# Grocery Basket Analysis

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Career Foundry
Data Analytics Portfolio

instacart

# Introduction

## OVERVIEW

Instacart is an online grocery store that operates through an application. It already has very good sales and wants to uncover more information about their sales pattern based on customer profiles with the appropriate products.

## OBJECTIVE

Analyze the data and perform an initial data and exploratory analysis in order to derive insights and suggest strategies for better segmentation based on the provided criteria.

## PURPOSE & CONTEXT

I have done this project as a part of my Data Analytics course at Career Foundry to demonstrate my skills in data analysis and visualization using Python.

# Project Plan

**PHASE 1**

Data and Business Understanding

**PHASE 2**

Data Preparation

**PHASE 3**

Analysis and Visualizations

## My Role

Data Analyst

## Project Duration

30 Days

## Tools Used

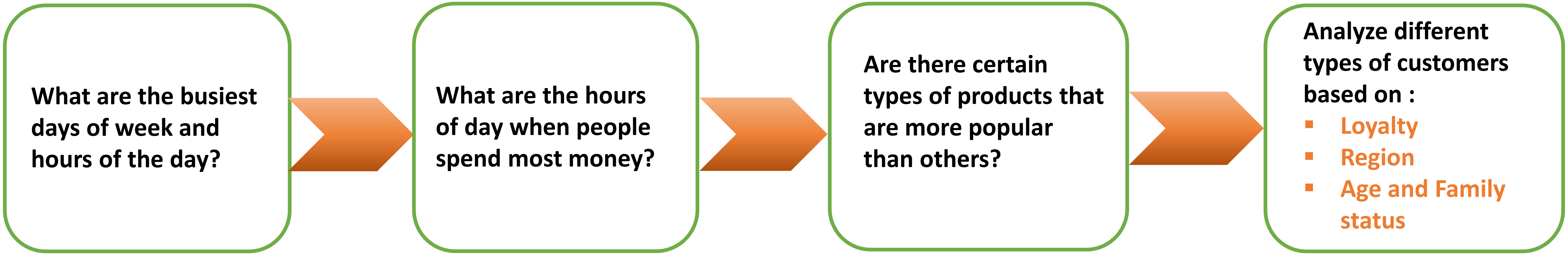
Jupyter Notebook(Anaconda) for Python, Excel

## Credits

Tutor : Mohsun Hajiyev
Mentor : Madhuri Joshi

# Phase 1:
# Data and Business Understanding

- In this phase of project, I tried to understand business goals, objective and requirements from BRD. (Business Requirement Document)
- I did check for different datasets from Instacart by looking at it's size, columns, data types etc.
- Below are the key questions from Sales and Marketing teams of Instacart:



**What are the busiest days of week and hours of the day?**

**What are the hours of day when people spend most money?**

**Are there certain types of products that are more popular than others?**

**Analyze different types of customers based on :**

- **Loyalty**
- **Region**
- **Age and Family status**

# Data Sources and Python Skills

- For this project, we have used number of open-source data sets from Instacart.
- We also have a customer data set (created and included for the purpose of this project)
- Below are the sources for data sets and python skills used to understand the data.

## DATA SOURCES

- □ **The Instacart Online Grocery Shopping Dataset 2017", Accessed from** https://www.instacart.com/datasets/grocery-shopping-2017 on May 15, 2021
- □ **Data Dictionary:** The Instacart Online Grocery Shopping Dataset 2017 Data Descriptions (github.com)
- □ **Customers Data Set:** https://s3.amazonaws.com/coach-courses-us/public/courses/data-immersion/A4/A4_Data_Assets/customers.zip

## PYTHON SKILLS USED

- □ Importing Python Libraries
- □ Importing and Exporting Instacart Data Sets
- □ Checking the size of data and different columns with their data types.
- □ Understanding necessary columns which will be useful for further analysis.

