



# Food Demand Forecasting Challenge



A report by Monil Gudhka



# About

Title:

Food Demand Forecasting  
Challenge

Contest:

[Genpact Machine Learning  
Hackathon](#)

Repository:

[https://github.com/monilgudhka/fo  
od\\_demand\\_forecasting](https://github.com/monilgudhka/food_demand_forecasting)

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# Problem Statement

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- Client: meal delivery company
- Problem:
  - Deals with a lot of perishable raw materials
  - Not enough inventory -> out-of-stocks -> push customers to competitors
  - Too much inventory -> more risk of wastage
- Solution will also help in
  - Planning the stock of raw materials
  - Staffing of the centers



# Evaluation Metric

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100 \* Root of Mean Squared Logarithmic Error (RMSLE)

*across all entries in the test set*



# 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

# Outliers & Missing Records

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- 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

# Merge Data

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

# Feature Extraction

## Based on past orders

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- average\_orders\_Nweek
- average\_orders\_Nweek\_across
- average\_orders\_Nweek\_adj
- average\_orders\_Nweek\_adj\_across
- mean\_base\_price
- discount

*where N is 13, 26 and 52*

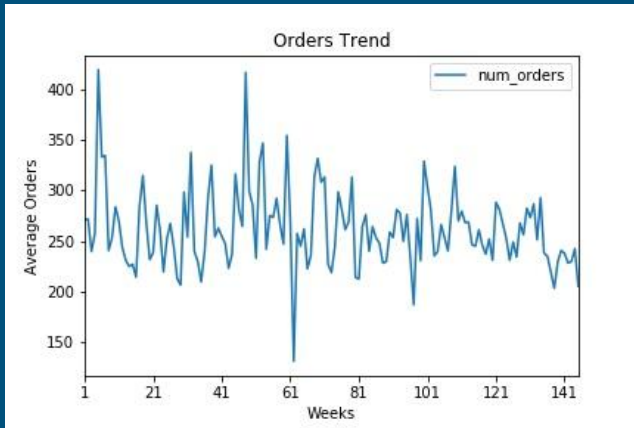
## Based on weeks

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- year
- month
- quarter
- week\_in\_month



# Analysis: Overall Orders Trend



- Week 62 have lowest Orders
- Week 5 and 48 have highest Orders
- Because of Promotions by emails

