DEMAND FORECASTING

Submitted by Thanima Firoz

ABOUT THE DATASET

The dataset belongs to a meal delivery company that operates in multiple cities. They have various fulfillment centers in these cities for dispatching meal orders to their customers. The objective of the project is to forecast the demand for upcoming weeks so that these centers will plan the stock of raw materials accordingly.

Client – Meal Delivery Company

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

OBJECTIVE

To Provide five actionable Insights about the dataset.

ode	region_code	center_type	op_area
679	56	TYPE_A	3.7
590	56	TYPE_B	6.7
590	56	TYPE_C	4.0
648	34	TYPE_A	4.1
632	34	TYPE_C	3.6

DATASET

The dataset consists of 5 CSV files :

- Fulfillment Center Info
- Meal info
- Sample Submission
- Test
- Train

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

	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

OUTLIERS AND MISSING RECORDS

Outliers:

- **Record with 24299 number of orders**
- **Record with 2.97 checkout price**

Missing records:

- **No Orders of some product-center combination for some week**

MERGED DATA

	id	week	center_id	meal_id	checkout_price	base_price	emailer_for_promotion	homepage_featured	city_code	region_code	center_type	op_area
0	1379560	1	55	1885	136.83	152.29	0	0	647	56	TYPE_C	2.0
1	1466964	1	55	1993	136.83	135.83	0	0	647	56	TYPE_C	2.0
2	1346989	1	55	2539	134.86	135.86	0	0	647	56	TYPE_C	2.0
3	1338232	1	55	2139	339.50	437.53	0	0	647	56	TYPE_C	2.0
4	1448490	1	55	2631	243.50	242.50	0	0	647	56	TYPE_C	2.0

FEATURE EXTRACTION

- Year
- Month
- Quarter
- Week in a month

ACTIONABLE INSIGHTS

INSIGHTS # 1

Seasonality in Food Demand :

The dataset shows clear seasonality in food demand, with higher demand in 2nd and 12th months and lower demand in 9th month. Also food demand is high in first and fourth week of the month compared to that of second and third week. This insight can be used by restaurants and food delivery services to plan their menus and inventory accordingly.

INSIGHTS # 2

Promotion Impact :

The second insight analyzes the impact of promotions on demand and calculates the average promotion impact, which can be used to design effective promotion strategies to increase customer loyalty and attract new customers.The promotional activities including the homepage and emails improve the order number. Promotion activity on the homepage has more impact than emails on increase in the number of orders.

INSIGHTS # 3

Order Demand by Centers :

Analyzing the demand for orders by centers helps to identify the centers that may be experiencing higher demand and may require additional resources. Type A center has more orders than Type B and Type C. The underperforming centre is Type C which needs changes in marketing, menu or pricing to improve demand.

INSIGHTS # 4

Most Popular Cuisine :

Analyzing the most popular cuisine among customers helps to optimize the menu and focus on popular items.

Most Popular cuisine is Italian.

There is a fluctuation of order for Indian cuisine.

Less Popular cuisine is continental.

INSIGHTS # 5

Average Order Demand by Cuisine:

