EXPLORATORY DATA ANALYSIS

Project by
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ABOUT BIG BASKET

- BigBasket is an online grocery store in India that was founded in 2011 and is headquartered in Bangalore. It was the first online grocer in India and is now one of the largest. BigBasket offers a wide range of products, including fresh fruits and vegetables, rice and dals, spices and seasonings, packaged products, beverages, personal care products, and meats.

Here are some facts about BigBasket:

- Operations
- BigBasket operates in more than 300 cities and towns in India and processes around 15 million orders per month.
- Products
- BigBasket offers over 100,000 products from more than 1,000 brands.
- Business model
- BigBasket uses a number of digital marketing strategies, including search engine optimization, social media marketing, content marketing, YouTube marketing, and influencer marketing.
- Supply chain
- BigBasket built an in-house Supply Chain Management (SCM) platform, TATA BB Matrix, to unify its disjointed systems.

INTRODUCTION:

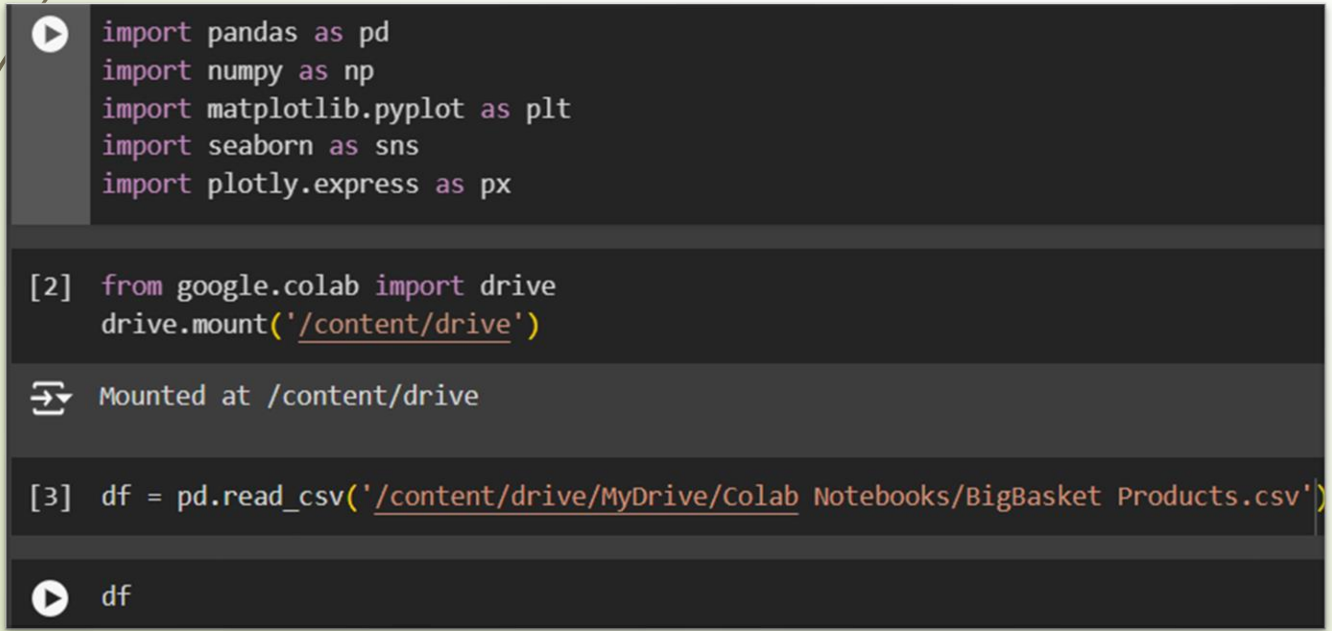
- his Dataset is sourced from Skill Circle and contains data collected from Big Basket. After a quick view of the Dataset, it looks like Sales dynamics data frame with multiple Product offerings. The dataset is a crucial asset for Exploratory Data Analysis (EDA), allowing us to explore Big Basket's operational metrics, product popularity, pricing strategies, and customer feedback in detail.
- This will involve steps such as loading the data, generating descriptive statistics, profiling the data, identifying outliers, and using visualization techniques.
- By conducting thorough analysis and creating visualizations, we seek to identify patterns, trends, and insights that can guide strategic decisions, improve inventory management, and enhance the shopping experience for customers.

OBJECTIVES OF THE PROJECT:

- The goals of this assessment is to –
- Sales Data Analysis : Understanding of General Sales performance and patterns.
- Top Selling Products : Identify which products are driving High Sales for the brand.
- Discount Analysis : Measure Discounts offered on products and analyze their impact on Sales.
- Handling Missing Values : Ensuring data quality by identifying and Handling Missing Values appropriately.
- Anomaly Detection and Handling : Identify and manage Anomalies to maintain data integrity.
- Consumer Insights : Ratings and product reviews provide valuable feedback that can guide product improvements and marketing efforts.
- Data Visualization : Create visual representations of data to better understand trends and insights.

DESCRIPTION OF DATASET:

- •The Dataset has been imported from Google Drive.
- • I have performed my work using Google Colaboratory Notebook.
- • As we begin our Exploratory Data Analysis (EDA), I've named the dataset ‘df’.
- • The dataset comprises of 27,555 Rows and 10 Columns.
- • For Data cleaning/visualization, I have utilized libraries like Numpy, Pandas, Seaborn, Matplotlib.
- • Any duplicate entries that were found have also been removed.



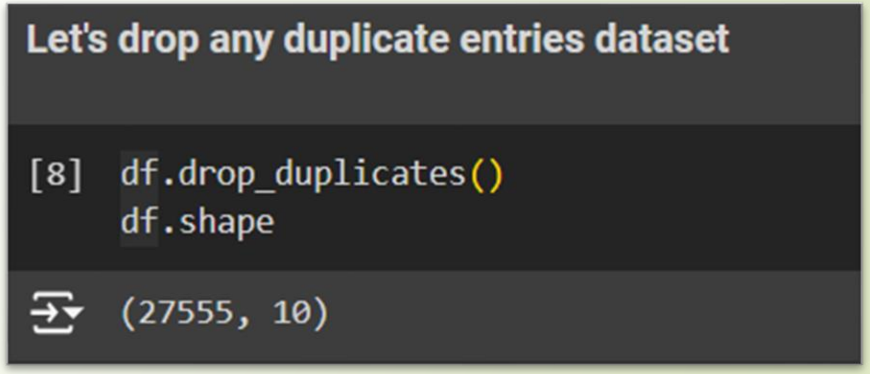
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import plotly.express as px
```

```
[2] from google.colab import drive
    drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
[3] df = pd.read_csv('/content/drive/MyDrive/Colab Notebooks/BigBasket Products.csv')
```

```
df
```



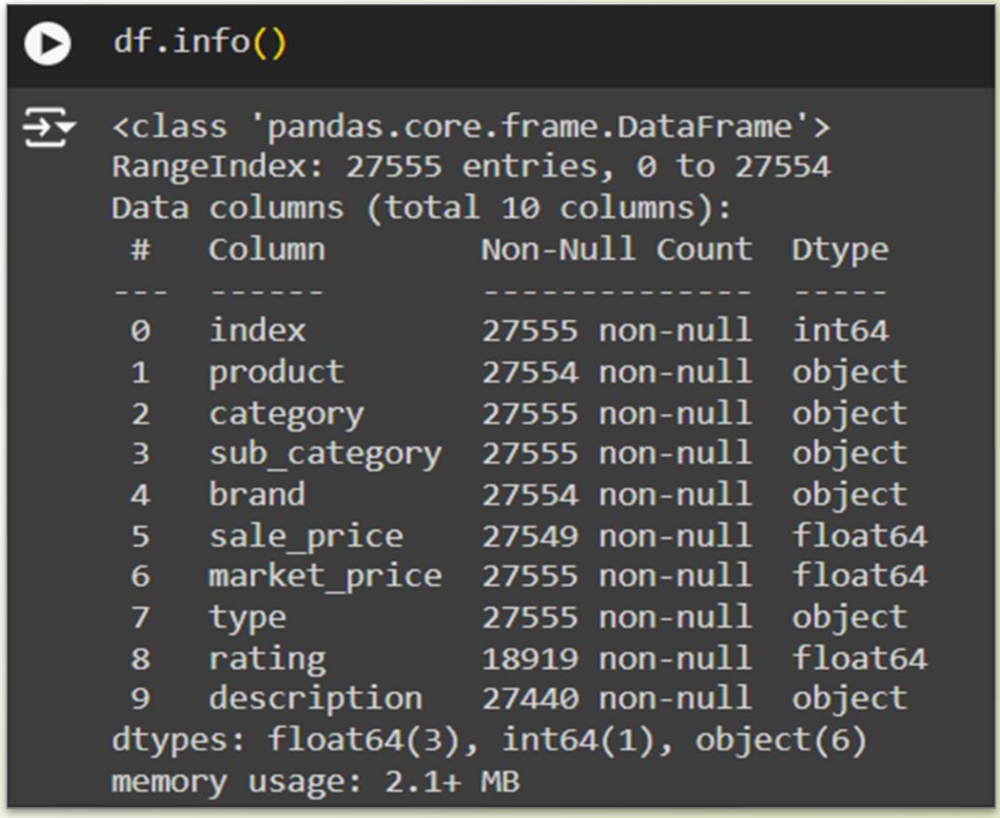
Let's drop any duplicate entries dataset

```
[8] df.drop_duplicates()
    df.shape
```

```
(27555, 10)
```

DESCRIPTION OF DATASET:

- The dataset under examination provides a comprehensive insight into Big Basket's product offerings and sales dynamics. It encompasses 10 key attributes that shed light on various facets of the business:
- Key Features include: - Index: This attribute serves as a unique identifier for each entry in the dataset.
- Product: The 'Product' attribute represents the title or name of the products listed on the Big Basket platform.
- Category: The 'Category' attribute classifies the products into broader categories, such as fruits, vegetables, dairy products, beverages, etc.
- Sub Category: Within each broad category, are further classified into more categories.

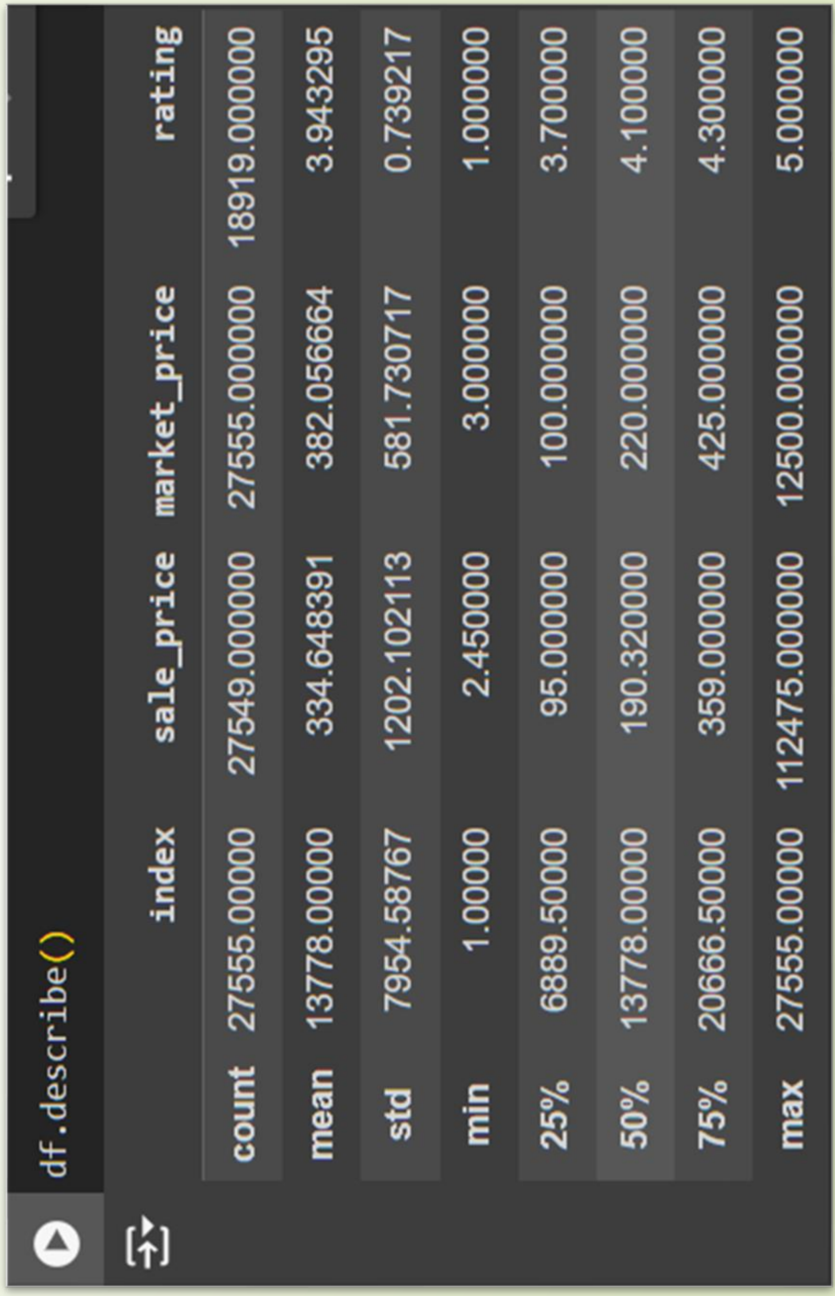


