Food Demand Forecasting

SAHIL FAIZAL-19BPS1083 & VASANTH REDDY 18BCN7069

INTRODUCTION

Demand forecasting is a key component to every growing online business. It 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. Without proper demand forecasting processes in place,it can be nearly impossible to have the right amount of stock on hand at any given time. A food delivery service has to deal with a lot of perishable raw materials which makes it all the more important for such a company 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

PROBLEM STATEMENT

Your client is a meal delivery company which operates in multiple cities.They have various fulfillment centers in these cities for dispatching meal orders to their customers. The client wants you to help these centers with demand forecasting for upcoming weeks so that these centers 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 centers is also one area wherein accurate demand forecasts are really helpful.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:

- Historical data of demand for a product-center combination(Weeks:1 to 145)
- Product(Meal) features such as category,sub-category,current price and discount
- Information for fulfillment center like center area, city information etc.

EVALUATION METRIC

100 * Root of Mean Squared Logarithmic Error (RMSLE)

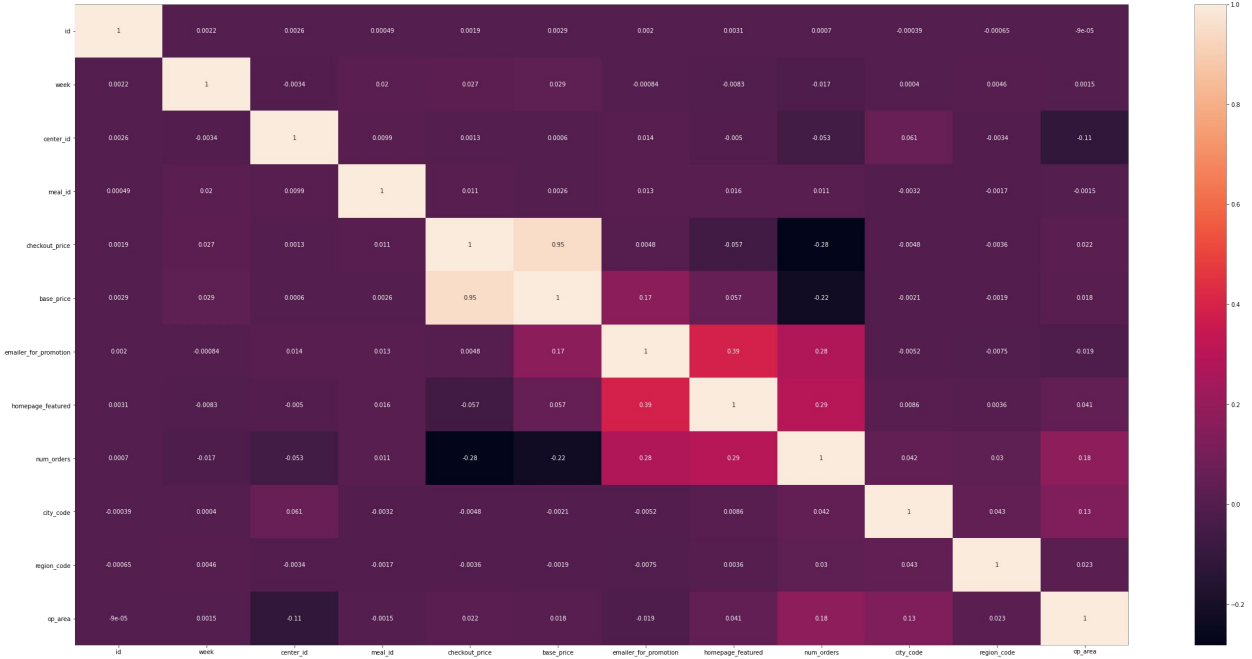
DATASET

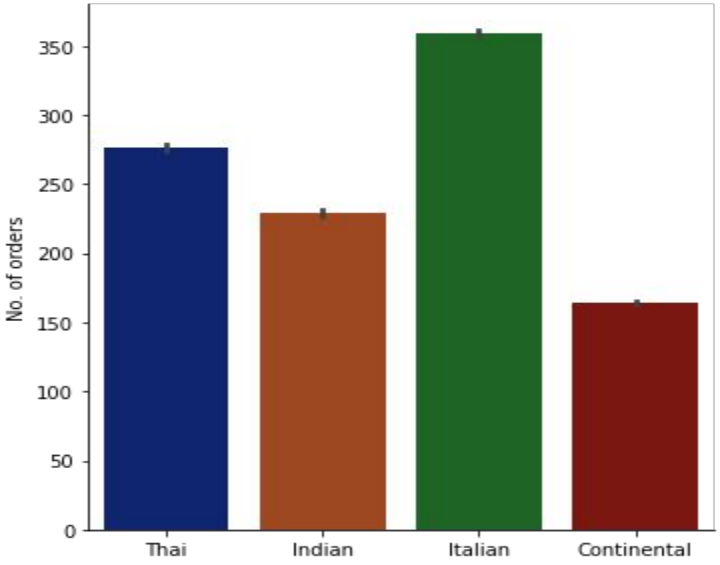
	id	week	center_id	meal_id	checkout_price	base_price	emailer_for_promotion	homepage_featured	num_orders
0	1379560	1	55	1885	136.83	152.29	0	0	177
1	1466964	1	55	1993	136.83	135.83	0	0	270
2	1346989	1	55	2539	134.86	135.86	0	0	189
3	1338232	1	55	2139	339.50	437.53	0	0	54
4	1448490	1	55	2631	243.50	242.50	0	0	40

