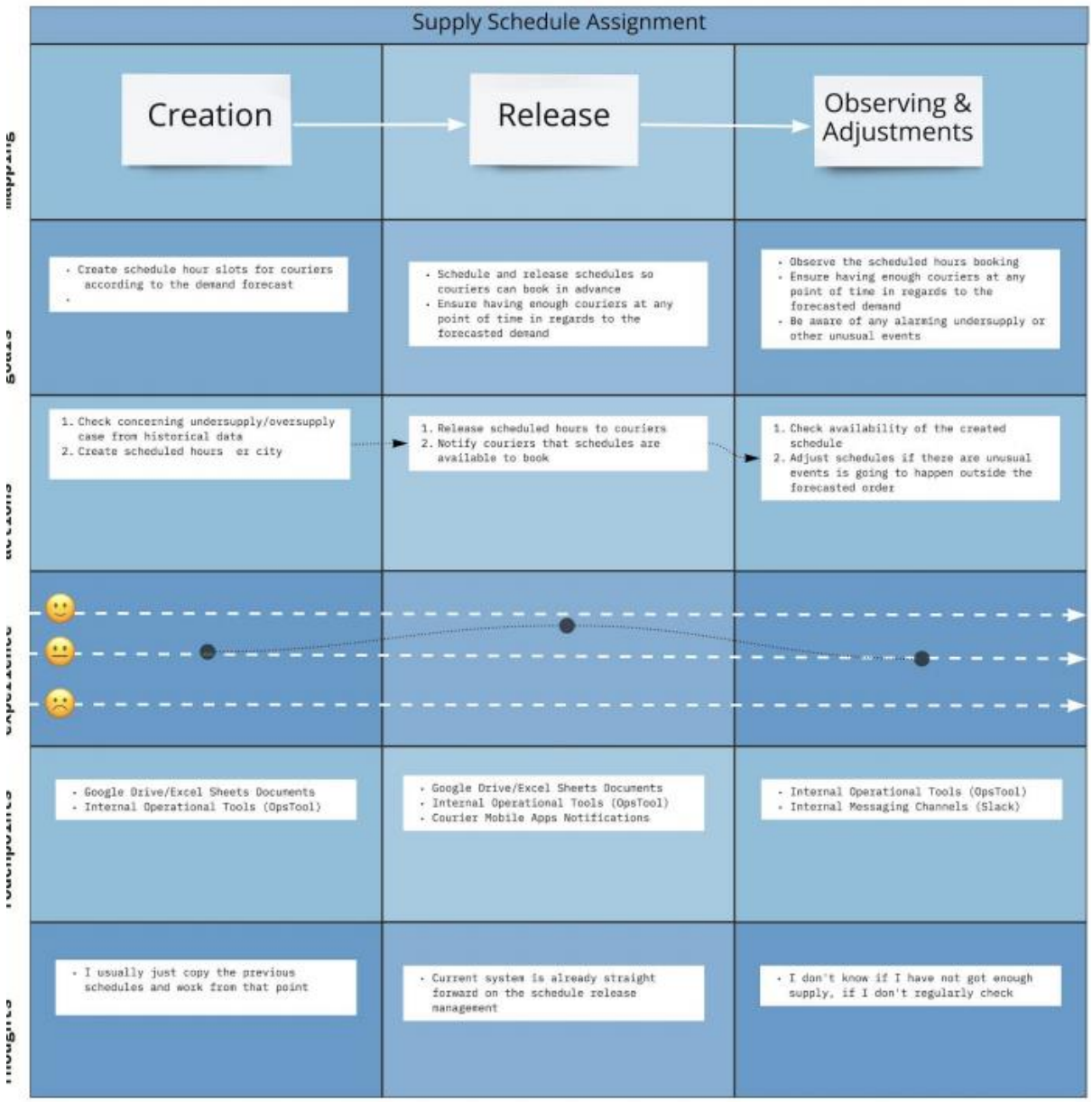

Figure 14: Supply Schedule - Forecasting Journey Mapping

The OMs who are schedule-dependent put a significant amount of effort and time into demand forecasting to balance supply and demand. Tables 4, 5 and 6 define the manager's journey which consists of using data collection, processing those data to demand predictions, and assigning the to match the delivery schedules. The focus of the flow is to plan couriers to operate efficiently in terms of delivery time and the cost of the couriers' guaranteed payment. These OMs do not have much flexibility in planning the schedules because they plan and create the Scheduled Hours slots usually one week in advance. Each of the stages of the specific forecasting journey mapping.