# Phase 2:
# Data Preparation

## STEPS INVOLVED

- In data preparation phase, data has been checked for it's quality and consistency so that clean dataset is available for further analysis.
- Missing values, duplicate records and mixed-type columns from data have been checked and corrected.
- Renaming column names so that it can be easily understandable.
- Data wrangling, subsetting and deriving new variables to create customer profiles.
- Combining different datasets using integration, so that only one data set can be used for analysis.

## PYTHON SKILLS USED

- ❑ Data wrangling and subsetting
- ❑ Data Consistency Check
- ❑ Deriving new variables
- ❑ Merge the data using integration

# Bringing Datasets Together

Below population flow shows integration of different datasets and their total count at each stage.

Orders, Products and Customers datasets have been checked for consistency and then combined and merged to get a final integrated dataset.

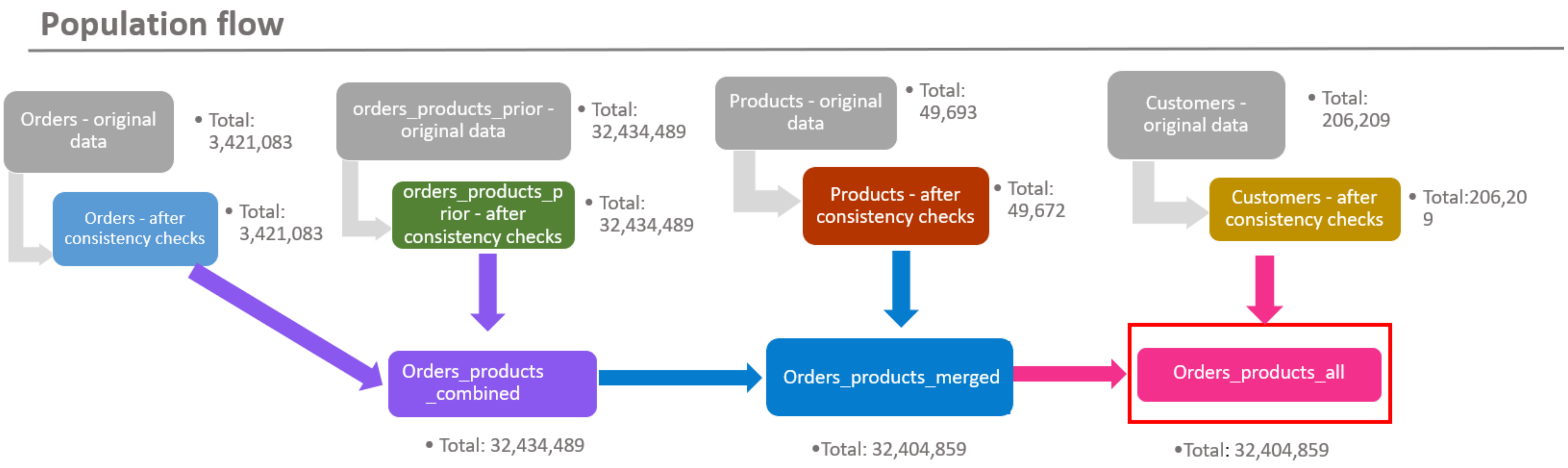


**Fig.1 Integration of datasets**

# Phase 3:
# Analysis and Visualization

## STEPS INVOLVED

- The last phase of project is Analysis and Visualization.
- In this phase, different statistical and descriptive analysis have been performed on final dataset to answer the business questions.
- Data has been grouped and aggregated to check the relationship between variables.
- Final results are presented in the visual form using python code for visualization.

## PYTHON SKILLS USED

- ❑ Descriptive and Statistical Analysis
- ❑ Grouping Data
- ❑ Aggregating Data
- ❑ Visualizations using Python libraries.

# Results and Recommendations

Saturday & Sunday have the highest number of orders placed while Tuesday & Wednesday have the lowest number of orders placed.

I would recommend ads to be run on weekdays to help with Mon - Fri order volume.