```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 27555 entries, 0 to 27554
Data columns (total 10 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   index         27555 non-null  int64
 1   product       27554 non-null  object
 2   category      27555 non-null  object
 3   sub_category  27555 non-null  object
 4   brand         27554 non-null  object
 5   sale_price    27549 non-null  float64
 6   market_price  27555 non-null  float64
 7   type          27555 non-null  object
 8   rating        18919 non-null  float64
 9   description   27440 non-null  object
dtypes: float64(3), int64(1), object(6)
memory usage: 2.1+ MB
```

DESCRIPTION OF DATASET:

- **Brand:** The 'Brand' attribute indicates the brand or manufacturer associated with each product.
- **Sale Price:** The 'Sale Price' attribute denotes the price at which each product is offered to consumers.
- **Market Price:** The 'Market Price' attribute specifies the standard market price of each product.
- **Type:** The 'Type' attribute categorizes the products based on their nature or characteristics.
- **Rating:** The 'Rating' attribute represents the consumer rating or feedback received by each product on the Big Basket platform.
- **Description**: The 'Description' attribute provides a detailed narrative describing the dataset, its scope, and the context in which it was compiled



```
df.describe()

             index     sale_price   market_price        rating
count  27555.00000   27549.000000   27555.000000  18919.000000
mean   13778.00000     334.648391     382.056664      3.943295
std     7954.58767    1202.102113     581.730717      0.739217
min        1.00000       2.450000       3.000000      1.000000
25%     6889.50000      95.000000     100.000000      3.700000
50%    13778.00000     190.320000     220.000000      4.100000
75%    20666.50000     359.000000     425.000000      4.300000
max    27555.00000  112475.000000   12500.000000      5.000000
```

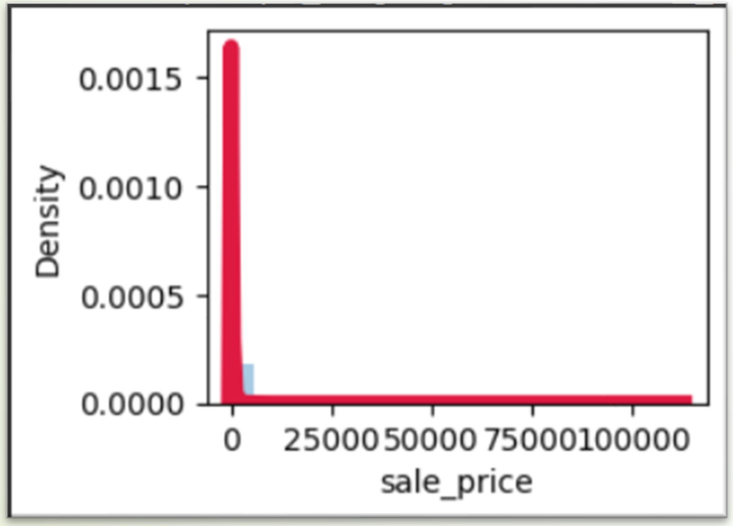
DATA CLEANING & PRE-PROCESSING:

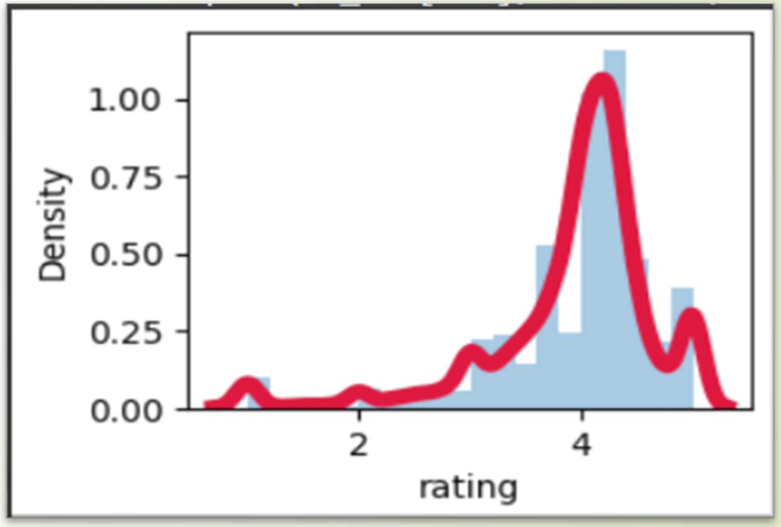
- The Dataset contains a total of 8,759 Null values. Of these, 117 are found in categorical features, while 8,642 are in numerical features.

- First handeling missing value in numerical column

##Mean: Whenever your data is numeric and normally distributed, in this case you will impute missing values with Mean.

##Median: Whenever your data is numeric and skewed, in this case you will impute missing values with Median.

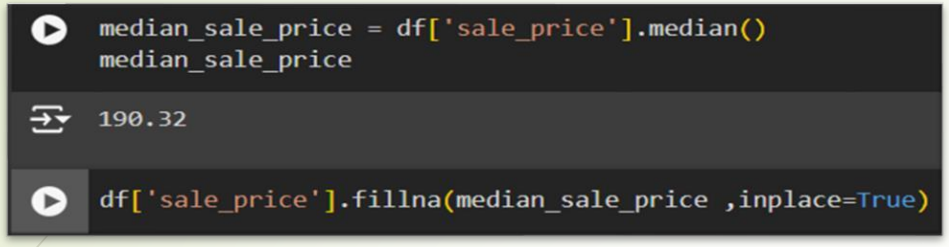




- For the ‘sale-price’ attribute, which has 6 null value filling in the missing entries with the ‘median’ will help ensure data completeness

- For the ‘rating’ attribute, which has 8636 null value filling in the missing entries with the ‘median’ will help ensure data completeness.

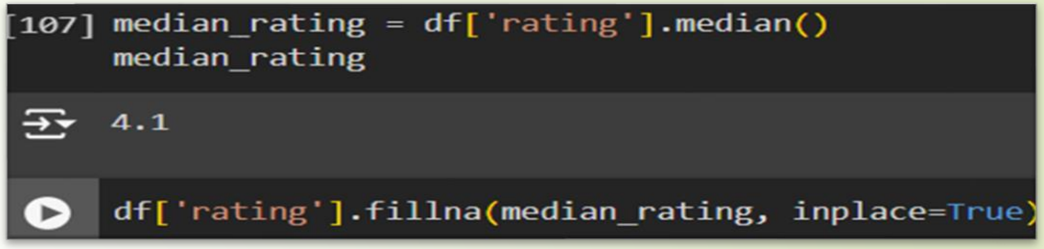
DATA CLEANING & PRE-PROCESSING:



```
median_sale_price = df['sale_price'].median()
median_sale_price
```

```
190.32
```

```
df['sale_price'].fillna(median_sale_price ,inplace=True)
```

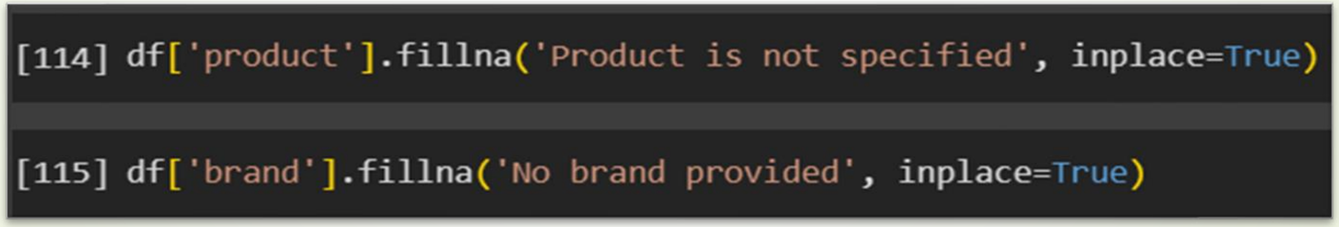


```
[107] median_rating = df['rating'].median()
      median_rating
```

```
4.1
```

```
df['rating'].fillna(median_rating, inplace=True)
```

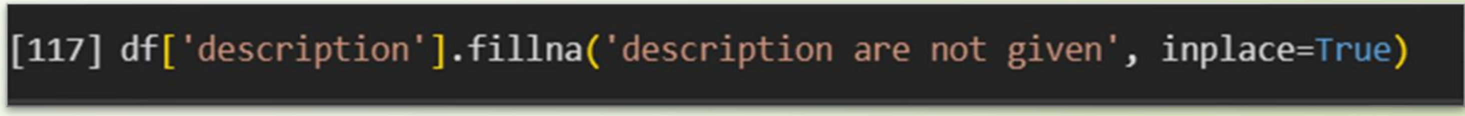
- The Dataset contains a total of 8,759 Null values. Of these, 117 are found in categorical features, while 8,642 are in numerical features.
- Brand : The 'Brand' attribute has only 1 null value in the categorical data. To ensure data completeness, this value can be filled with 'No Brand Provided'.
- Product : For another categorical attribute 'Product' which has again 1 null value, using 'Product is not specified' to fill in the missing value is a viable solution.