7. CODING & SOLUTION

7.1 FEATURES

There are several limitations to this research. The first limitation is the low number of sample interviewees, due to the OMs' availability for this research. As this research is a part of Wolt's ongoing initiative, the chosen OMs interviewed here were based voluntarily on their availability and experience. Out of the current 22 countries operating for Wolt, the research only interviewed OMs from 7 countries. The current settings were not covering all the nations that Wolt operates in so that the study could have some forecasting process biases from these countries. Moreover, the data was gathered through semi-structured interviews. Hence, the reliability and accuracy of the data depend highly on the OMs' expertise when the interview was conducted. It is challenging to research with different sets of characteristics and factors important in each country. However, because all the countries generally need the same forecasting information to operate, the research would address most of the uncovered countries' issues. Stakeholders taken as samples are also limited to OMs and do not include the Business Developer team in Wolt. As the forecasting service would be needed across the different teams in Wolt, it would be better to take more samples from different stakeholder needs in an ideal world. Thus, the improvements and problems would be balanced from different teams and different countries that are dependent or independent of Scheduled Hour. This approach would create even more comprehensive research that represents how the forecasting process is progressing.

Except for Finnish Operations, all the other OMs are located in different cities worldwide. The interviews and observations were mostly done via online video conferences. Hence, the interviews and observations were based on recorded interviews, mostly sound, and screens only. Most of the interviewed OMs explained the forecasting process in the online interview. Moreover, because the whole forecasting process would take weeks to observe, I observed the OMs only on the specific parts of the flow, such as the forecasting process and the supply assignments parts. If there were no time and location constraints, itwould be better to have the interviews and the observation face-to-face with these OMs.Then, I could observe better on their behavior when creating these

forecasts. These would lead to a detailed observation, both from the problems they explain and reality when making the demand forecasts.

This study of demand forecasting service conveys that to comprehend the different internal and external factors that contribute to the demand forecasting service, further exploration of each country's local specification is also required. The variations of local specificity and implications should be taken into account when thinking about how to forecast better and how the number of demand forecasts can help the local team expect and plan on their supply operations and meet their operational targets in the long term. Hence, creating a demand forecasting service that caters to the forecasting service's local factors, such as weather or eating time behaviors in different countries, could significantly enhance the service. The current service approach would not fit all markets, and there needs to be a way to customize the learnings of these factors based on localities in future research.

The demand forecasting service could also be expanded to the supply forecasting service. Based on demand forecasting, the OMs need to forecast how much couriers supply that they should have to be online and deliver the food demand in a specific time. If both parts of the demand and supply forecasting calculation are automated by machine learning, then OMs would monitor ad hoc or exceptional cases more frequently. The service would also benefit and enhance their working time to other parts of the food delivery operations .

8. ADVANTAGES & DISADVANTAGES

ADVANTAGES

Demand forecasting helps reduce risk and make efficient financial decisions that impact profit margins, cash, flow, allocation of resources, opportunities for expansion, inventory accounting, operating costs, staffing and overall

spends. All strategic and operational plans are formulated around forecasting demand.

Forecasting projections is one of the toughest things to get right. Gradual sales or is in high-growth mode. Demand forecasting is the process of using predictive analysis of historical data t estimate and predict customers future demand for a product or service.

DISADVANTAGES

Forcasting are never 100% accurate.Lets face it; its hard to predict the future.It can be time -consuming and resource -intensive .Forcasting involves a lot of data gathering ,data organizing,and coordination.It can also be costly .