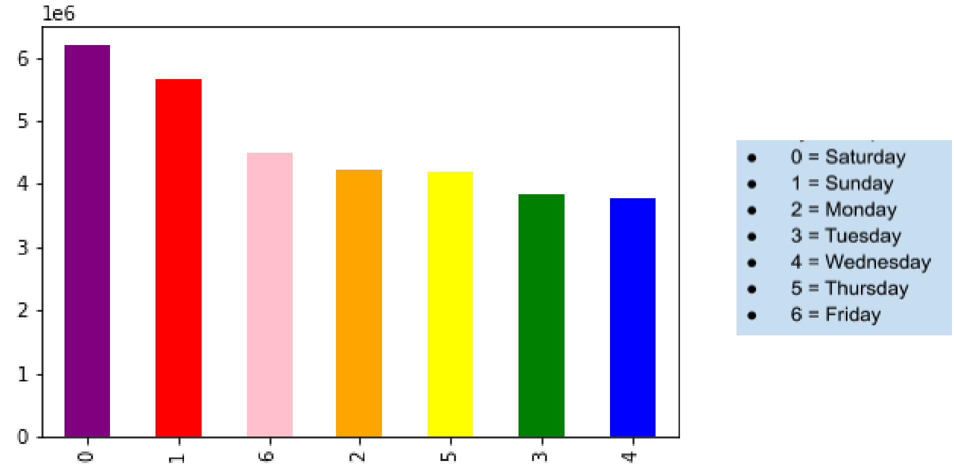


**Fig.2 Number of Orders Per Day**

Very few orders are placed through the hours of night.

With the most popular hours being 10am - 3pm & least popular hours being 10pm - 6am, company should focus on ads during 6pm - 10pm.

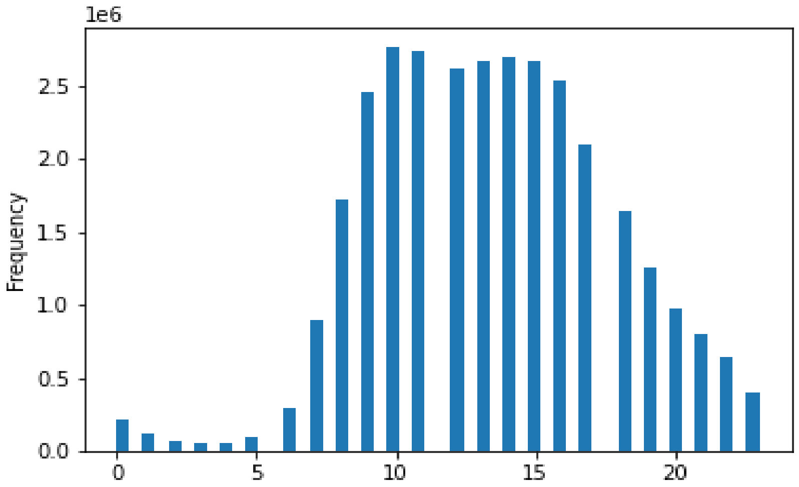


**Fig.3 Number of Orders Per Hour**

# Results and Recommendations

Surprisingly orders at 2am result in the highest average prices paid (perhaps emergency purchases? or people may spend more time on shopping during the night time).

Because marketing at such an uncommon time may not be worthwhile, I would recommend focusing advertising on the 2nd highest paid times at 6am and other hours which are having average price of products purchased.