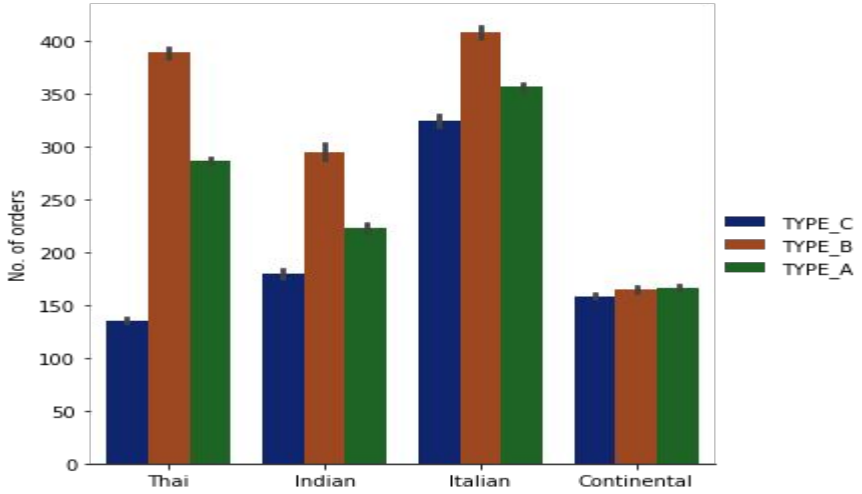
	center_id	city_code	region_code	center_type	op_area
0	11	679	56	TYPE_A	3.7
1	13	590	56	TYPE_B	6.7
2	124	590	56	TYPE_C	4.0
3	66	648	34	TYPE_A	4.1
4	94	632	34	TYPE_C	3.6

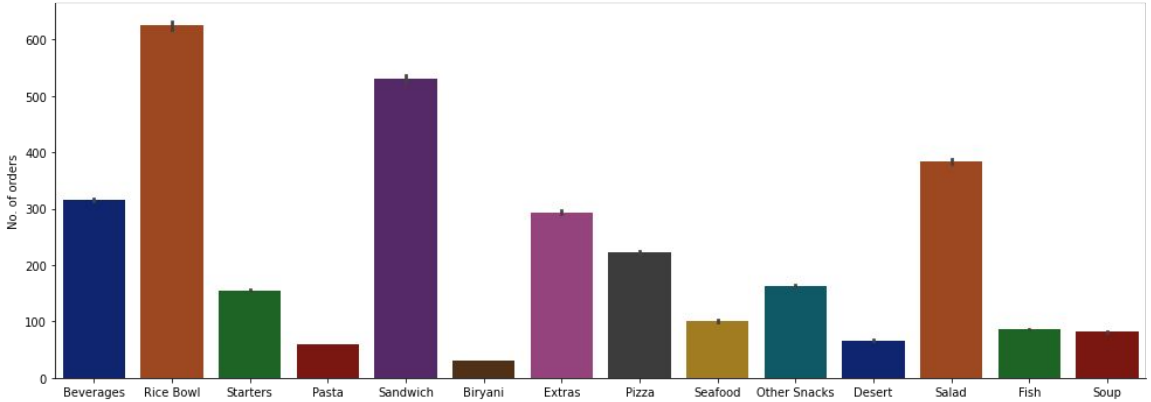
	meal_id	category	cuisine
0	1885	Beverages	Thai
1	1993	Beverages	Thai
2	2539	Beverages	Thai
3	1248	Beverages	Indian
4	2631	Beverages	Indian