CONCLUSION

This study aims to understand the current demand forecasting service in Wolt and integrate the user-centric design approach to establish a service that supports the forecasting process efficiently. Based on the primary users, the focus group of the research is the OMs in Wolt. The service design methods helped reveal the pain points, wishes, and gaps in redefining how the

demand forecast process should move forward in the future. The service design approach helps shape suggestions to match user expectations and needs for the demand forecasting service. The approach explains the OMs' underlying experience when forecasting demand and uncovering the hidden necessities and insights, which are useful to improve the future forecasting service

development. With the wisdom of the OMs, the company could suggest better and more robust design solutions to the service. Service design methods also revealed the connection between the service provider and the primary users by clarifying the connection and touchpoints to develop the enhancement ideas.

The Affinity Diagram maps that consisted of the OMs insight were useful for uncovering insights and patterns between the OMs on the forecasting process.

Using the diagram, I can cluster the common patterns to understand the current process better. Furthermore, the Persona method displayed the OM's common approach when creating a demand forecasting and supply schedules. The two profiles are Schedule Dependent OMs and Non-Schedule Dependent OMs,

each with different approaches and need to gather and process the demand forecasting.

These two profiles also differ in how they are using the result of the demand forecasting. The User journey map explained the OM’s journey in the demand forecasting cycle. Using the map, I can identify and explore the challenges and opportunities of the current forecasting process with OMs. Moreover, the service blueprint combined all the insights from the previous methods and

conveyed all the services' interaction, both the visible and the background process.

In the gig-economy industry, planning the right supply to the forecasted demand is one of the most critical factors to reach the efficiency of the *giggers*

and the company cost, as discussed . The extent of this research indicates that the area of order demand forecasting can be effectively improved by automating the process and fine-tuning the results based on external and local factors. In the scope of forecasting service, automated machine learning model-generated

results could offer the accuracy and time-efficiency that many companies encounter in this digital era. With the capability to automate the forecasting process and maintenance, the service can be scalable for more country expansion while still bridging the local factors and necessities

during the forecasting process. An automated forecasting service would help the OMs become aware of the expected growth changes, which improves the flexibility and precision to prepare

the courier supply. By allowing these local OMs to set and tune their local forecasting factors, the forecast results will be more reliable and beneficial for future learnings of the demand forecasting model.

SOURCE CODE

home.html:

```
<!DOCTYPE html>
<html>
<head>
<meta name="viewport" content="width=device-width, initial-scale=1">
<style>
body, html {
height: 100%;
margin: 0;
font-family: 'Poppins', sans-serif;
}
* {
box-sizing: border-box;
}
.bg-image {
background-image: url("https://d27k8xmh3cuzik.cloudfront.net/wpcontent/uploads/2018/06/belgian-waffles-og-image.jpg");
filter: blur(8px);
-webkit-filter: blur(8px);
height: 100%;
background-position: center;
background-repeat: no-repeat;
background-size: cover;
}
.bg-text {
background-color: rgb(0,0,0);
background-color: rgba(0,0,0, 0.4);
color: white;
font-weight: bold;
border: 3px solid #f1f1f1;
```

```
position: absolute;
top: 50%;
left: 50%;
transform: translate(-50%, -50%);
z-index: 2;
width: 80%;
padding: 20px;
text-align: center;
}
ul {
list-style-type: none;
margin: 0;
padding: 0;
overflow: hidden;
background-color:gray;
}
li {
float: right;
}
li a {
display: block;
color: white;
text-align: center;
padding: 14px 16px;
text-decoration: none;
}
li a:hover {
background-color:gray;
}
</style>
</head>
<body>
```

```
<ul>
<li style="font-size:20px;"><a href="../home">Home</a></li>
<li style="font-size:20px;"><a href="../pred">Predict</a></li>
</ul>
<div class="bg-image"></div>
<div class="bg-text">
<h2>About Us</h2>
<h1 style="font-size:50px">Food Demand Forecasting</h1>
<p>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.</p>
</div>
</body>
</html>
```