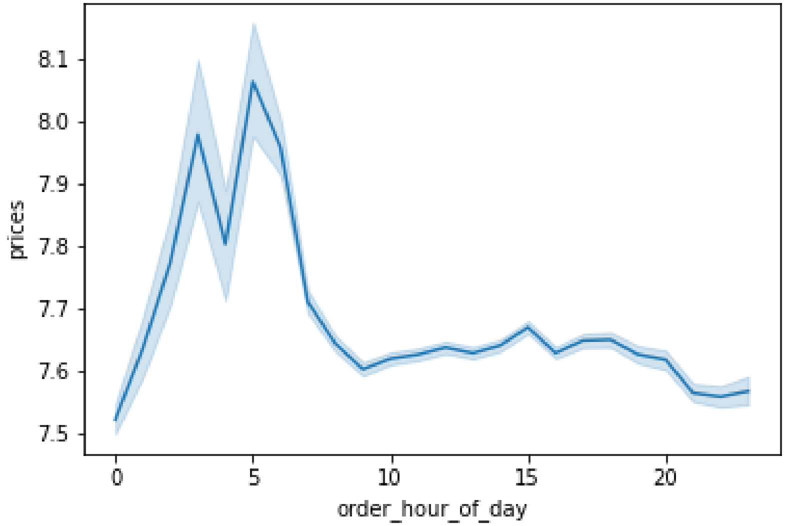
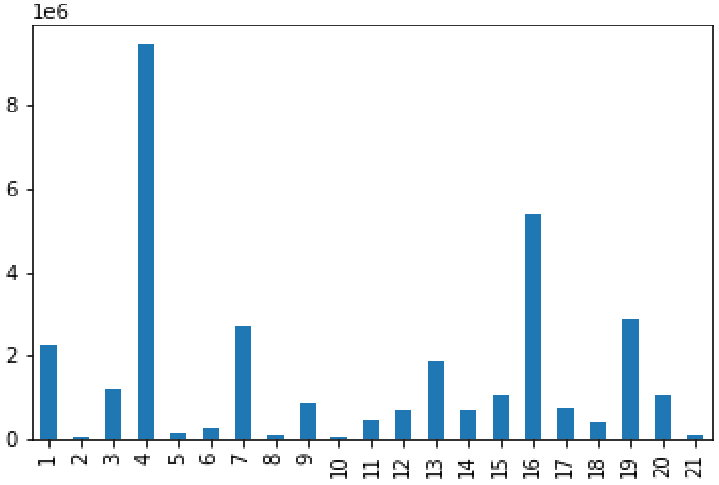
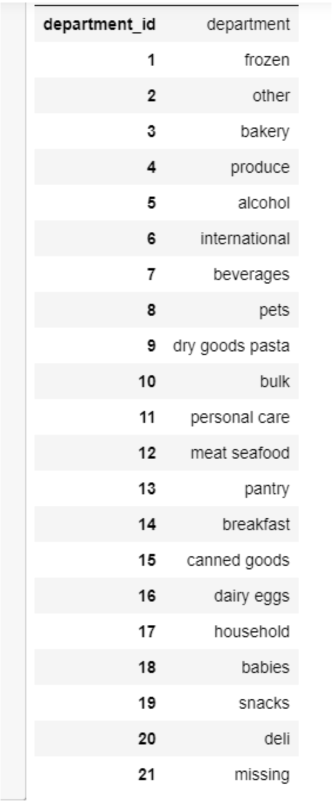


**Fig.4 Average Price of Products Purchased Each Hour**

Produce is the most popular department followed by dairy/eggs, snacks, frozen then beverages.





| department_id | department |
|---|---|
| 1 | frozen |
| 2 | other |
| 3 | bakery |
| 4 | produce |
| 5 | alcohol |
| 6 | international |
| 7 | beverages |
| 8 | pets |
| 9 | dry goods pasta |
| 10 | bulk |
| 11 | personal care |
| 12 | meat seafood |
| 13 | pantry |
| 14 | breakfast |
| 15 | canned goods |
| 16 | dairy eggs |
| 17 | household |
| 18 | babies |
| 19 | snacks |
| 20 | deli |
| 21 | missing |