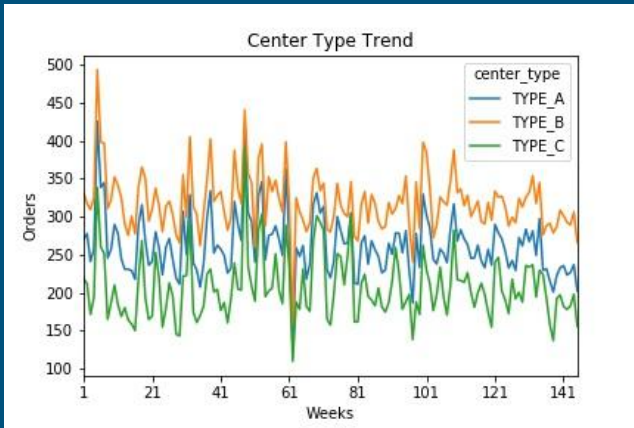


Start and end of the month has highest orders

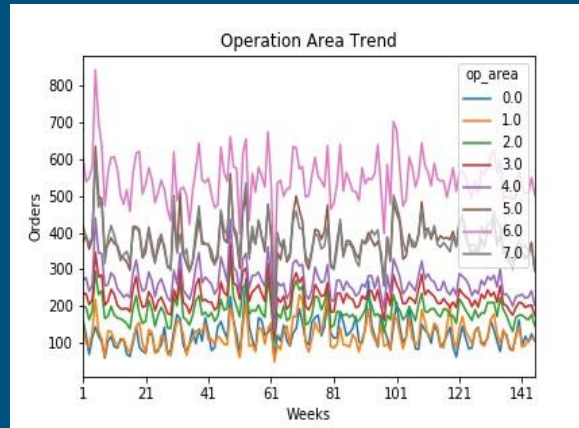


- Month 2 have highest orders
- Month 9 have lowest orders

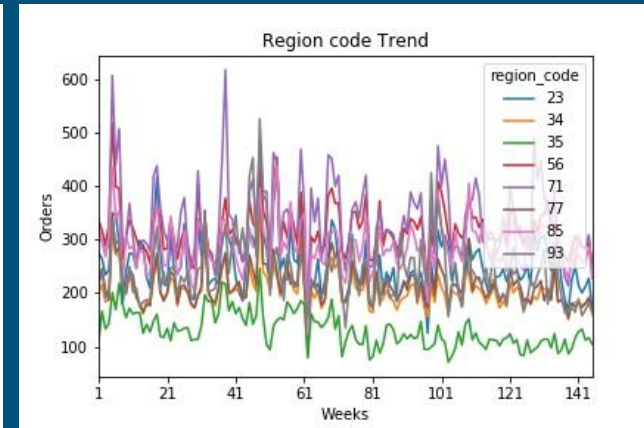
# Analysis: Center Wise Orders Trend



- TYPE\_B has highest orders
- TYPE\_C has lowest orders



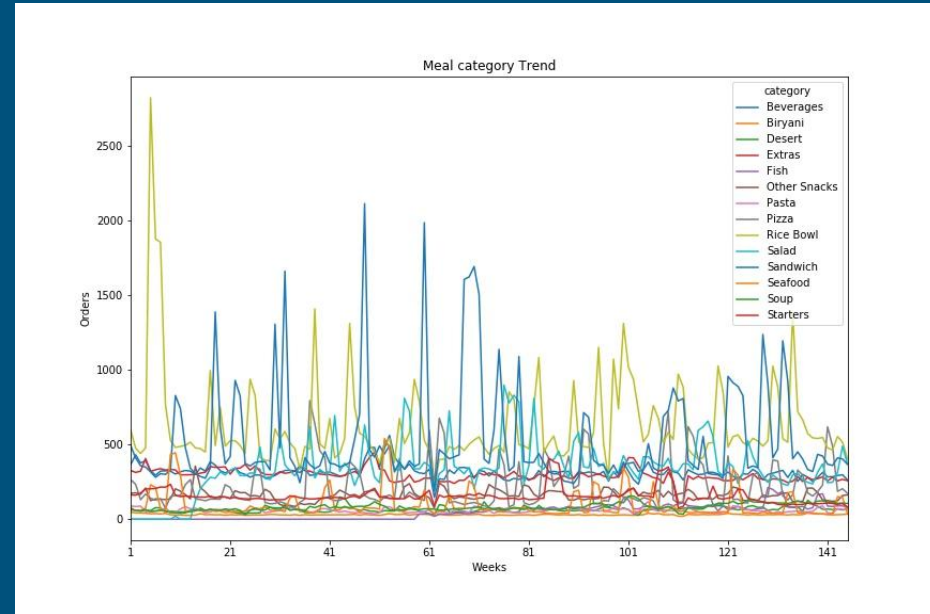
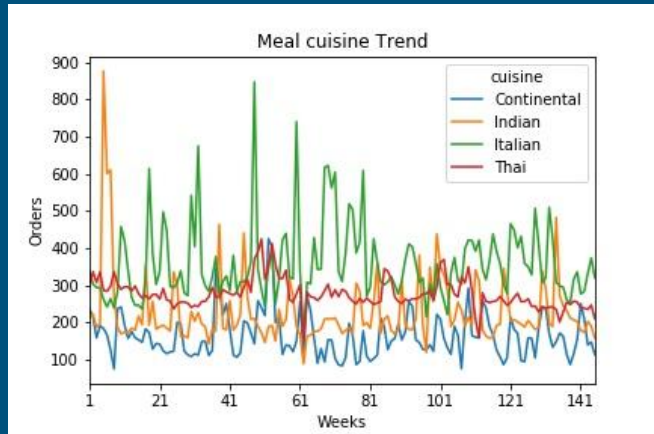
Positive correlation between  
Operation Area and Orders



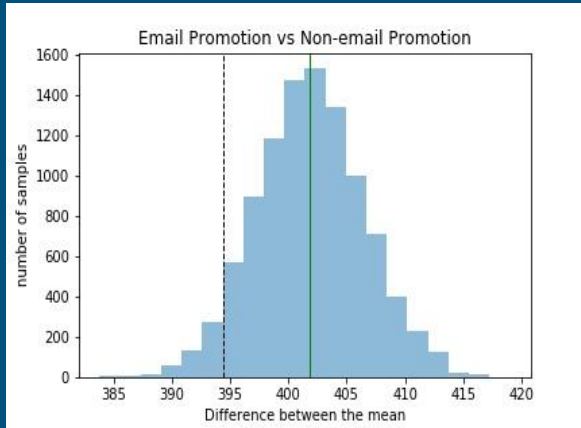
- Region code 35 have lowest orders
- Fluctuations for almost all regions