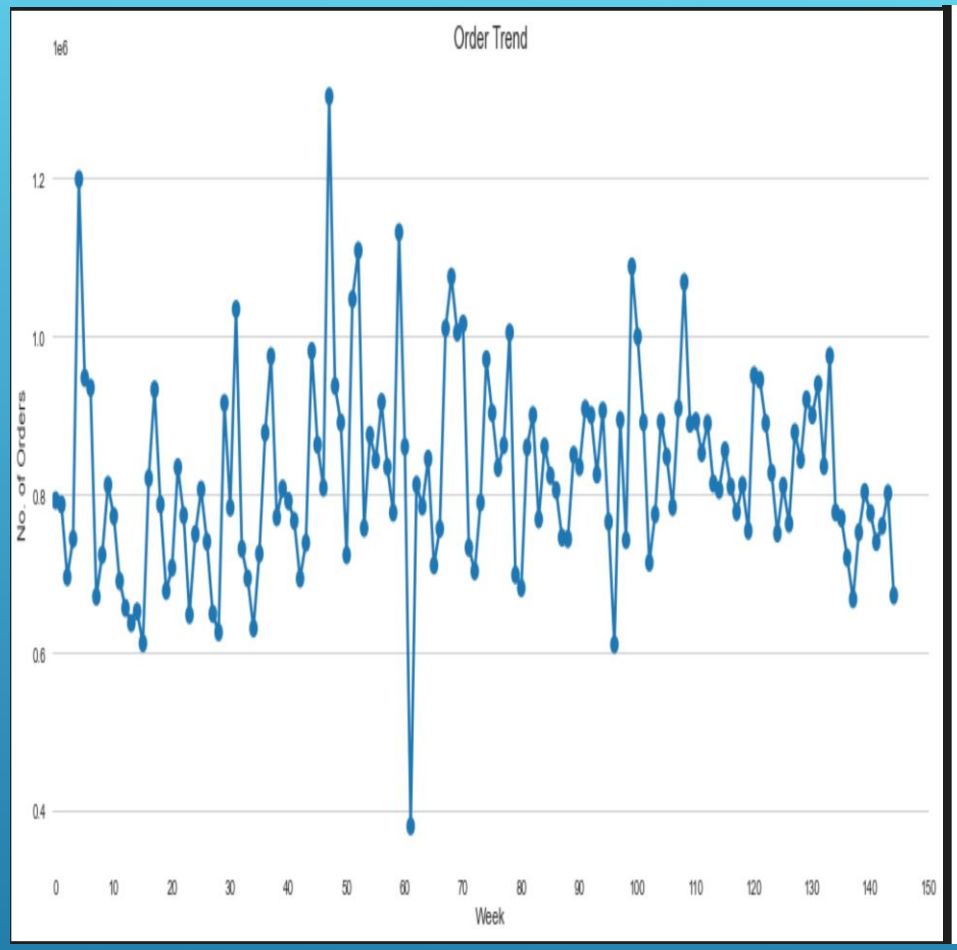
Analyzing the average order demand for each cuisine helps to determine which cuisines are more profitable and which items may need to be reevaluated.

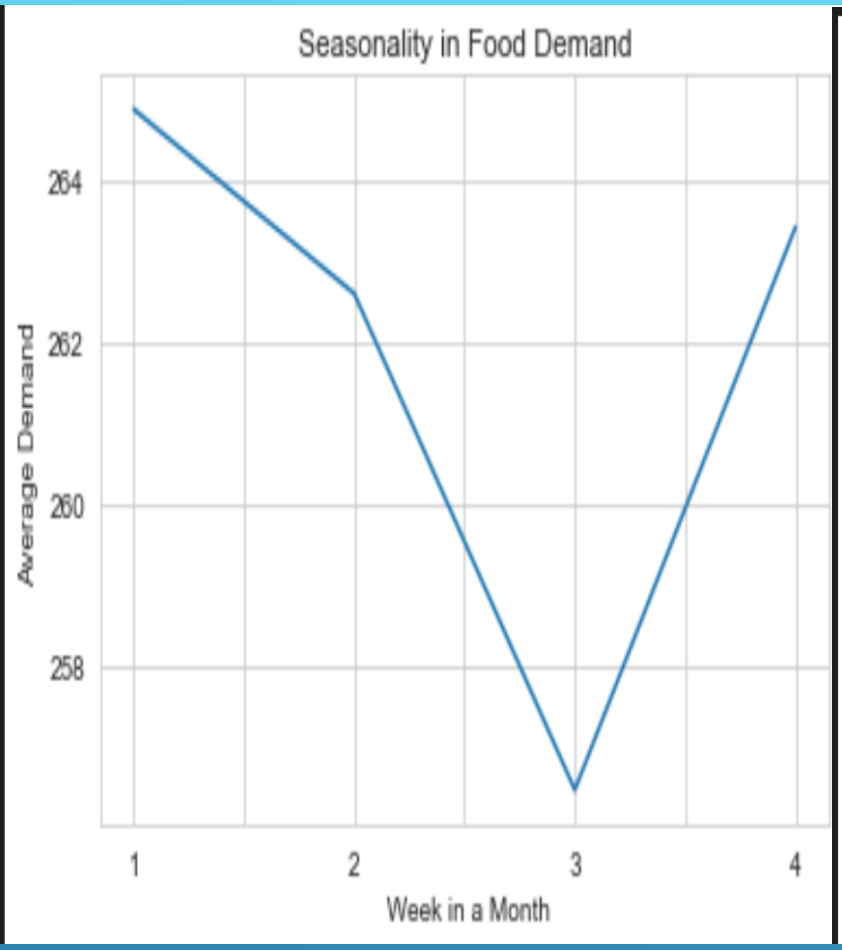
- The average order demand for Italian cuisine is 359.35.
- The average order demand for Thai cuisine is 276.42.
- The average order demand for Indian cuisine is 229.03.
- The average order demand for Continental cuisine is 164.55.