```
[114] df['product'].fillna('Product is not specified', inplace=True)

[115] df['brand'].fillna('No brand provided', inplace=True)
```

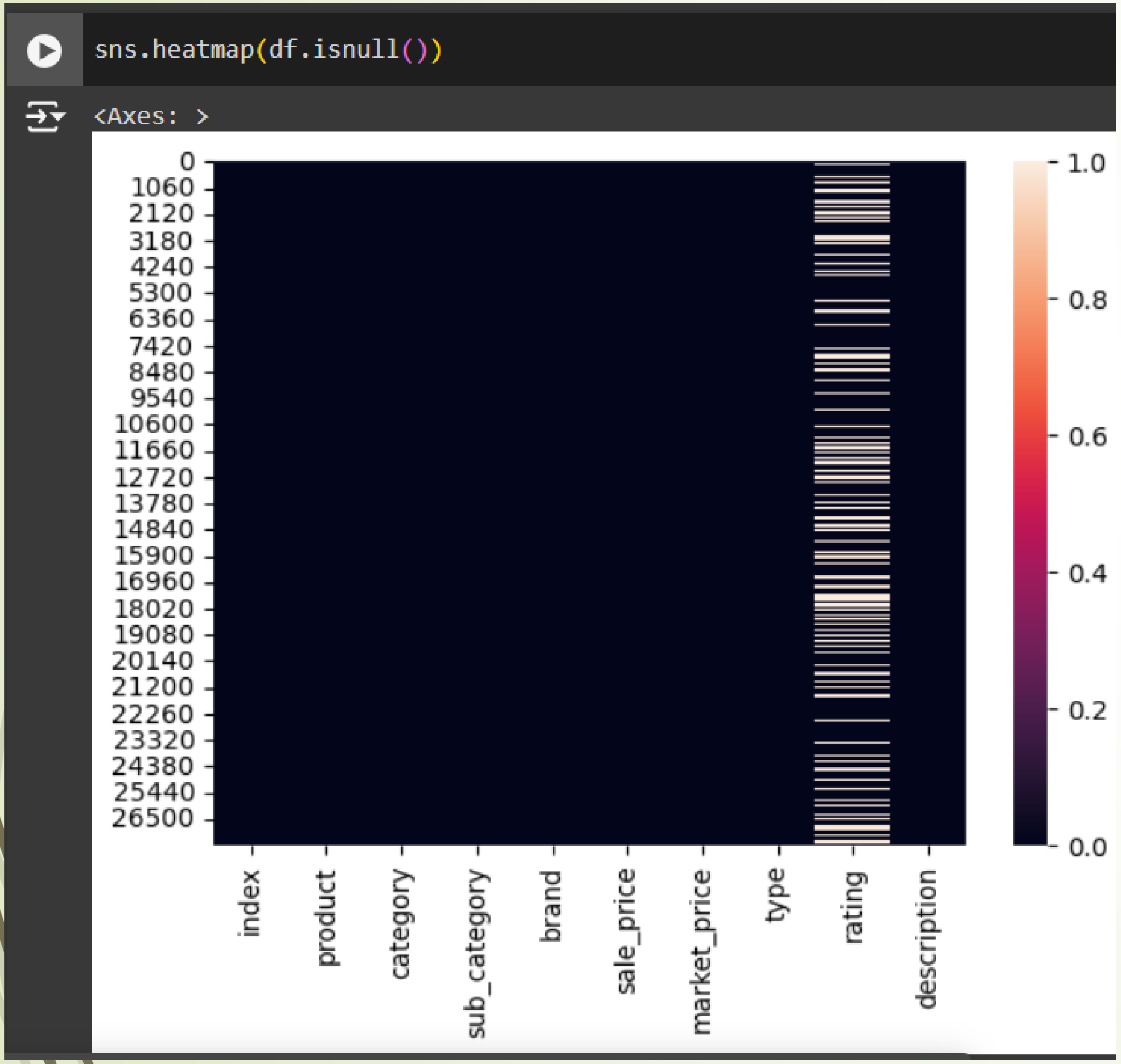
- For the 'description' attribute, which has 115 null value filling in the missing entries with the ' description are not given' will help ensure data completeness



```
[117] df['description'].fillna('description are not given', inplace=True)
```

HEATMAPS

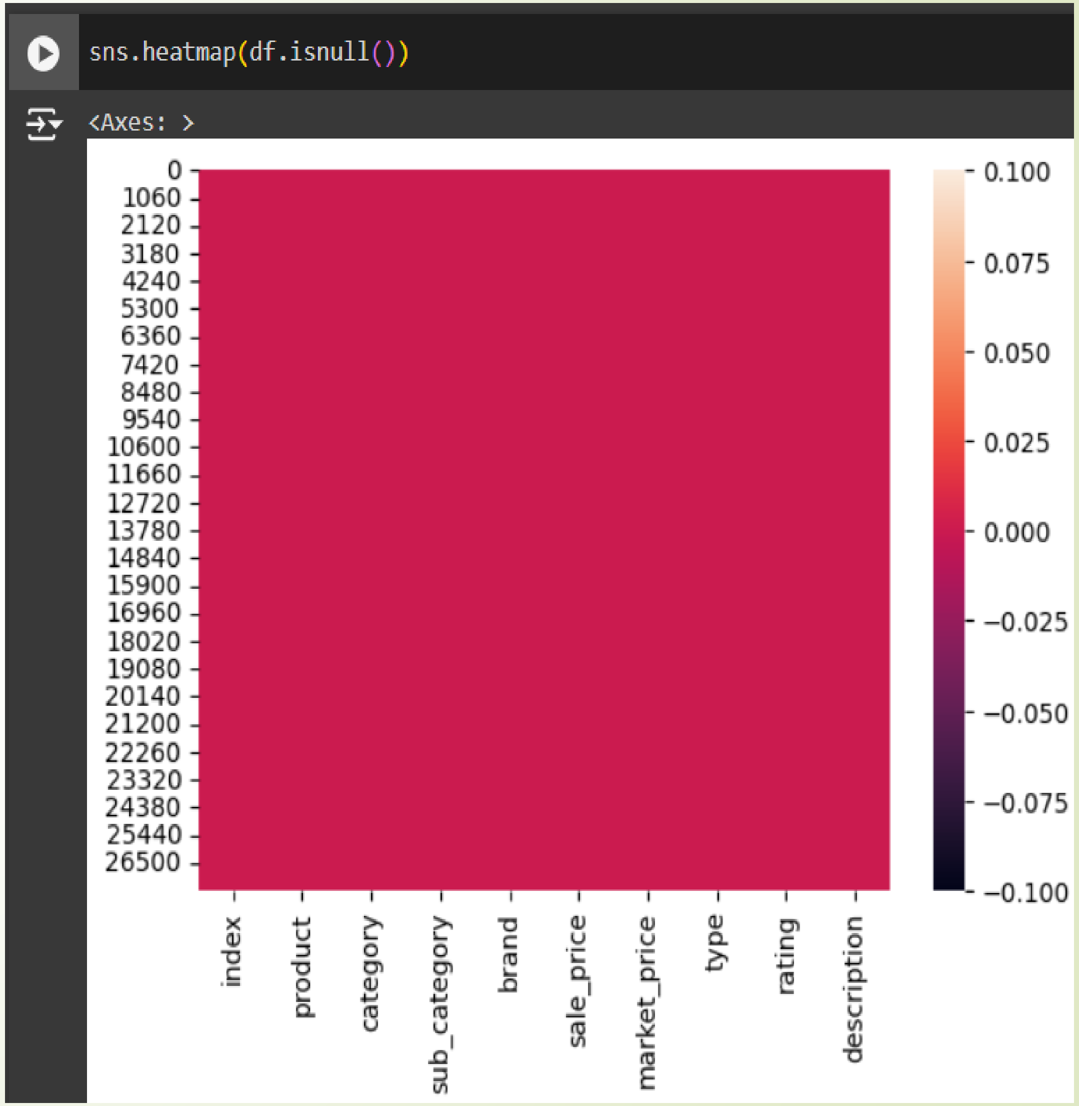
Before Cleaning