intro.html

```
<!DOCTYPE html>
<html>
<head>
<meta name="viewport" content="width=device-width, initial-scale=1">
<style>
body, html {
height: 100%;
margin: 0;
font-family: Arial, Helvetica, sans-serif;
}
* {
box-sizing: border-box;
```

```
}
.bg-image {
background-image: url("https://who-euro.shorthandstories.com/food-and-nutrition-tips-duringself-quarantine/assets/WoizMxIOjR/cover-photo-2560x1922.jpeg");
filter: blur(8px);
-webkit-filter: blur(8px);
height: 100%;
background-position: center;
background-repeat: no-repeat;
background-size: cover;
}
.bg-text {
background-color: rgb(0,0,0);
background-color: rgba(0,0,0, 0.4);
color: white;
font-weight: bold;
border: 3px solid #f1f1f1;
position: absolute;
top: 50%;
left: 50%;
transform: translate(-50%, -50%);
z-index: 2;
width: 80%;
padding: 20px;
text-align: center;
}
</style>
</head>
<body>
<div class="bg-image"></div>
<div class="bg-text">
<h2> Home </h2>
<h1 style="font-size:50px">Food Demand Forecasting</h1>
```

 Demand forecasting is the process in which
historical data is used to estimate the quantity of product
customer will purchase. This prediction activity is used in
many fields like retailing, food industry etc. In Restaurants,
prediction play a vital role as most of the basic ingredients
have short-shelf life. The demands depend upon many explicit
and hidden context such as season, region etc. We will be considering
number of order is used to forecast stock of items, using
machine learning with internal and external data. We will be predicting
in such a way that it is capable of overpowering the wastage of short life
items.

</body>
</html>

upload.html

```
<!DOCTYPE html>
<html>
<head>
<meta name="viewport" content="width=device-width, initial-scale=1">
<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>
body, html {
height: 100%;
```

```
margin: 0;
font-family: Arial, Helvetica, sans-serif;
}
* {
box-sizing: border-box;
}
.bg-image {
background-image: url("https://img.freepik.com/free-photo/chicken-wings-barbecue-sweetlysour-sauce-picnic-summer-menu-tasty-food-top-view-flat-lay_2829-6471.jpg?w=2000");
filter: blur(8px);
-webkit-filter: blur(8px);
height: 100%;
background-position: center;
background-repeat: no-repeat;
background-size: cover;
}
.bg-text {
background-color: rgb(0,0,0);
background-color: rgba(0,0,0, 0.4);
color: white;
font-weight: bold;
border: 3px solid #f1f1f1;
border-radius: 25px;
position: absolute;
top: 50%;
left: 50%;
transform: translate(-50%, -50%);
z-index: 2;
width: 80%;
padding: 20px;
text-align: center;
}
</style>
```

```
</head>
<body>
<div class="bg-image"></div>
<div class="bg-text">
<div class="container">
<center> <div id="content" style="margin-top:2em">
<h1><center>Food Demand Forecasting</center></h1>
<form action="{{ url_for('predict') }}" method="POST">
<select id="homepage_featured" name="homepage_featured" required>
<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" required>
<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)"
required><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"
required><br><br>
<input class="form-input" type="text" name="region_code" placeholder="Enter region_code"
required><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">Demand is: {{ prediction_text }}</h1>
</div></center>
</div>
</div>
</div>
</body>
</html>
```

app.py

```
import pandas as pd
import numpy as np
import requests
```

```
import os
from flask import Flask,request, render_template
app=Flask(__name__,template_folder='templates')
@app.route('/',methods=['GET'])
def index():
return render_template('index.html')
@app.route('/home',methods=['GET'])
def about():
return render_template('intro.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...")
input_features = [float(x) for x in request.form.values()]
features_value = [input_features]
print(features_value)
features_name = ['homepage_featured', 'emailer_for_promotion', 'op_area', 'cuisine',
'city_code', 'region_code', 'category']
# NOTE: you must manually set API_KEY below using information retrieved from your IBM
Cloud account.
API_KEY = "V0FedIvcsn9vpDN7cIG2cmB8T8zpenX6vPs8tufhqE6b"
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": [{"values": features_value}]}
response_scoring = requests.post('https://ussouth.ml.cloud.ibm.com/ml/v4/deployments/cfbed64a-
29cb-44e2-bc53-
e0a418c3077e/predictions?version=2022-11-14', json=payload_scoring,
headers={'Authorization': 'Bearer ' + mltoken})
```

```
print("Scoring Endpoint")
print(response_scoring.json())
pred = response_scoring.json()
output=pred['predictions'][0]['values'][0][0]
print(output)
return render_template('upload.html', prediction_text=output)
if __name__ == '__main__':
app.run()
```

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