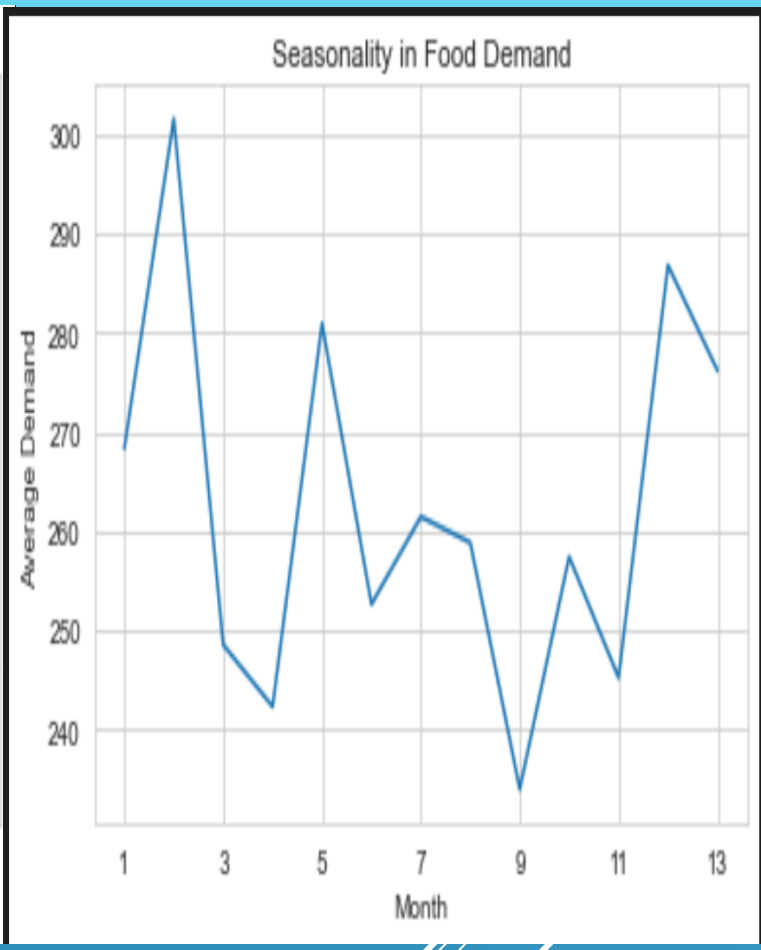
INSIGHTS #1

Seasonality in Food Demand :

The dataset shows clear seasonality in food demand, with higher demand in 2nd and 12th months and lower demand in 9th month. Also food demand is high in first and fourth week of the month compared to that of second and third week. This insight can be used by restaurants and food delivery services to plan their menus and inventory accordingly.







- Week 62 has lowest orders
- Weeks 5 and 48 have the highest orders because of increase in promotions by emails

- Start and end week of the month has highest orders compared to other weeks.

- Month 2 have highest orders
- Month 9 have lowest orders

INSIGHTS # 2

Promotion Impact :