```
sns.heatmap(df.isnull())
```

```
<Axes: >
```

After Cleaning

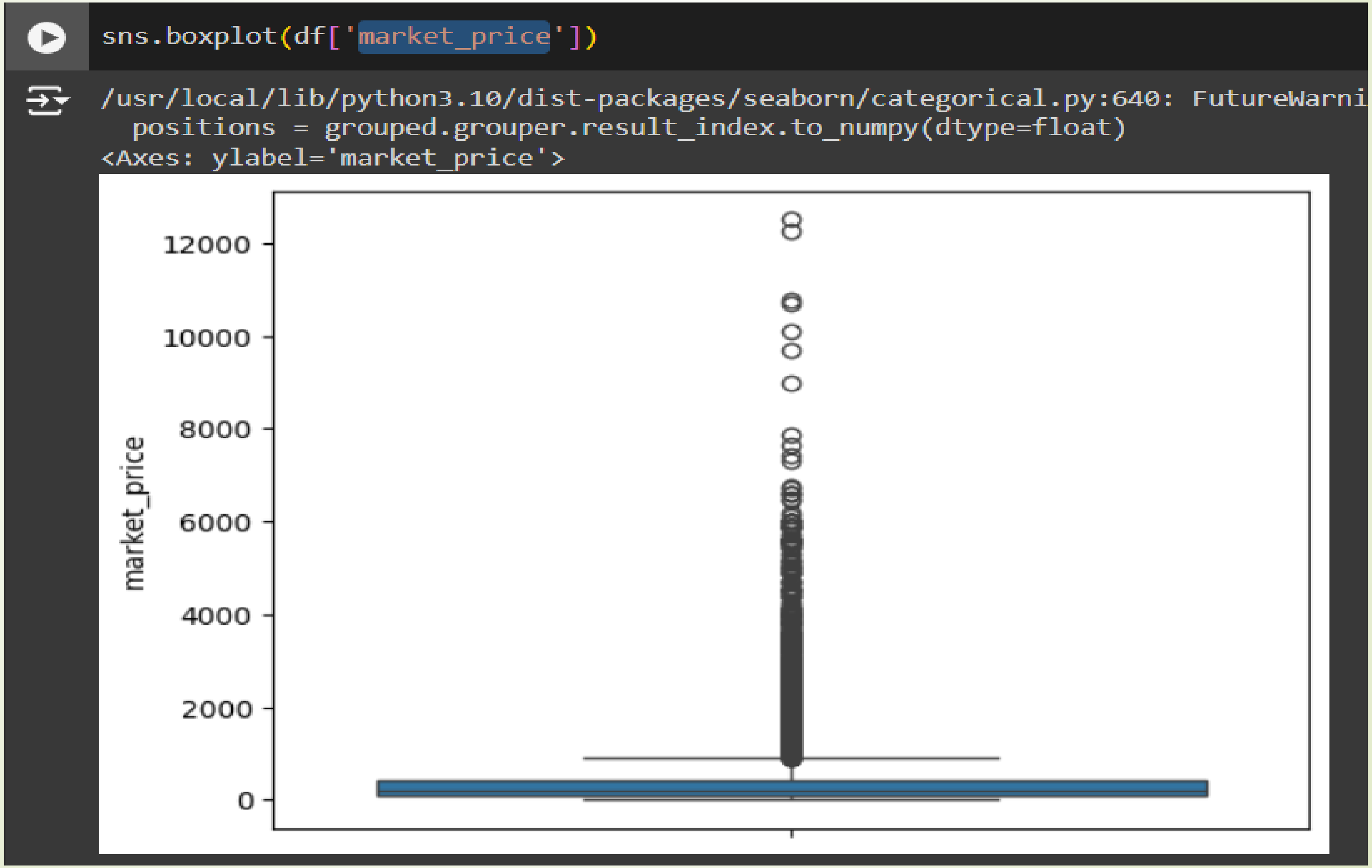


```
sns.heatmap(df.isnull())
```

```
<Axes: >
```

REMOVING OUTLIERS

- After generating a box plot for the ‘market_price’ , we identified the presence of outliers in this column.

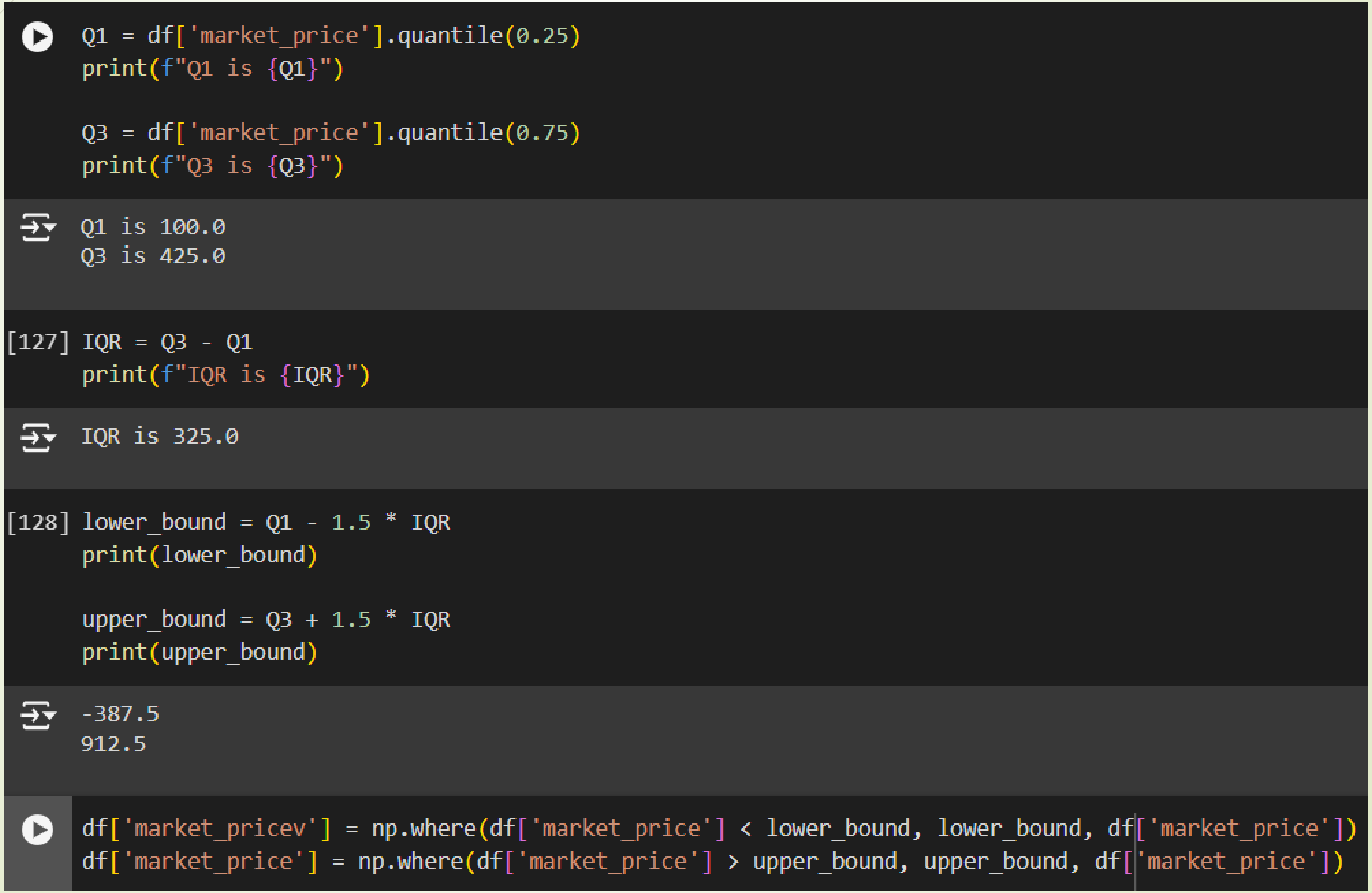


```
sns.boxplot(df['market_price'])
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarni
  positions = grouped.grouper.result_index.to_numpy(dtype=float)
<Axes: ylabel='market_price'>
```

REMOVING OUTLIERS

- To address these outliers, we will apply the IQR method.



```
Q1 = df['market_price'].quantile(0.25)
print(f"Q1 is {Q1}")

Q3 = df['market_price'].quantile(0.75)
print(f"Q3 is {Q3}")
```

```
Q1 is 100.0
Q3 is 425.0
```

```
[127] IQR = Q3 - Q1
      print(f"IQR is {IQR}")
```

```
IQR is 325.0
```

```
[128] lower_bound = Q1 - 1.5 * IQR
      print(lower_bound)

      upper_bound = Q3 + 1.5 * IQR
      print(upper_bound)
```

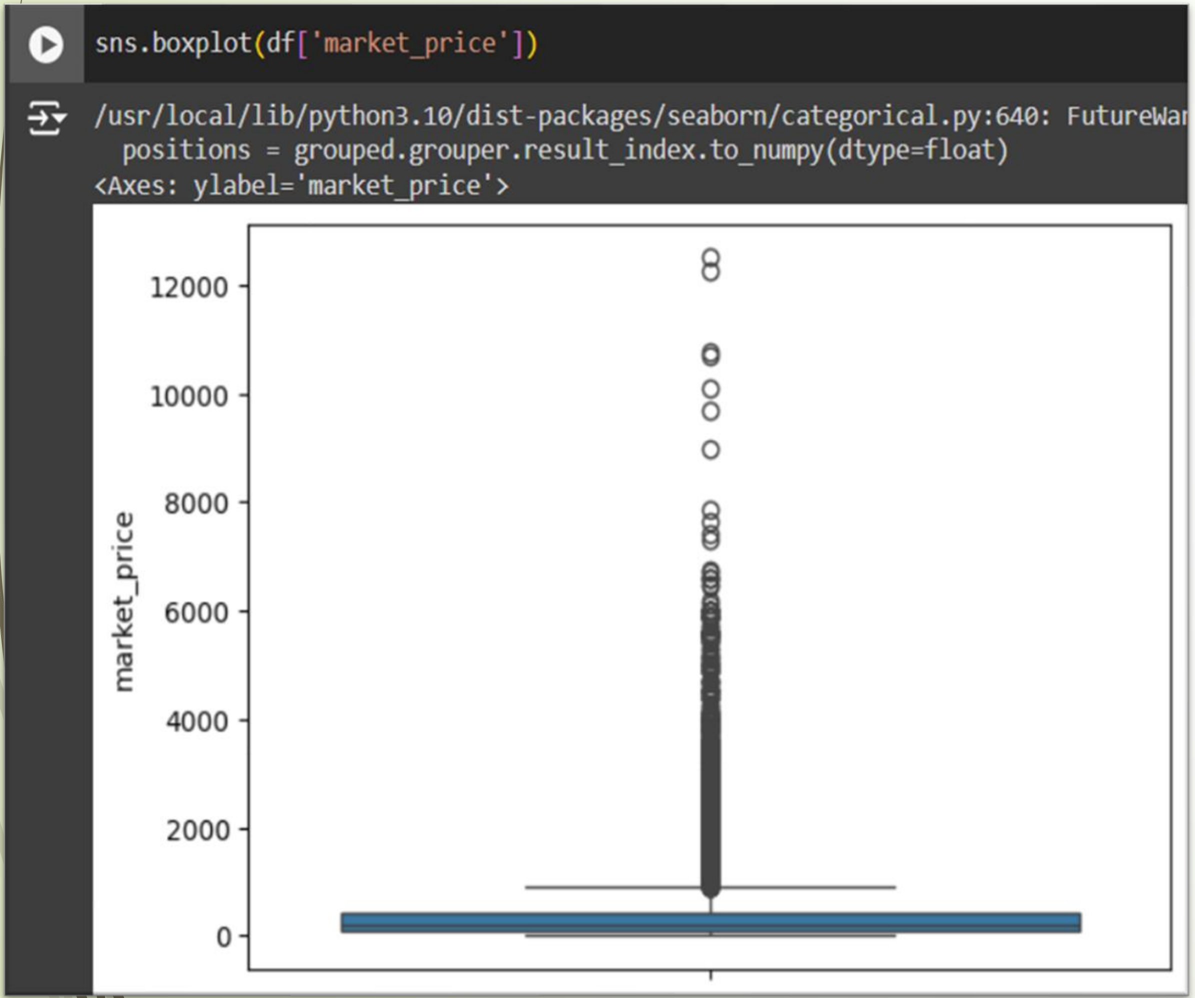
```
-387.5
912.5
```

```
df['market_pricev'] = np.where(df['market_price'] < lower_bound, lower_bound, df['market_price'])
df['market_price'] = np.where(df['market_price'] > upper_bound, upper_bound, df['market_price'])
```

REMOVING OUTLIERS

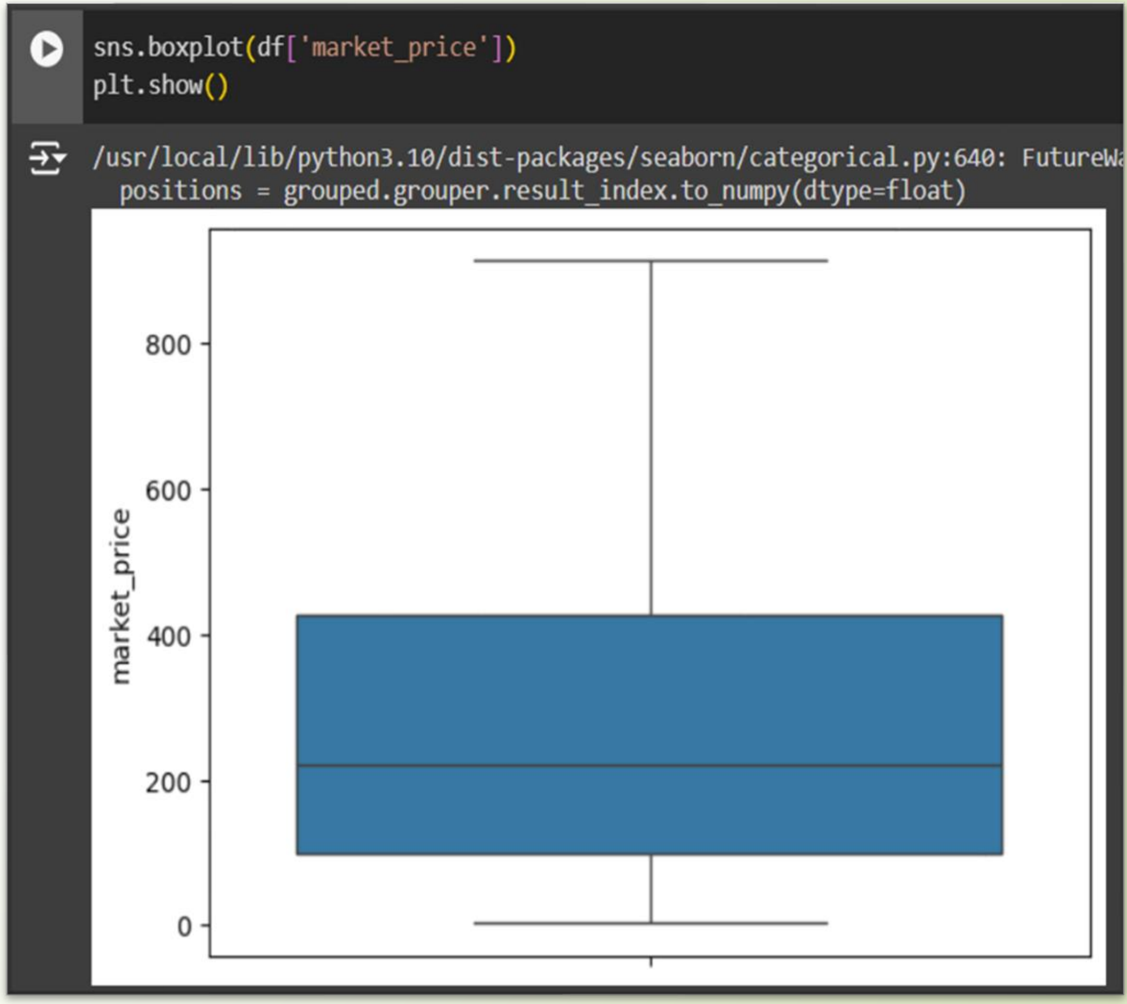
- **Before Removing**

After Removing



```
sns.boxplot(df['market_price'])
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWar
  positions = grouped.grouper.result_index.to_numpy(dtype=float)
<Axes: ylabel='market_price'>
```