# Analysis: Meal wise Orders Trend

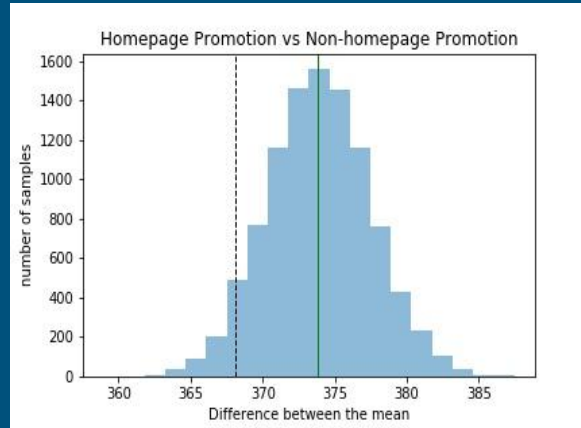
- Italian meals and Beverages has high Orders
- Orders for Salad increased after week 18
- Fluctuations for Indian meals, Rice Bowl and Sandwich



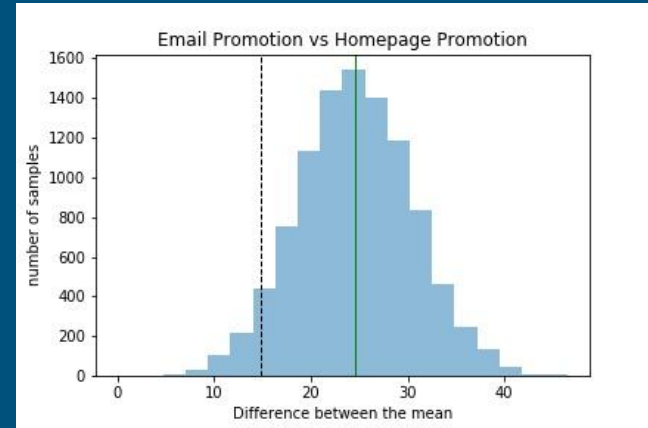
# Analysis: Promotional Activity



Promotions by emails increases the number of orders

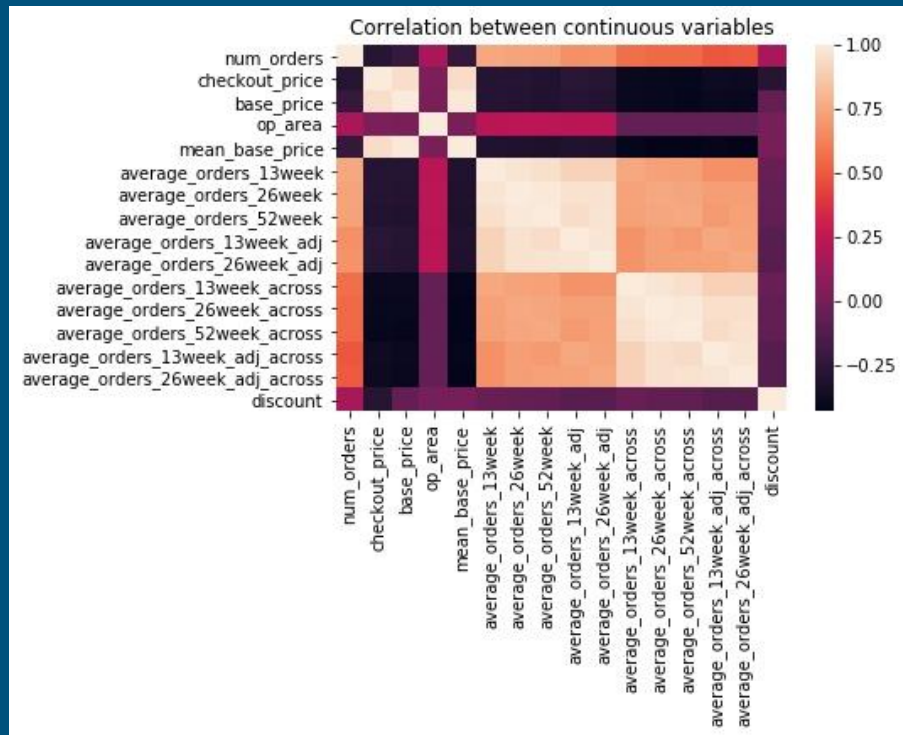


Promotions in homepage increases the number of orders



Promotions in homepage has more impact than emails

- High positive correlation between checkout price and base price
- Negative correlation between Orders and both prices
- Low positive correlation between discount and Orders
- Low negative correlation between discount and checkout price



Thank You