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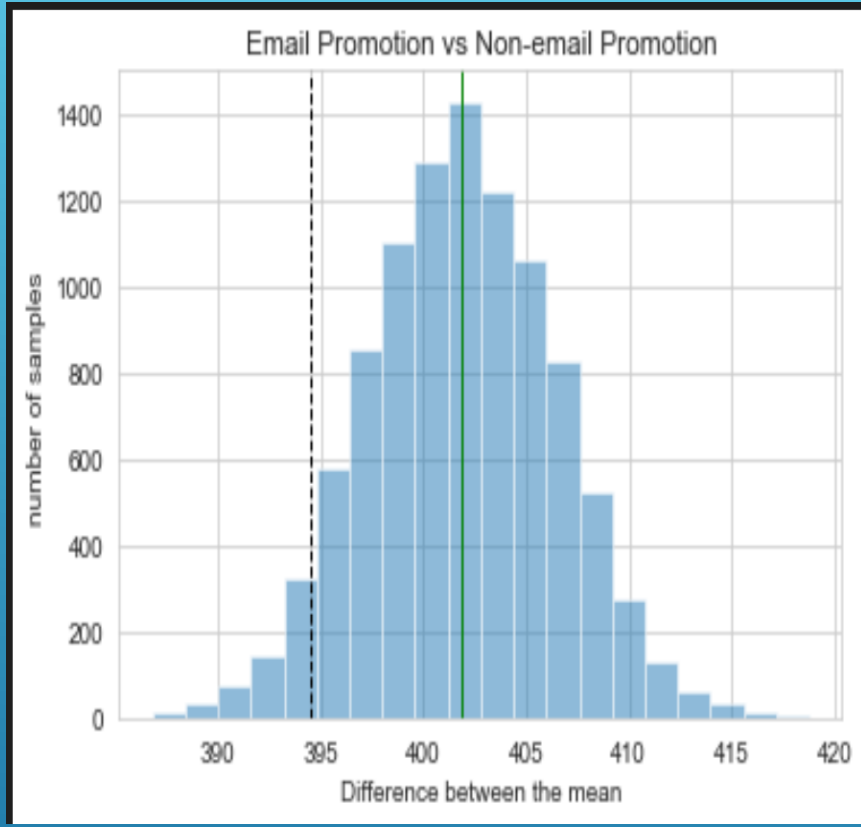
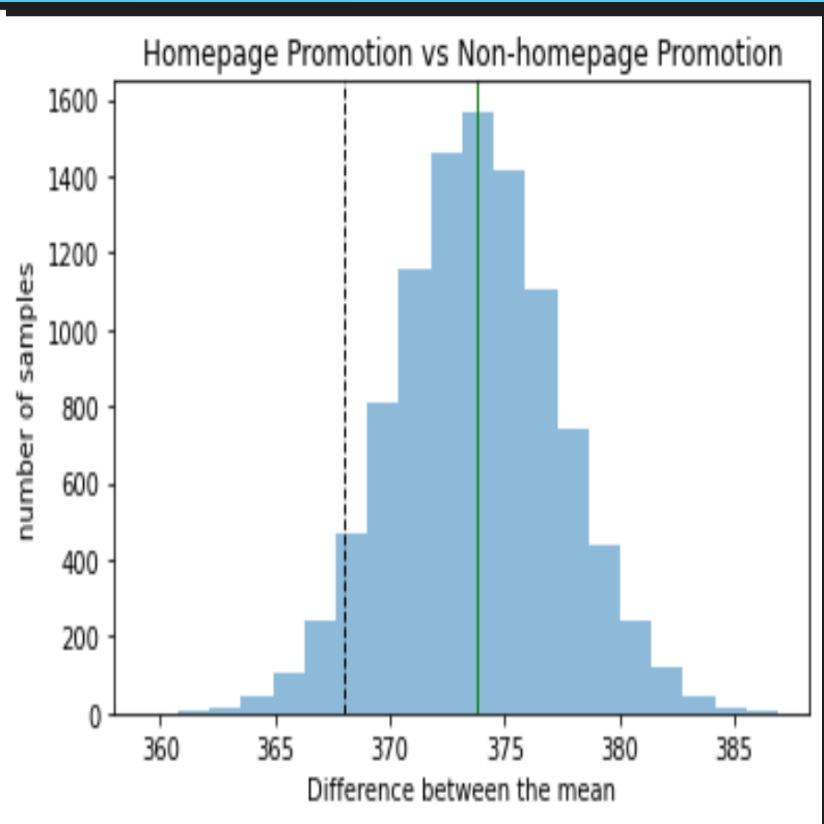
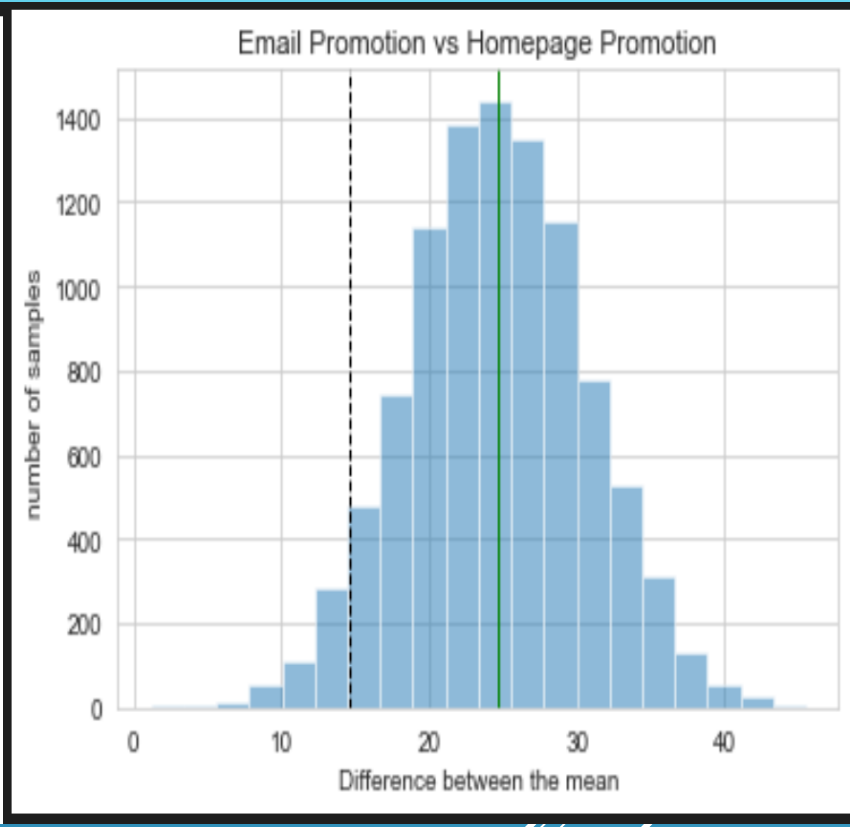




