supertmart-sales-analysis

September 13, 2024

[360]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import plotly.express as px
import plotly.graph_objects as go
from sklearn.linear_model import LinearRegression, LogisticRegression
from sklearn.preprocessing import PolynomialFeatures
from sklearn.linear_model import BayesianRidge, Ridge, Lasso
from sklearn.metrics import mean_squared_error, r2_score, accuracy_score
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import LabelEncoder
from sklearn.model_selection import cross_val_score
from sklearn.compose import ColumnTransformer
from sklearn.preprocessing import OneHotEncoder, StandardScaler

plt.rcParams['figure.figsize'] = (12,6)
plt.style.use('fivethirtyeight')

import warnings
warnings.filterwarnings("ignore")
```

[362]:
```
import numpy as np
import pandas as pd
import os
for dirname, _, filenames in os.walk('Supermart Grocery Sales - Retail␣
 ↪Analytics Dataset.csv'):
    for filename in filenames:
        print(os.path.join(dirname, filename))
```

[364]:
```
df=pd.read_csv('Supermart Grocery Sales - Retail Analytics Dataset.csv')
df.head().style.set_properties(**{'background-color':'lightgreen','color':
 ↪'black','border-color':'#8b8c8c'})
```

[364]:
```
<pandas.io.formats.style.Styler at 0x217e5beff80>
```

[366]:
```
print('Number of rows:', df.shape[0])
print('Number of columns:', df.shape[1])
```

```
Number of rows: 9994
Number of columns: 11
```

[368]:
```
df.dtypes
```

[368]:
```
Order ID          object
Customer Name     object
Category          object
Sub Category      object
City              object
Order Date        object
Region            object
Sales              int64
Discount         float64
Profit           float64
State             object
dtype: object
```

[370]:
```
col_names = df.columns

col_names
```

[370]:
```
Index(['Order ID', 'Customer Name', 'Category', 'Sub Category', 'City',
       'Order Date', 'Region', 'Sales', 'Discount', 'Profit', 'State'],
      dtype='object')
```

[372]:
```
df['Order Date'].info
```

[372]:
```
<bound method Series.info of 0       11-08-2017
1       11-08-2017
2       06-12-2017
3       10-11-2016
4       10-11-2016
           …
9989    12/24/2015
9990    07-12-2015
9991    06-06-2017
9992    10/16/2018
9993     4/17/2018
Name: Order Date, Length: 9994, dtype: object>
```

[373]:
```
df.isnull().sum()
```

[373]:
```
Order ID         0
Customer Name    0
Category         0
Sub Category     0
City             0
Order Date       0
Region           0
Sales            0
Discount         0
Profit           0
State            0
dtype: int64
```

[374]:
```
df.duplicated().sum()
```

[374]:
```
0
```

[375]:
```
df['Category'].unique()
```

[375]:
```
array(['Oil & Masala', 'Beverages', 'Food Grains', 'Fruits & Veggies',
       'Bakery', 'Snacks', 'Eggs, Meat & Fish'], dtype=object)
```

[376]:
```
df['Category'].value_counts(normalize=False)
```

[376]:
```
Category
Snacks               1514
Eggs, Meat & Fish    1490
Fruits & Veggies     1418
Bakery               1413
Beverages            1400
Food Grains          1398
Oil & Masala         1361
Name: count, dtype: int64
```

[379]:
```
df['Sub Category'].unique()
```

[379]:
```
array(['Masalas', 'Health Drinks', 'Atta & Flour', 'Fresh Vegetables',
       'Organic Staples', 'Fresh Fruits', 'Biscuits', 'Cakes',
       'Chocolates', 'Eggs', 'Cookies', 'Chicken', 'Edible Oil & Ghee',
       'Mutton', 'Soft Drinks', 'Dals & Pulses', 'Organic Vegetables',
       'Noodles', 'Organic Fruits', 'Fish', 'Spices', 'Rice',
       'Breads & Buns'], dtype=object)
```

[380]:
```
df['Sub Category'].value_counts(normalize=False)
```

[380]:
```
Sub Category
Health Drinks         719
```