```
sns.boxplot(df['market_price'])
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWa
  positions = grouped.grouper.result_index.to_numpy(dtype=float)
```

DATA CLEANING & PRE-PROCESSING:

- **Summary** - To summarize, addressing Null values and Outliers necessitates a methodical approach tailored to the data's characteristics and specific attributes. Data cleaning and Outlier handling are crucial steps for accurate analysis.

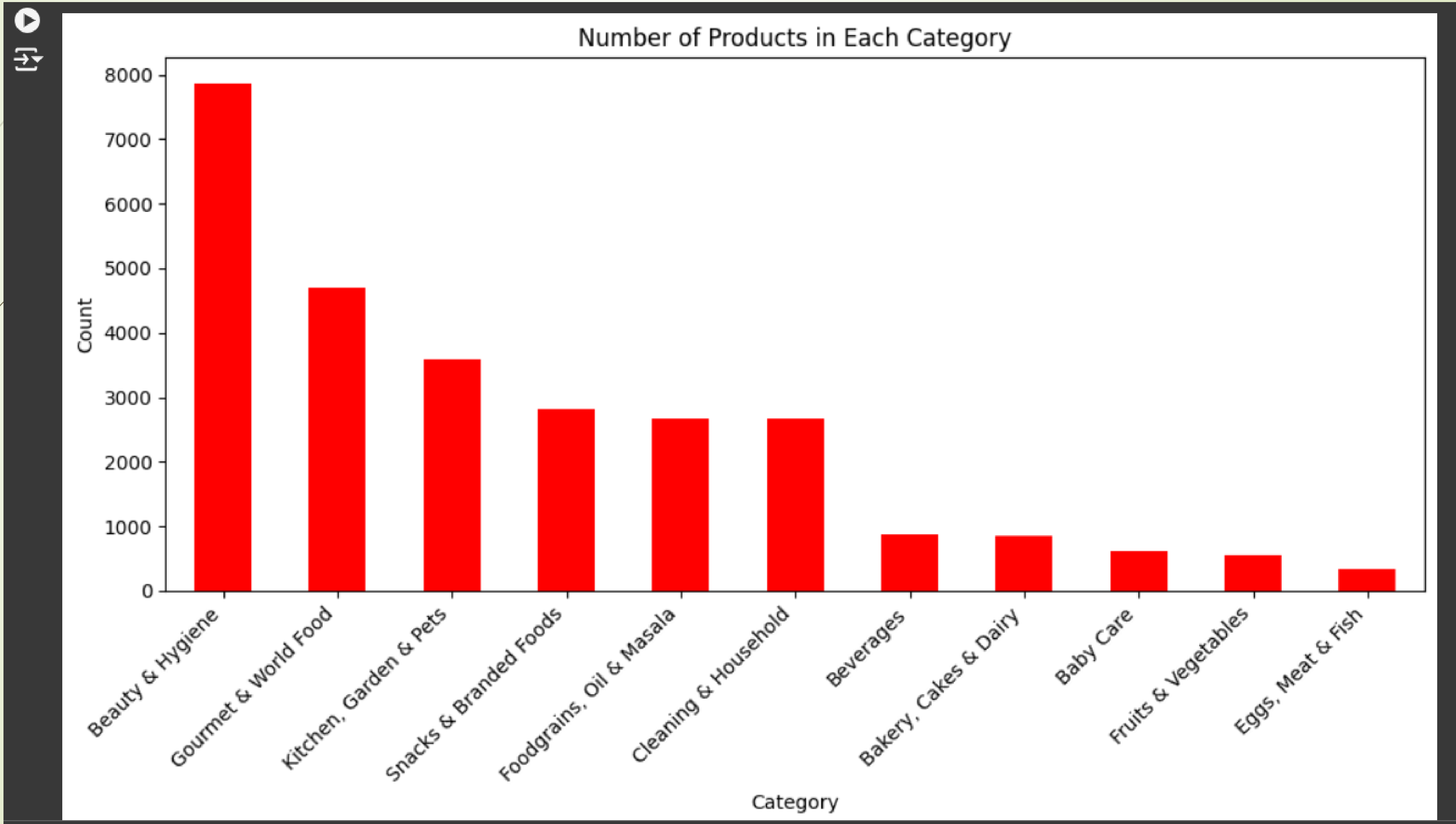
- ✓ The dataset contained Missing Values in ‘product', 'brand’, ‘sale price', 'rating' and 'description’ features. These were handled by imputation (filling with median/mode) and dropping irrelevant columns ('description’).

- ✓ Outliers were present in ‘sale price' and 'market price'. These were addressed using the IQR method and capping to boundary values.

- ✓ With these Null, Missing, and Invalid values appropriately addressed, we are now ready to move forward with analyzing the dataset.

Data Visualization and Insights

- **BAR CHART: Plot the distribution of number of products in each Category.**



Data Visualization and Insights

- **BAR CHART: Plot the distribution of number of products in each Category**

- **Key insights:**

- ➢ The category "Beauty & Hygiene" has the highest number of products. This suggests that Big Basket has a strong focus on this category followed by "Gourmet & World Food".

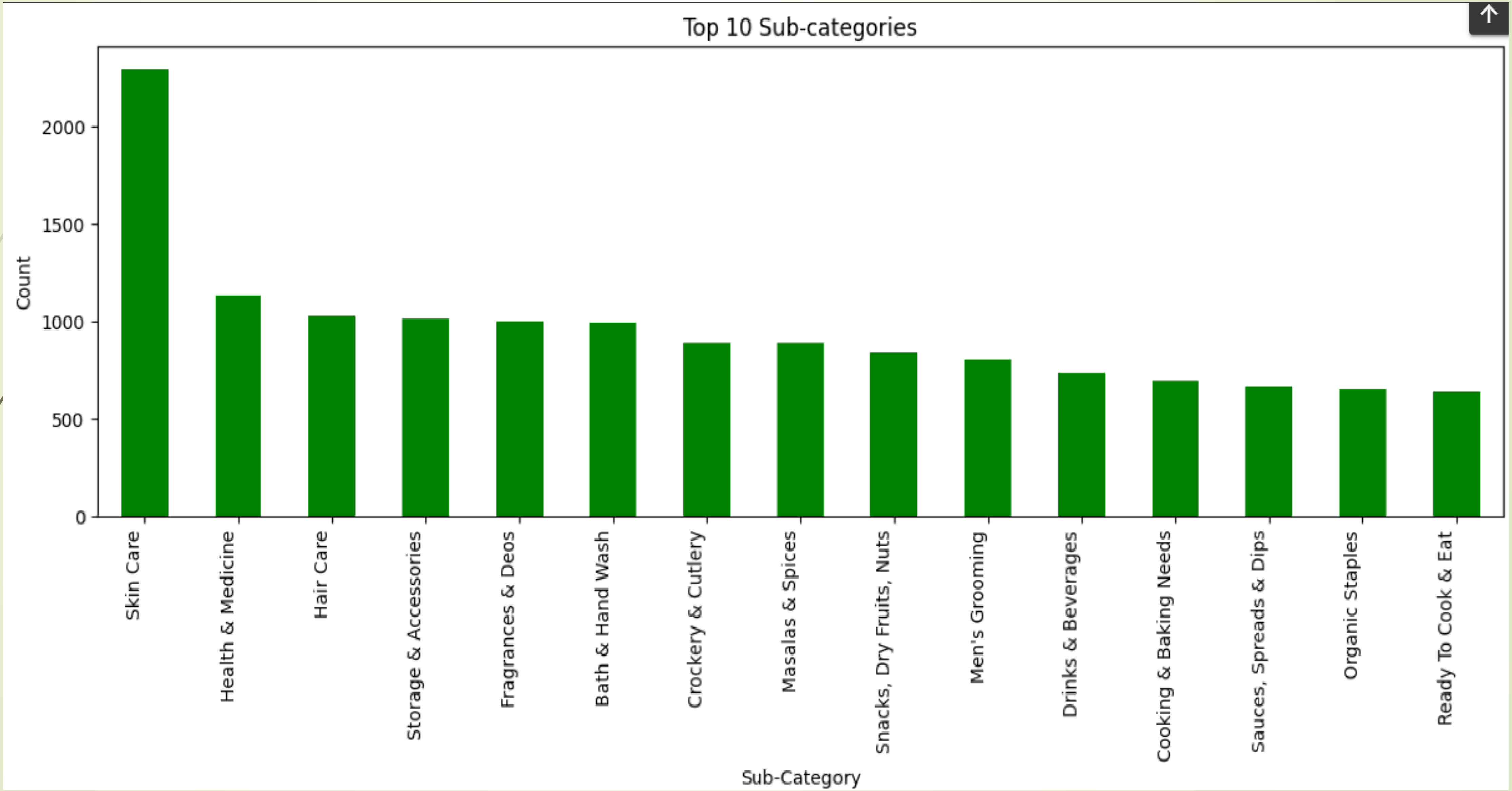
- ➢ The categories "Snacks & Branded Foods" and "Foodgrains, Oil & Masala" also have a significant number of products. These are essential categories that are likely to be in high demand.

- ➢ The categories "Fruits & Vegetables" and "Eggs, Meat & Fish" have a relatively smaller number of products. Big Basket may want to consider expanding their offerings in these categories to cater to a wider range of customer needs.

- ➢ Overall, the distribution of products across categories provides insights into Big Basket's focus areas and potential areas for growth

Data Visualization and Insights

- **BAR CHART: Plot the distribution of number of products in Top 15 Sub-category**



Data Visualization and Insights

- **BAR CHART: Plot the distribution of number of products in Top 20 Sub-category**

- **Key insights:**

- ➢ "Skin Care" is the leading sub-category with the highest number of products. "Health & Medicine" follows closely behind "Skin Care" in terms of product count.

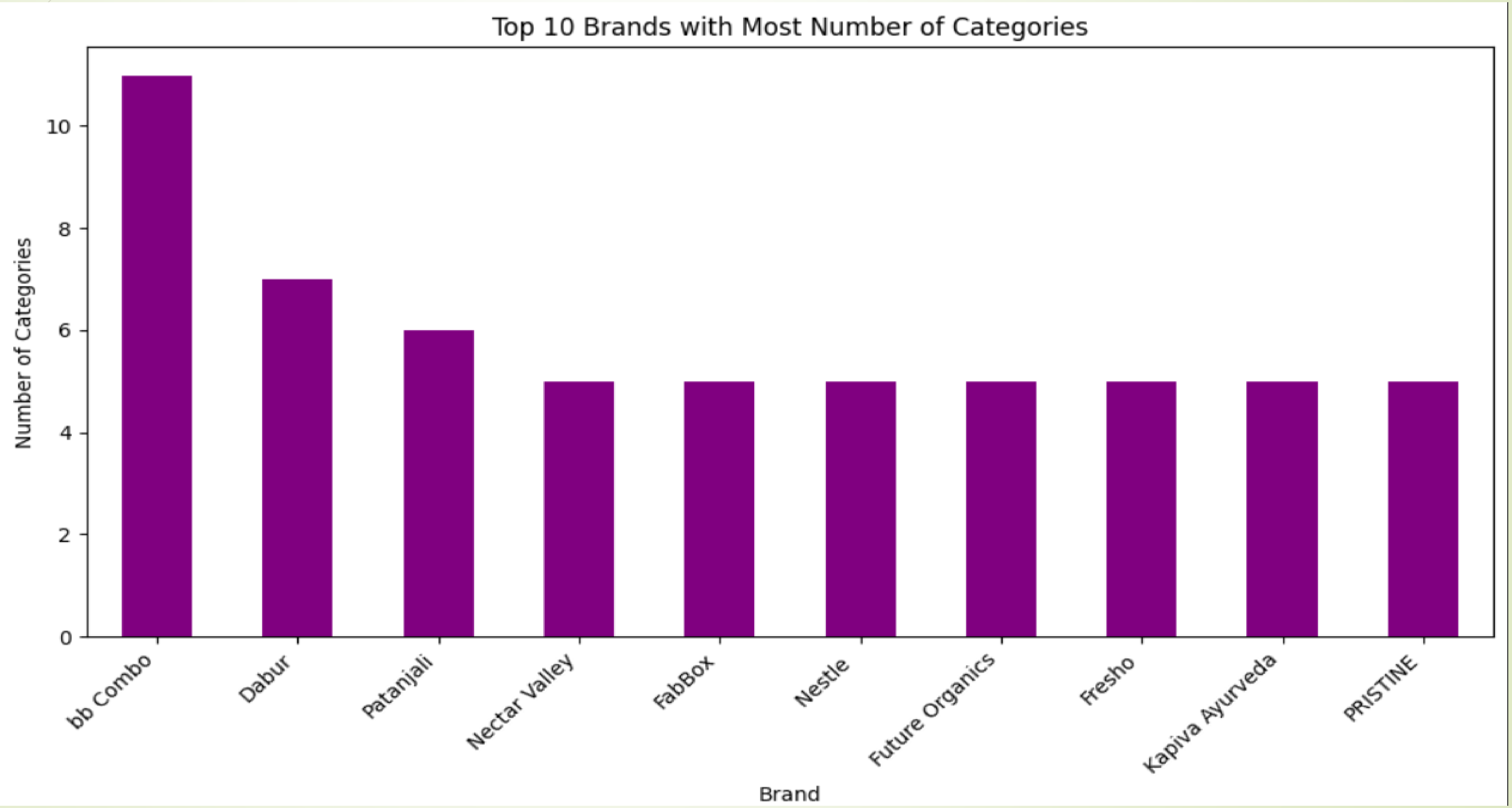
- ➢ There's a significant drop in product count after the top 3 categories ("Skincare", "Health & Medicine", and "Hair Care").

- ➢ It should be noted that all top 3 Sub-categories belongs to category "Beauty & Hygiene" estimating that Big Basket focus more on these categories.

- ➢ The remaining sub-categories have relatively similar product counts, with some fluctuations.

Data Visualization and Insights

- **BAR CHART:** **Draw a visualization of Top 10 brands with most number of Categories**



Data Visualization and Insights

- BAR CHART: Draw a visualization of Top 10 brands with most number of Categories.

- Key insights:

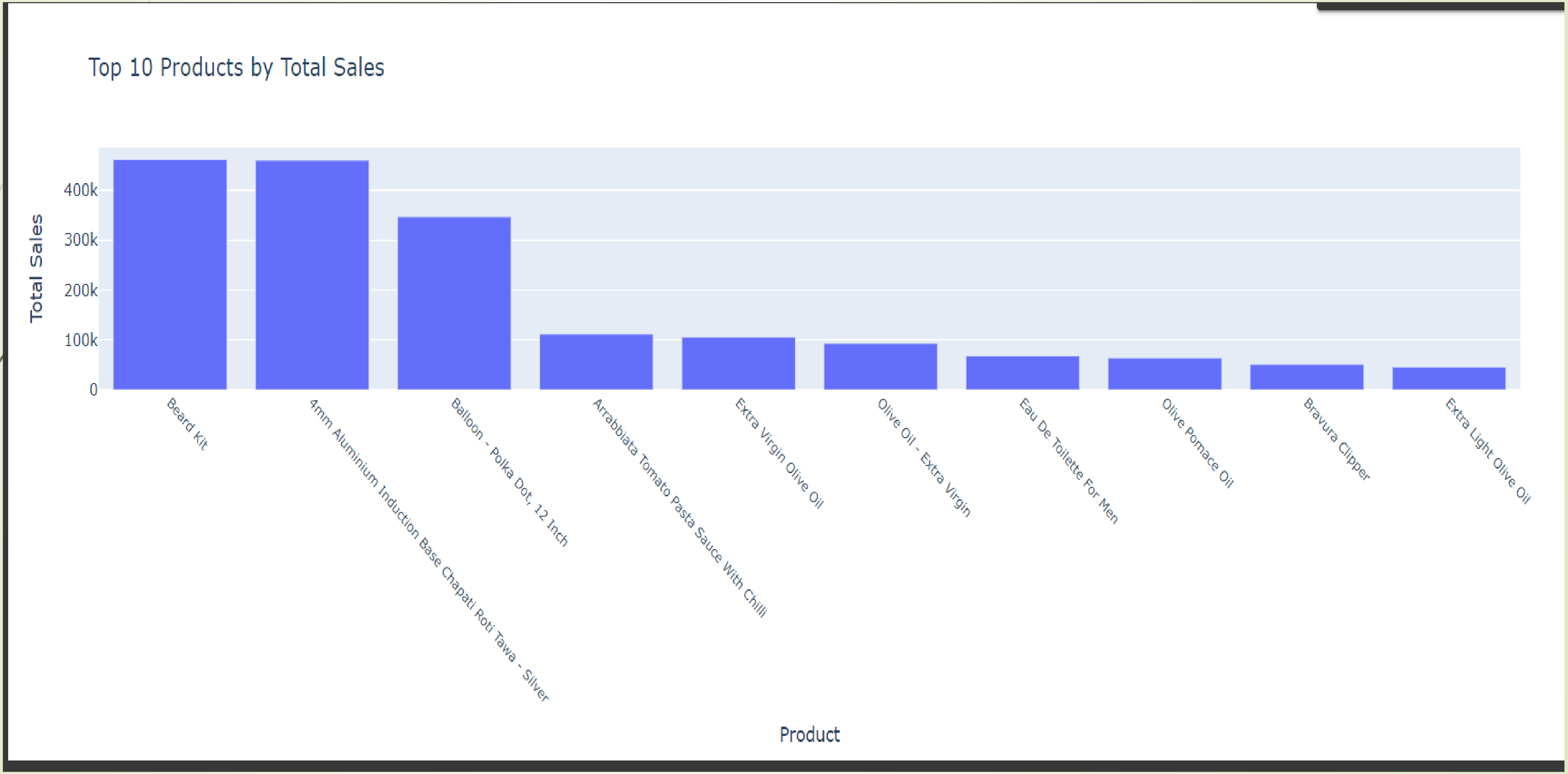