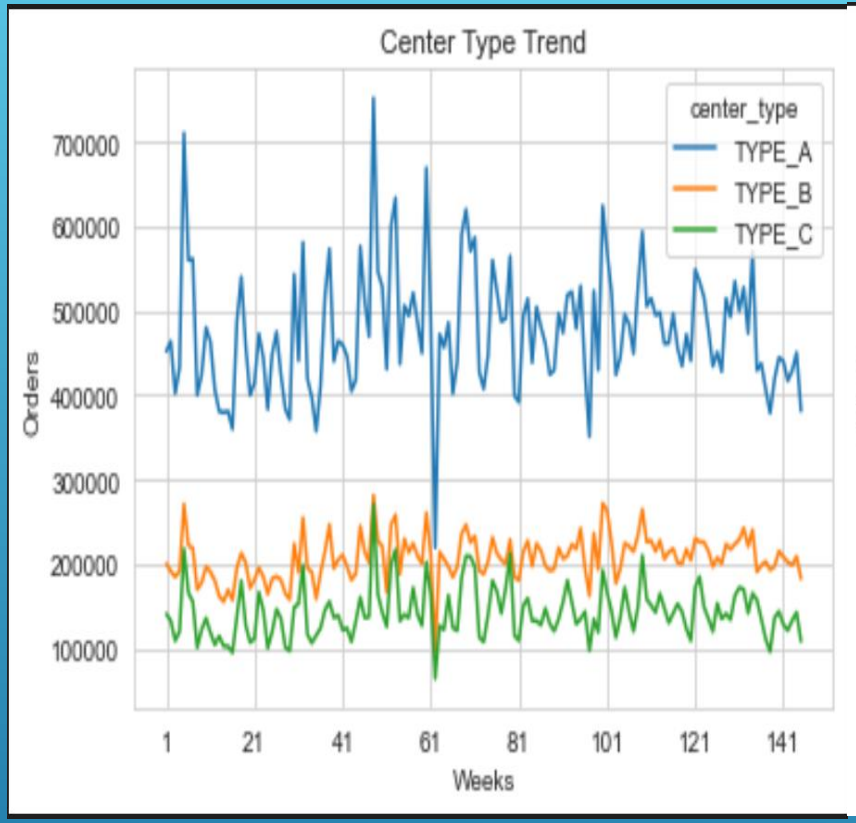


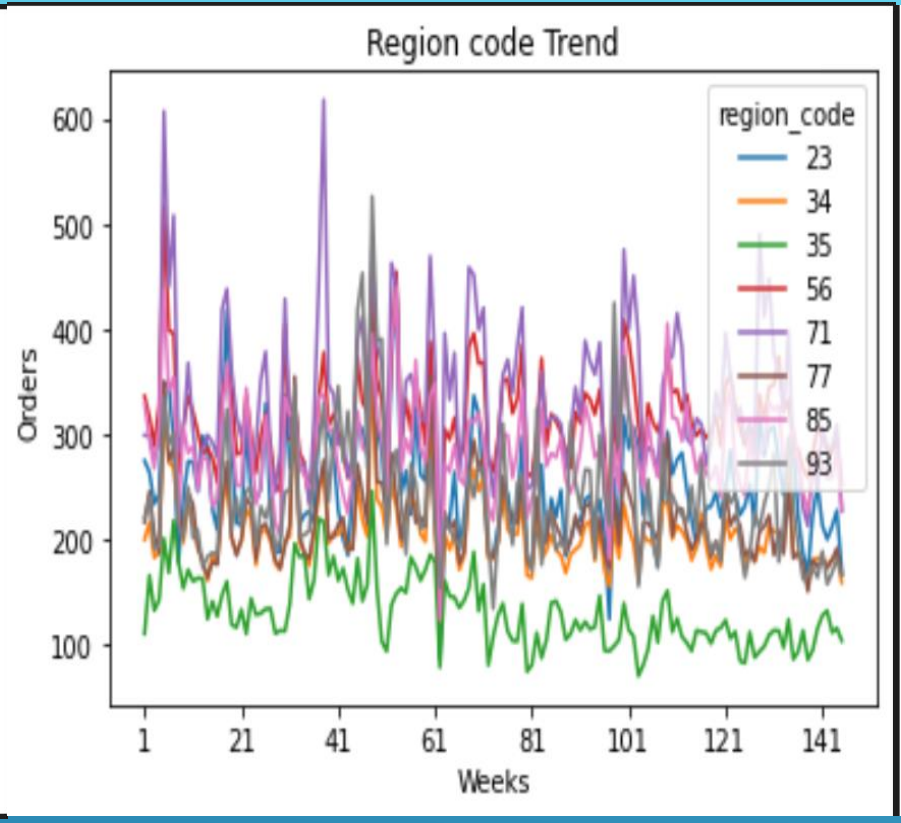
- **Promotions via email increase the number of orders.**
- **Promotions via homepage increases the number of orders.**
- **Promotions in the home page has more impact than emails.**