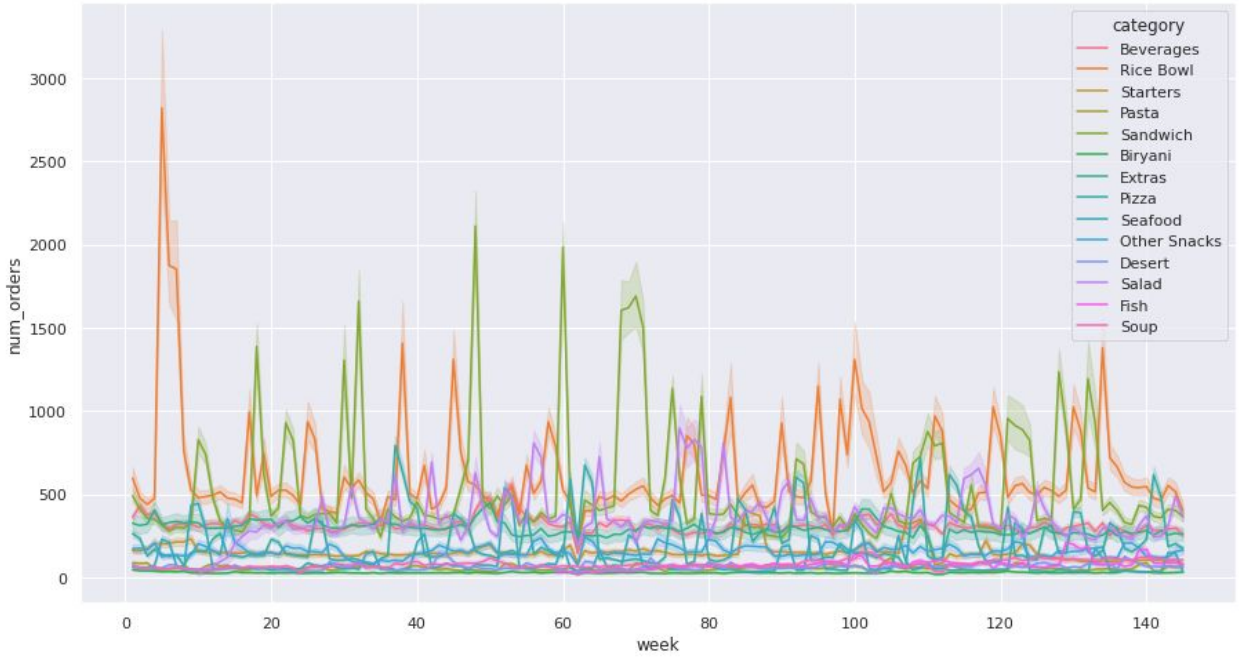
OVERALL TREND ANALYSIS




No. of orders
0
50
100
150
200
250
300
350
Thai
Indian
Italian
Continental


No. of orders
0
50
100
150
200
250
300
350
400
Thai
Indian
Italian
Continental
TYPE_C
TYPE_B
TYPE_A

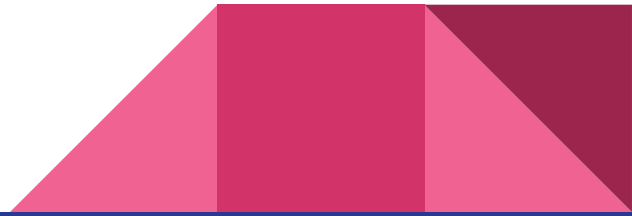

No. of orders
0
100
200
300
400
500
600
Beverages
Rice Bowl
Starters
Pasta
Sandwich
Biryani
Extras
Pizza
Seafood
Other Snacks
Desert
Salad
Fish
Soup


category
Beverages
Rice Bowl
Starters
Pasta
Sandwich
Biryani
Extras
Pizza
Seafood
Other Snacks
Desert
Salad
Fish
Soup
num_orders
3000
2500
2000
1500
1000
500
0
0
20
40
60
80
100
120
140
week


cuisine
Thai
Indian
Italian
Continental
num_orders
1000
800
600
400
200
0
20
40
60
80
100
120
140
week

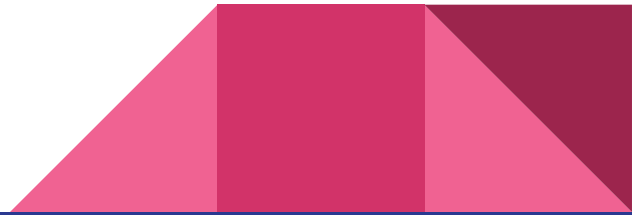
MODEL BUILDING

The main work done here is of applying the different algorithms on the training set and checking the accuracy of the model on the basis of these algorithms. The evaluation is done using RMSE values.



APPLICATION BUILDING

In this section we have built a web application to integrate the ML model which we built. A UI is built for the user to enter the input details ie; feature variables for predicting the total order volume of the particular product at a center and locality. Once the input is received it is then fed into the model for prediction purpose after which the result will be printed in the same page.



THANK YOU!!