- ➢ "bb Combo" is the clear leader in terms of the number of categories offered with offering products in all 11 categories. To increase sales, Big Basket should prioritize support for these brands.

- ➢ There's a significant drop in the number of categories offered by the subsequent brands ("Dabur", "Patanjali", "Nectar Valley", and "FabBox").

- ➢ The remaining four brands have a relatively similar number of categories, with slight variations

Data Visualization and Insights

- **BAR CHART:** Draw a visualization of Top 10 products by Total Sales.

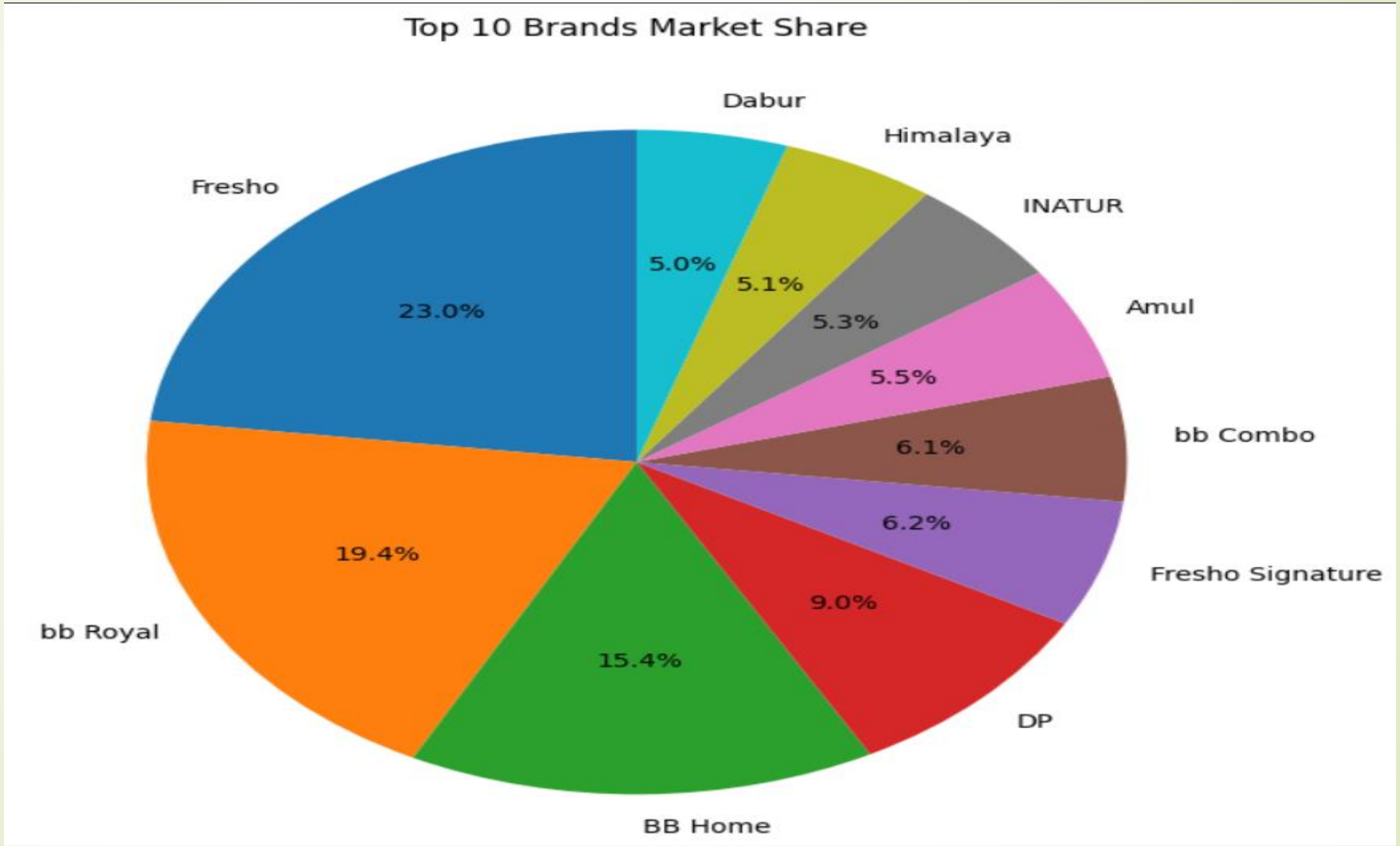


Data Visualization and Insights

- **BAR CHART:** Draw a visualization of Top 10 products by Total Sales.
- **Key insights:**
- ➢ "Extra Virgin Olive Oil" is the top-selling product, with sales significantly higher than the other products.
- ➢ "Colorsilk Hair Colour With Keratin" is the second best-selling product, followed closely by "Cow Ghee/Tuppa" and "Casting Creme Gloss Hair Color".
- ➢ The following three products, "Excellence Creme Hair Color", "Top Speed Hair Color", and "Olive Oil - Extra Virgin" have relatively similar sales figures, with "Excellence Creme Hair Color" being slightly ahead.
- ➢ Note that Top 10 products list is significantly dominated with "Beauty" (4 Products) and "Foodgrains/Gourmet" related items (5 Products). This finding aligns with our previous analysis in Bar chart of Question 1

Data Visualization and Insights

- **Brand Analysis –**
- **PIE CHART: Draw a visualization of Top 10 Brands to show their Market Share**

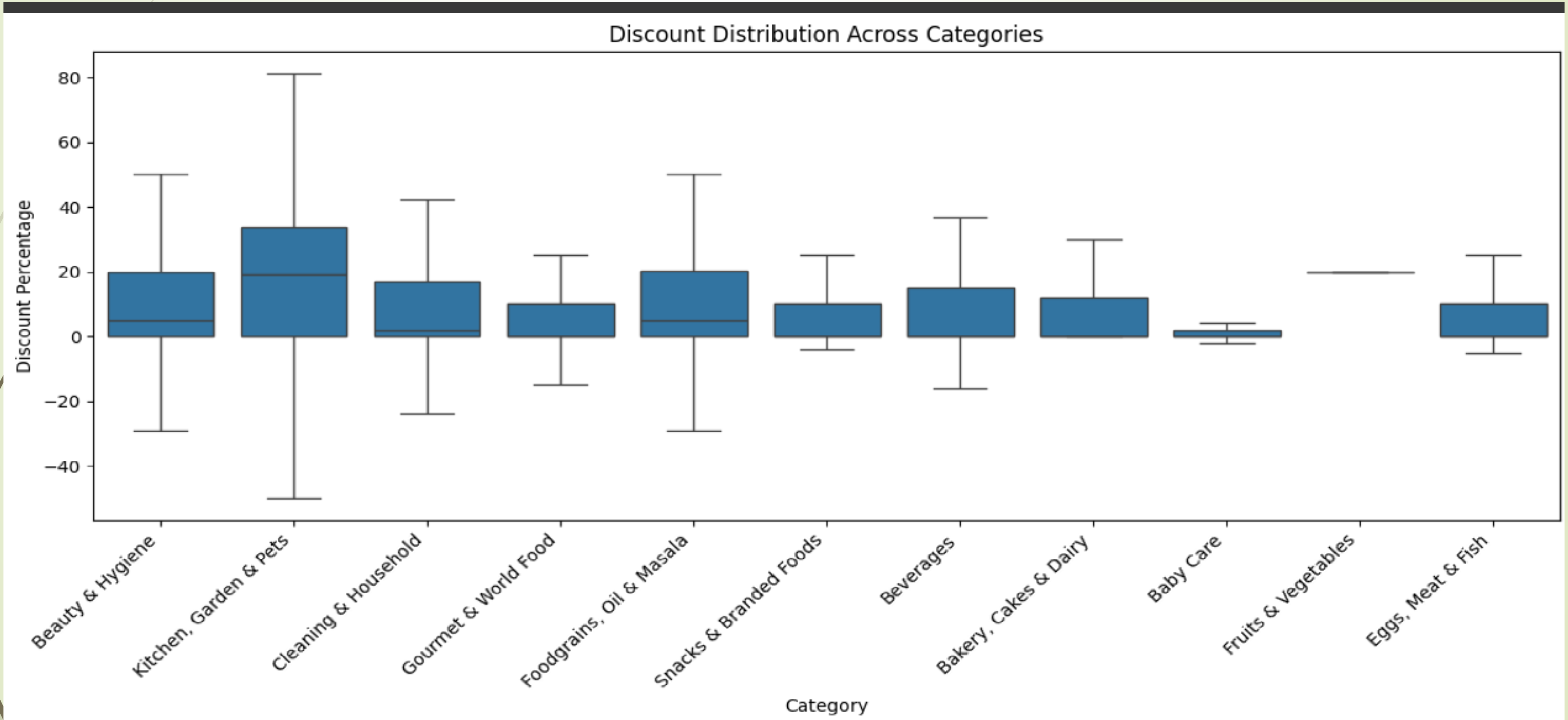


Data Visualization and Insights

- Brand Analysis –
- PIE CHART:
- Draw a visualization of Top 10 Brands to show their Market Share. Key insights:
- ➢ "Fresho" commands the largest market share with 23.0% among the top 10 brands, indicating its strong presence and popularity on Big Basket.
- ➢ "bb Royal" and "BB Home" also hold significant market shares with 19.4% and 15.4%, suggesting their strong brand recognition and customer loyalty.
- ➢ The chart reveals that Big Basket offers a diverse product range, encompassing categories like Baby care ("bb Combo"), Cleaning & Household ("DP"), Garden & Pets ("BB Home").
- ➢ Big Basket could consider strategies to further strengthen the market position of "Fresho", "bb Royal", and "BB Home" while also exploring ways to increase the market share of other brands

Data Visualization and Insights

- **Discount Analysis –**
- **BOXPLOT: Draw a visualization to compare Discount Distributions across Categories**

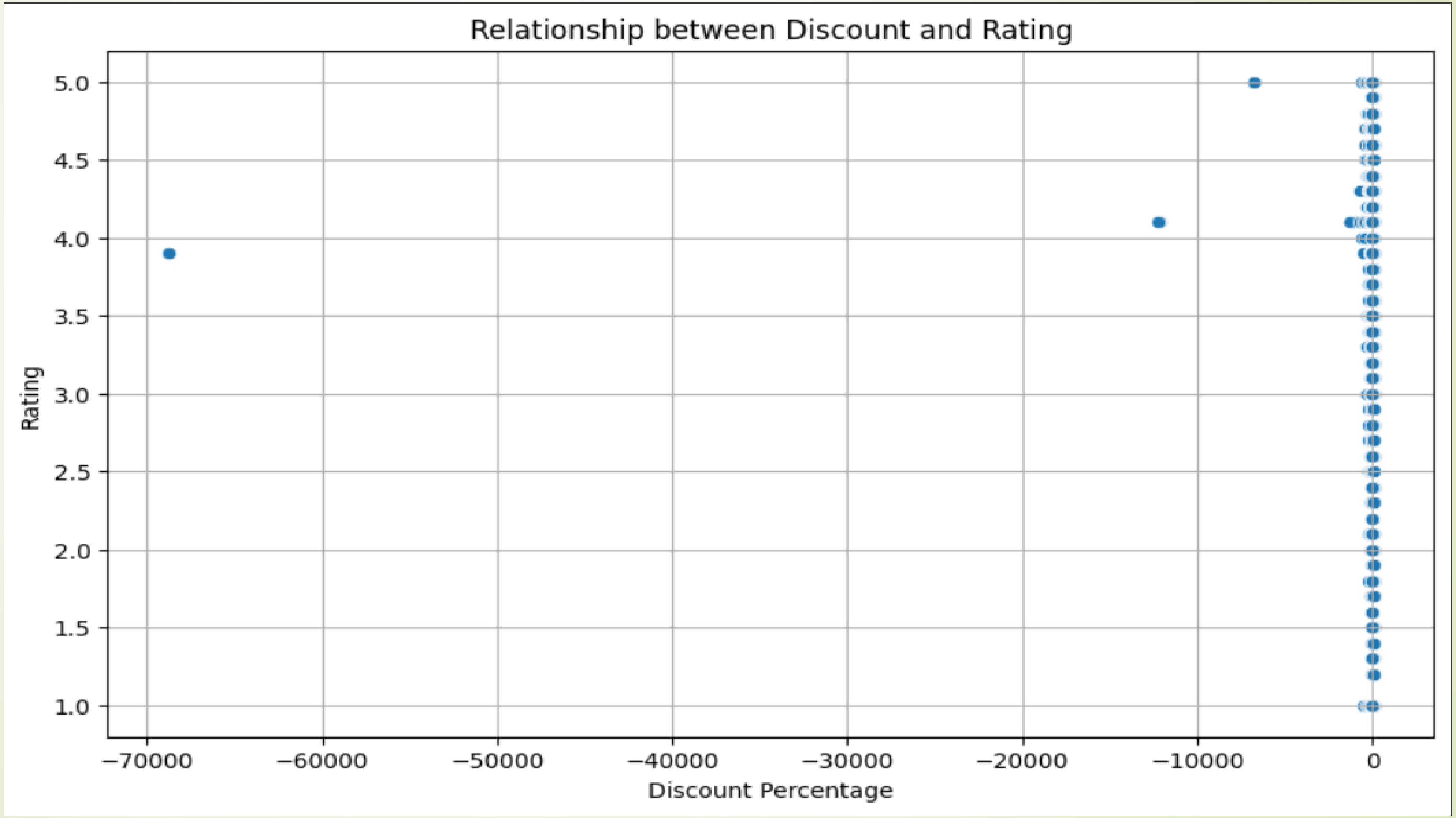


Data Visualization and Insights

- Discount Analysis –
- BOXPLOT: Draw a visualization to compare Discount Distributions across Categories.
- Key insights:
- **Potential Business Implications**
- ➢ Pricing Strategy : This visualization can inform pricing decisions for new products or adjustments to existing pricing. Like if we see a category with a high median price and low variability, we might consider introducing a lower-priced product to capture a different market segment.
- ➢ Inventory Management : Understanding price distributions can help with inventory management. Categories with a wide range of prices might require a more diverse inventory strategy compared to categories with a narrow price range.