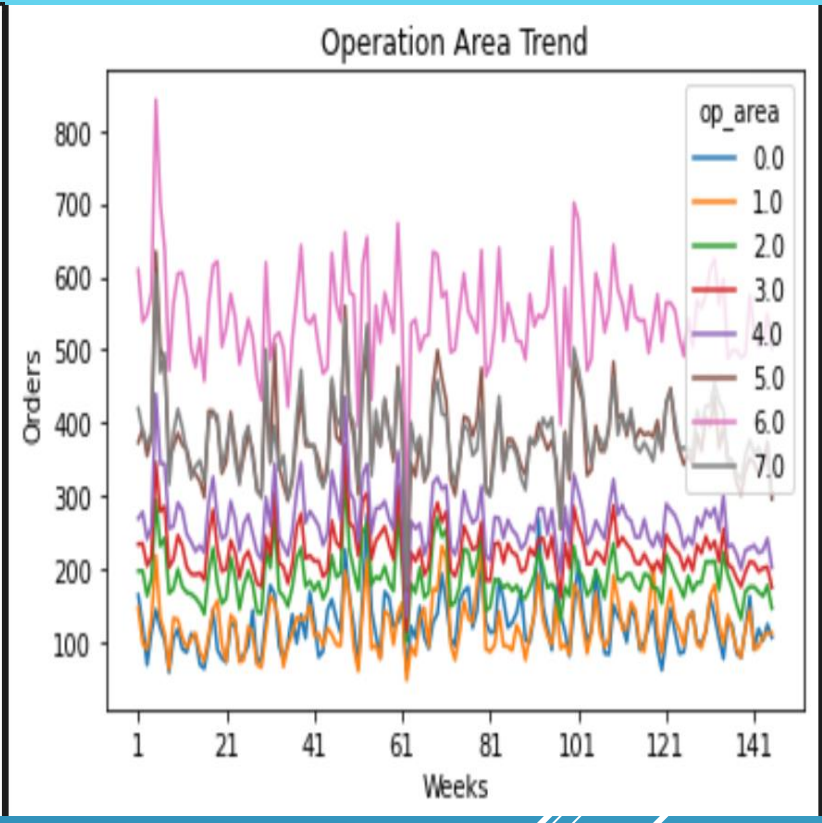
INSIGHTS # 3

Order Demand by Centers :

Analyzing the demand for orders by centers helps to identify the centers that may be experiencing higher demand and may require additional resources. Type A center has more orders than Type B and Type C. The underperforming centre is Type C which needs changes in marketing, menu or pricing to improve demand.







- Type A has more orders.
- Type C has lowest orders.

- Region code 35 has lowest orders.
- Fluctuations for almost all region.

- Positive correlation between Operation Area and Orders

INSIGHTS # 4

Most Popular Cuisine :

Analyzing the most popular cuisine among customers helps to optimize the menu and focus on popular items.