**Fig.5 Frequency of Orders Placed in Each Department**

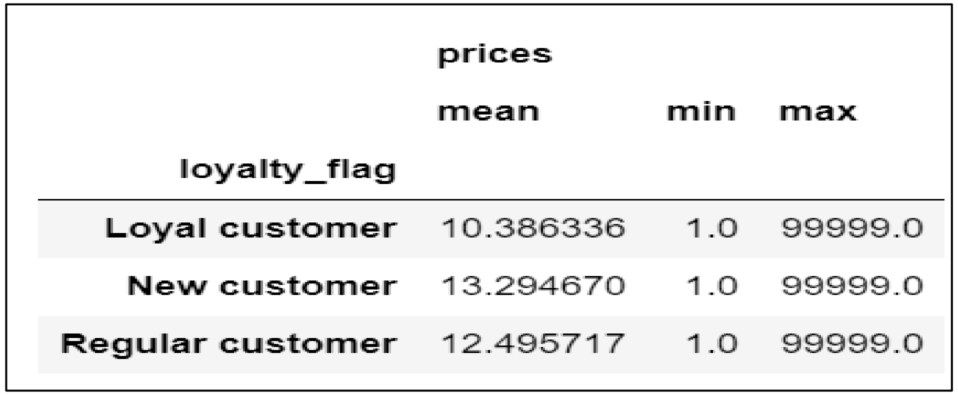
# Results and Recommendations

The min and max ordering price is same for all customer categories.

But average price for ordering is the highest for new customers followed by regular and then loyal customers.

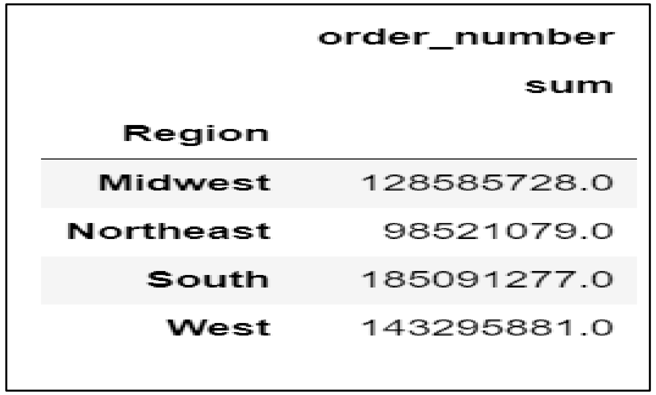
South region has the largest number of total orders followed by West, Midwest region.

Northeast has lowest number of orders as compared to other regions.



| | prices | | |
|---|---|---|---|
| | mean | min | max |
| loyalty_flag | | | |
| Loyal customer | 10.386336 | 1.0 | 99999.0 |
| New customer | 13.294670 | 1.0 | 99999.0 |
| Regular customer | 12.495717 | 1.0 | 99999.0 |

Fig. 6 Distribution of orders among customers in terms of loyalty



| | order_number |
|---|---|
| | sum |
| Region | |
| Midwest | 128585728.0 |
| Northeast | 98521079.0 |
| South | 185091277.0 |
| West | 143295881.0 |

Fig.7 Ordering habits based on a customer’s region

# Customers Ordering Habits

Busiest Days: Saturday and Sunday
Busiest Hours : Between 10 AM and 3 PM

Most Popular Department : Produce

Times of the day when people spend the most money: Early morning 6 AM

Average price of ordering is the highest for new customers followed by regular and then loyal customers.

South region has the largest number of total orders followed by West, Midwest region.

# Challenges Faced

This was my favourite as well as most challenging project. Since Python was completely new for me, I enjoyed working with it.

While working with large datasets, Jupyter Notebook slowed down dramatically and did not produce all the necessary outputs. It also started throwing some memory errors while integrating and exporting datasets. My laptop got hanged many times due to this time consuming execution for large datasets.

***Solution*:** I discussed this issue with my tutor and he shared one article which explained this memory issue due to big data types for columns. I then converted data types for all necessary columns and then this issue got resolved.

# Thank You!!

Glad you made it through! Please feel free to reach out to me using below links ☺