- ➢ Marketing and Promotions : The insights from this plot can be used to tailor marketing and promotional efforts. For instance, we might focus discounts on categories with higher median prices to attract price-sensitive customers

Data Visualization and Insights

- **Discount Analysis –**
- **SCATTER PLOT: Draw a visualization to see if there's any relationship between Discount and Rating.**



Data Visualization and Insights

- Discount Analysis –

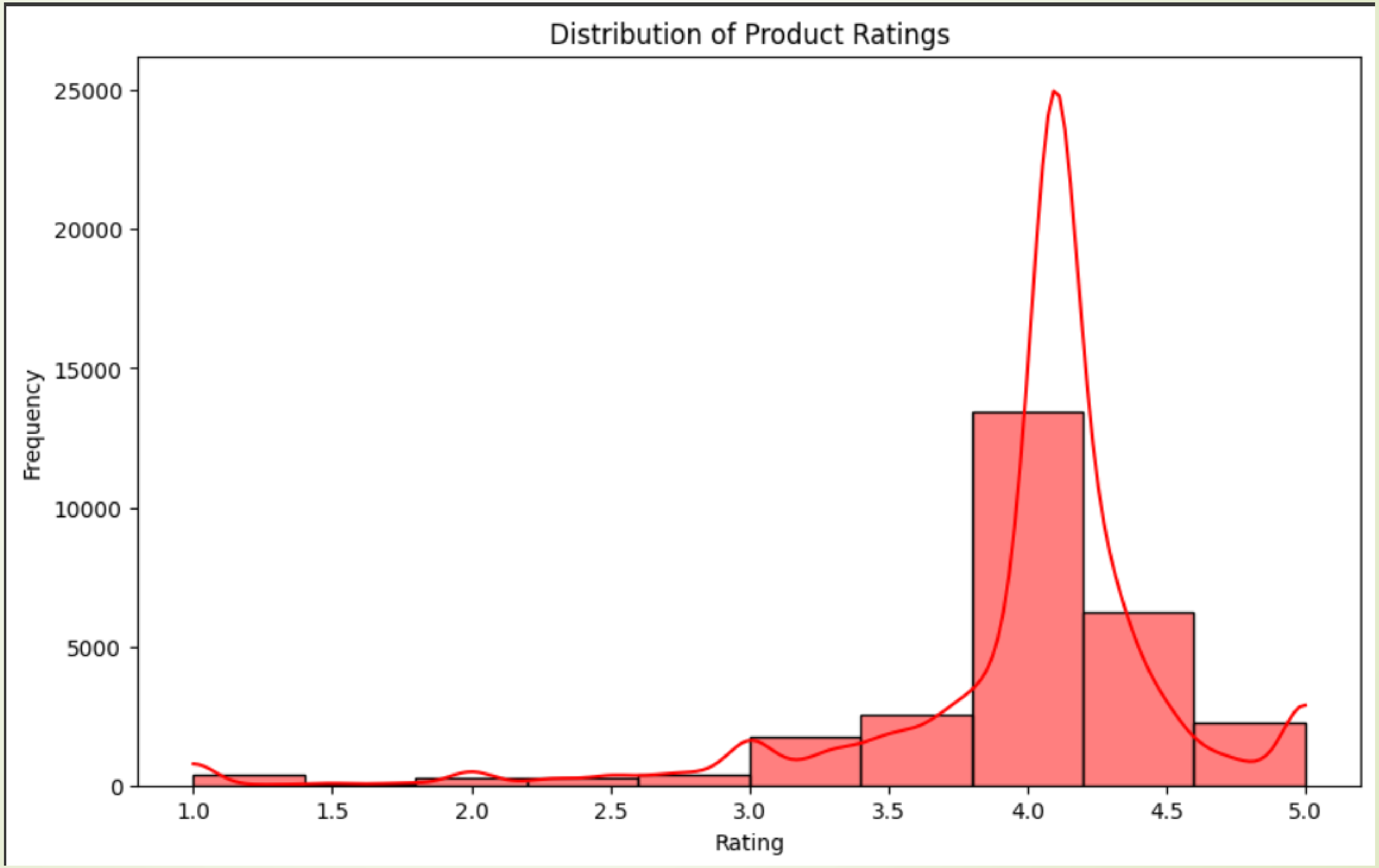
- SCATTER PLOT: Draw a visualization to see if there's any relationship between Discount and Rating. Key insights:

- ➢ No Clear Correlation : The scatter plot does not show a strong linear relationship between "Discount" percentage and "Rating". This suggests that offering a higher discount does not necessarily lead to a higher product rating

- Discount Strategy : While discounts can attract customers, they may not be the primary driver of positive product ratings. Focus on overall product quality and customer experience to improve ratings.

Data Visualization and Insights

- Draw a visualization to show the Distribution of Product ratings.



Data Visualization and Insights

- HISTOGRAM: Draw a visualization to show the Distribution of Product ratings.

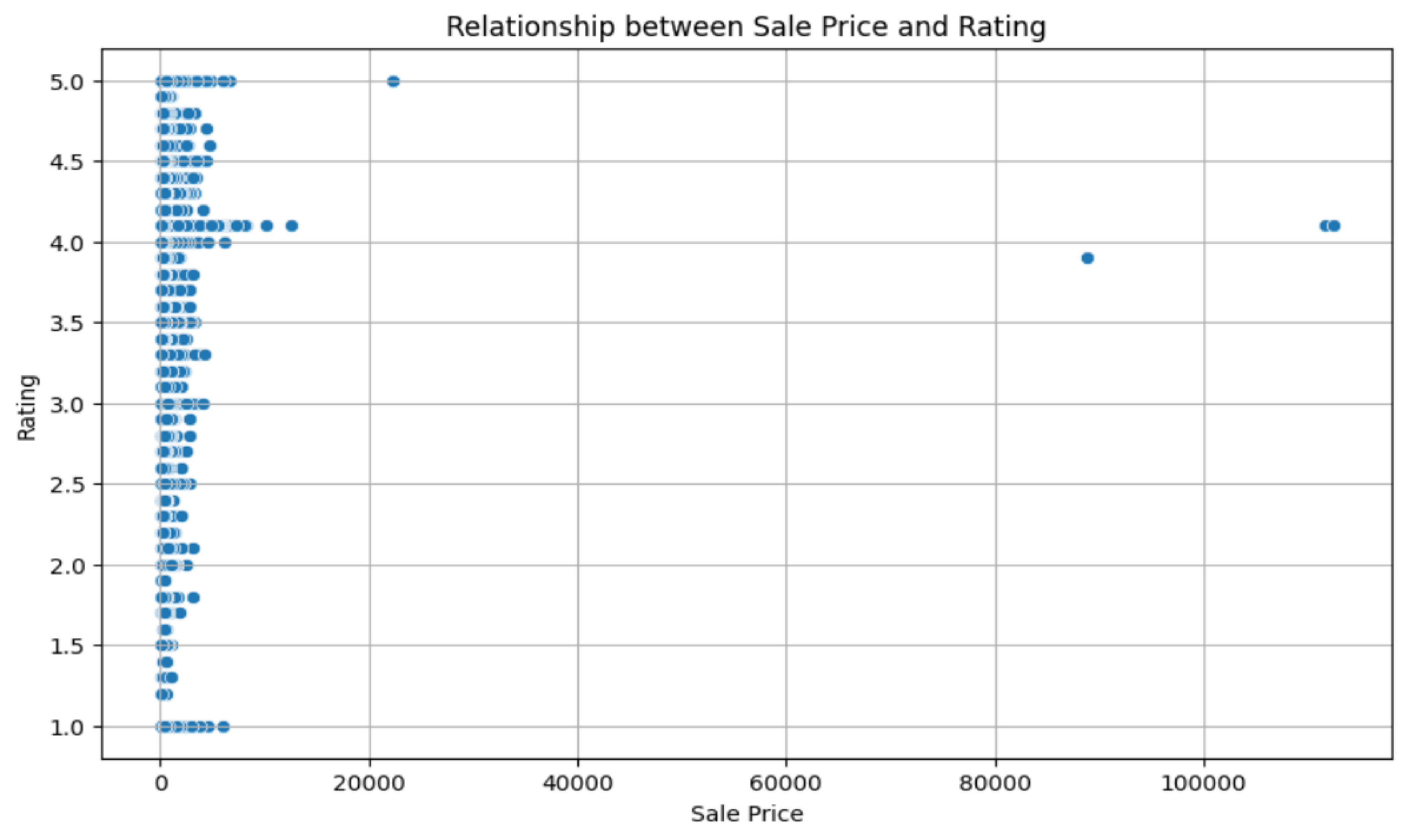
- Key insights:

- ➢ The distribution of product "Ratings" is heavily skewed towards higher ratings, with the majority of products receiving ratings of 4 or above. This suggests that customers are generally satisfied with the products being sold on the platform.

- ➢ I strongly believe that this is a significant finding as prioritizing customer satisfaction is a fundamental key to growth for service-oriented businesses.

Data Visualization and Insights

SCATTER PLOT: **Draw a visualization to explore the relationship between Product Sale Price and Rating.**



Data Visualization and Insights

- SCATTER PLOT: Draw a visualization to explore the relationship between Product Sale Price and Rating.

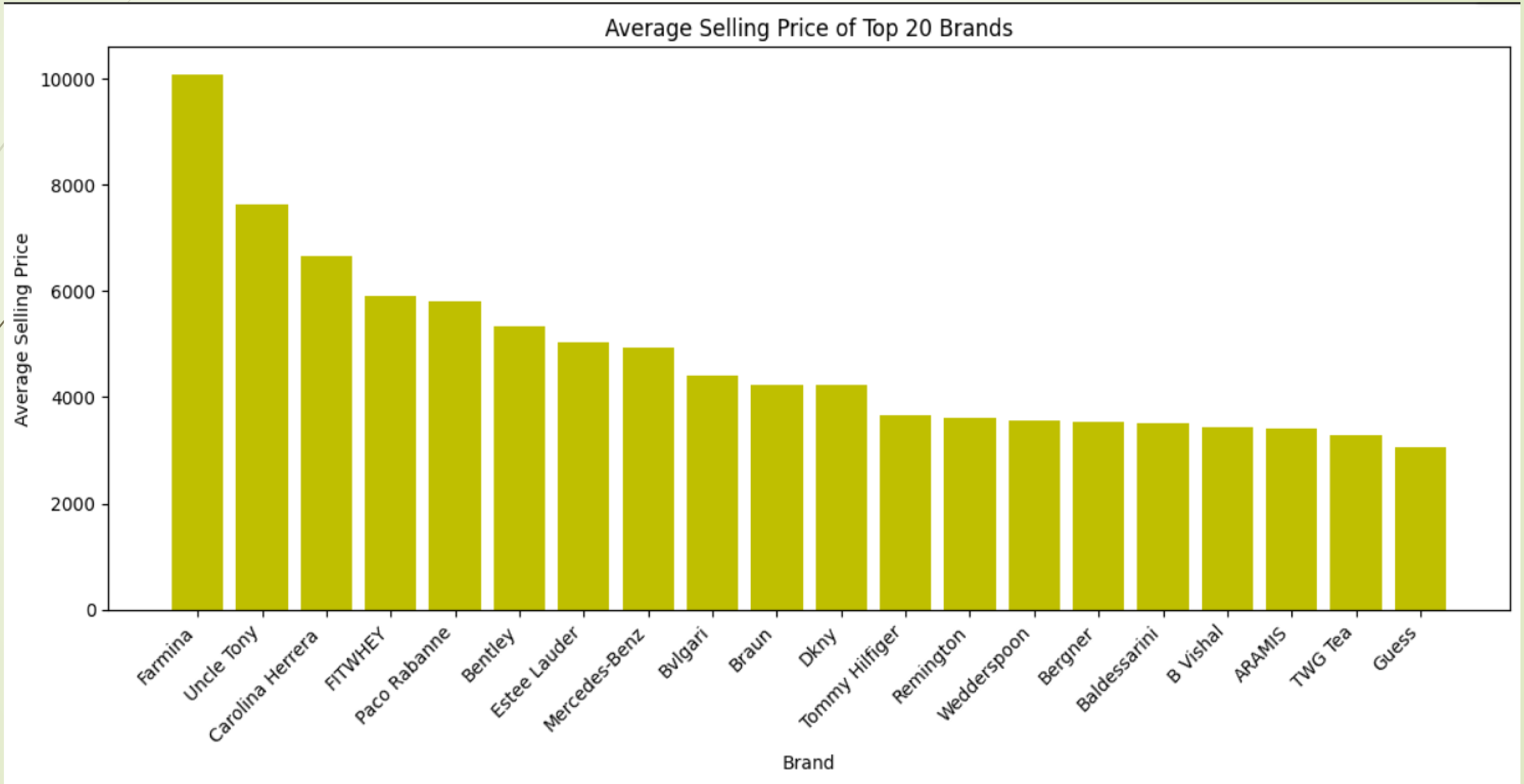
- Key insights:

- ➢ No clear correlation : There doesn't seem to be a strong linear relationship between product "Sale Price" and "Rating". This suggests that customers don't necessarily rate higher-priced products more favorably.

- ➢ Potential outliers : There are a few products with high prices and low ratings, which could be worth investigating further to understand why they didn't receive favorable reviews despite their cost.

Data Visualization and Insights

Average Selling Price of Top 20 Brands



Data Visualization and Insights

- Key Insights
- Loreal Paris : has the highest average selling price among the listed brands.
- Britannia : has the lowest average selling price. There's a wide range of average selling prices, indicating diversity in product categories and brand positioning.
- Beauty and personal care brands : like Loreal Paris, bb Combo, and INATUR generally have higher average selling prices.
- Food and FMCG brands : like Britannia, Fresho, and Amul generally have lower average selling prices.
- Nike : stands out as a non-beauty/FMCG brand with a relatively high average selling price.