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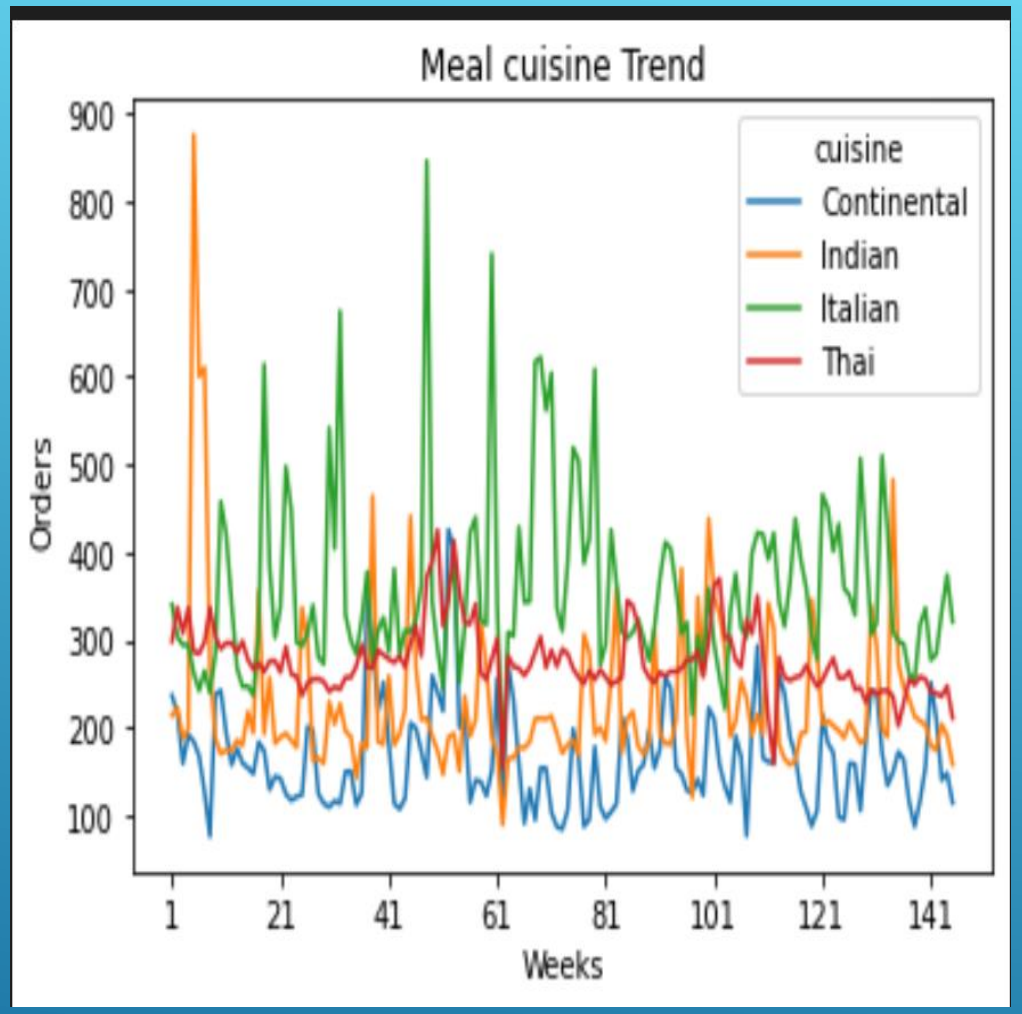
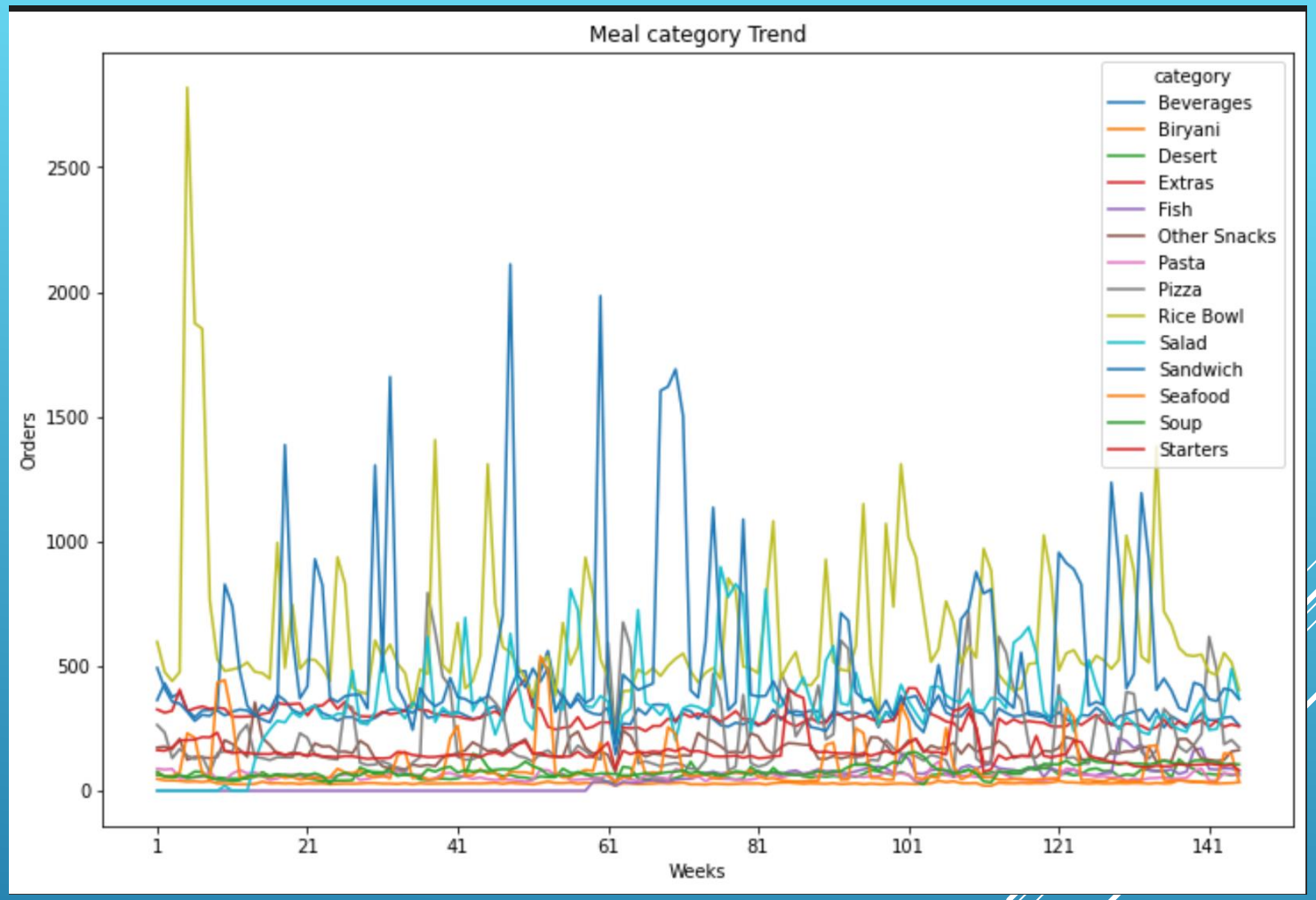
Less Popular cuisine is continental.





- **Italian meals and Beverages has high Orders**
- **Orders for Salad increased after week 18.**
- **Fluctuations for Indian meals, Rice Bowl and Sandwich.**

INSIGHTS # 5

Average Order Demand by Cuisine:

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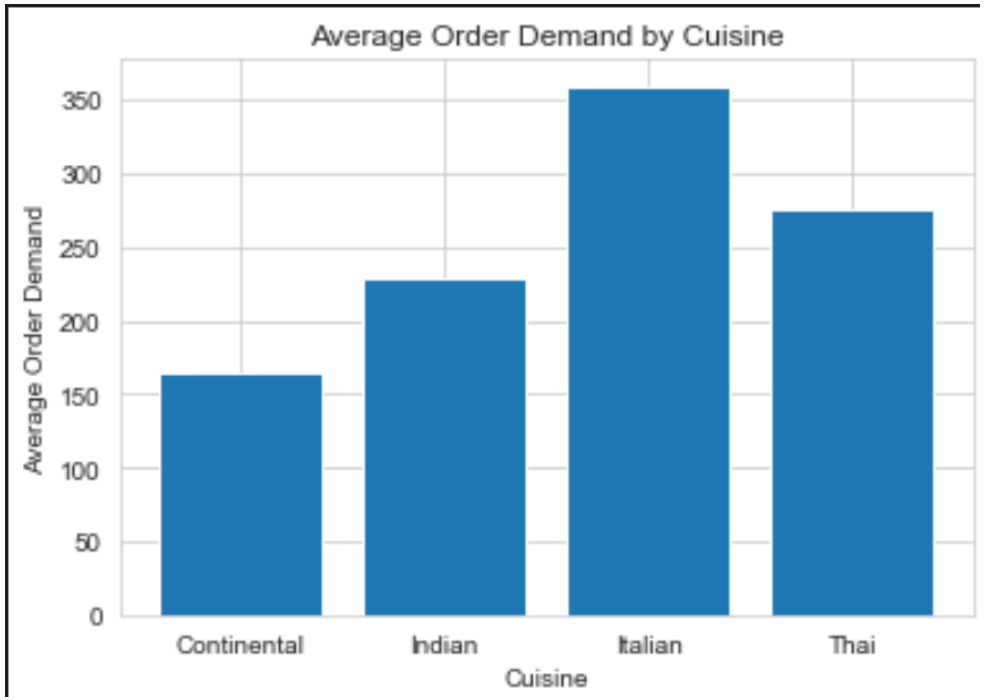

	cuisine	num_orders
2	Italian	359.347830
3	Thai	276.423411
1	Indian	229.039037
0	Continental	164.545348

THANK YOU