- Overall, this chart provides a snapshot of the pricing landscape for top brands on the platform, which can be useful for competitive analysis and pricing strategy.

FINAL REPORT

- The exploratory data analysis (EDA) of the Big Basket e-commerce dataset has uncovered significant insights regarding product offerings, sales trends, pricing strategies, and customer feedback. By effectively managing missing data, eliminating outliers, and performing thorough data analysis, this study has generated actionable insights that can facilitate business growth, inspire innovation, and improve customer satisfaction within India's expanding online grocery market.

- The results of this EDA can provide a solid foundation for future research, strategic planning, and decision-making processes. This empowers Big Basket and other stakeholders in the online grocery industry to make informed choices, optimize their operations, and seize new opportunities in the fastevolving e-commerce landscape.

FINAL REPORT

- ✓ The Big Basket e-commerce dataset provides a robust foundation for comprehending India's online grocery market, offering invaluable insights into product demand, pricing approaches, customer feedback, and industry trends. By meticulously preparing the data, eliminating outliers, and conducting thorough exploratory analysis, this dataset empowers stakeholders to make well-informed decisions, streamline operations, and seize emerging opportunities in the fast-paced e-commerce landscape

- ✓ In summary, the Big Basket e-commerce dataset not only serves as a critical resource for immediate operational improvements but also lays the groundwork for long-term strategic planning. By harnessing the power of data analytics, stakeholders can navigate the complexities of the online grocery sector, adapt to changing market dynamics, and ultimately drive sustainable growth in this rapidly evolving landscape.

FINAL REPORT

- **CONCLUSIONS :**
- Big Basket's focus is on "Beauty & Hygiene" and "Gourmet & World Food" categories, with a strong emphasis on "Skin Care".
- "Fresho" is a key brand for Big Basket, while "BB Home" and "bb Royal" are major revenue drivers.
- These Top brands dominate the market in terms of product variety, sales, and market share.
- Discounts don't necessarily guarantee higher ratings; product quality and customer experience are crucial.
- Customers are mostly pleased with the products offered by Big Basket, and their overall experience is positive

FINAL REPORT

- **RECOMMANDATIONS :**

- Big Basket is supposed to leverage the popularity of "Fresho", "BB Home", and "bb Royal" for further growth.

- Big Basket must expand product offerings in categories like "Fruits & Vegetables" and "Eggs, Meat & Fish" to cater to a wider audience.

- Consider targeted discounts based on customer preferences and product categories.

- Prioritize product quality and customer experience to maintain high ratings.

- Firstly, Big Basket should typically concentrate on promoting products in popular categories and sub-categories, as these are significant revenue generators for the brand.

THANK YOU FOR READING
For coding part, kindly refer to below link :

https://colab.research.google.com/drive/1chZcZslr26xP21BjOv1okec3spmFonZ?usp=sharing