```
Soft Drinks           681
Cookies               520
Breads & Buns         502
Chocolates            499
Noodles               495
Masalas               463
Biscuits              459
Cakes                 452
Edible Oil & Ghee     451
Spices                447
Mutton                394
Eggs                  379
Organic Staples       372
Fresh Fruits          369
Fish                  369
Fresh Vegetables      354
Atta & Flour          353
Organic Fruits        348
Chicken               348
Organic Vegetables    347
Dals & Pulses         343
Rice                  330
Name: count, dtype: int64
```

[382]:
```
df['City'].unique()
```

[382]:
```
array(['Vellore', 'Krishnagiri', 'Perambalur', 'Dharmapuri', 'Ooty',
       'Trichy', 'Ramanadhapuram', 'Tirunelveli', 'Chennai', 'Karur',
       'Namakkal', 'Dindigul', 'Kanyakumari', 'Bodi', 'Tenkasi',
       'Viluppuram', 'Madurai', 'Salem', 'Cumbum', 'Nagercoil',
       'Pudukottai', 'Theni', 'Coimbatore', 'Virudhunagar'], dtype=object)
```

[383]:
```
# Remove unnecessary columns
df = df.drop(columns=['Order ID', 'State'])

# Rename columns
df = df.rename(columns={'Sub Category': 'Sub_Category', 'Order Date':␣
 ↪'Order_Date'})
```

[385]:
```
# Convert date column to datetime format
df['Order_Date'] = pd.to_datetime(df['Order_Date'], errors='coerce')

# Check for any remaining null values in the date column
df[df['Order_Date'].isnull()]
```

[385]:
```
     Customer Name     Category  Sub_Category       City  \
12          Sharon       Snacks       Cookies   Dindigul
```

```
14          Sundar  Eggs, Meat & Fish            Chicken  Kanyakumari
15          Ramesh       Oil & Masala  Edible Oil & Ghee  Krishnagiri
17          Arutra          Beverages      Health Drinks         Bodi
18         Haseena  Eggs, Meat & Fish             Mutton      Tenkasi
…             …                 …                 …          …
9985        Shree  Eggs, Meat & Fish             Mutton  Kanyakumari
9987       Ganesh   Fruits & Veggies   Fresh Vegetables        Theni
9989       Sudeep  Eggs, Meat & Fish               Eggs      Madurai
9992         Peer       Oil & Masala             Spices   Pudukottai
9993       Ganesh        Food Grains       Atta & Flour  Tirunelveli

     Order_Date   Region  Sales  Discount  Profit
12          NaT    South   1659      0.19  315.21
14          NaT  Central    831      0.22  207.75
15          NaT  Central   1440      0.11  100.80
17          NaT     West   1617      0.19  113.19
18          NaT     West   1757      0.35  386.54
…         …       …      …         …     …
9985        NaT     West   1286      0.30  475.82
9987        NaT     West   1350      0.15   67.50
9989        NaT     West    945      0.16  359.10
9992        NaT     West   1659      0.15  597.24
9993        NaT     West   1034      0.28  165.44

[5952 rows x 9 columns]
```

[386]:
```python
# Convert date column to datetime format
df['Order_Date'] = pd.to_datetime(df['Order_Date'], format='%m/%d/%Y')
```

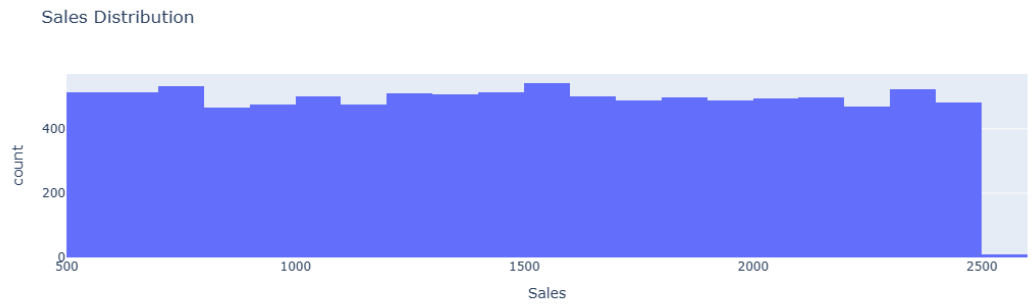
[388]:
```python
# Convert date column to datetime format
df['Order_Date'] = pd.to_datetime(df['Order_Date'], format='%m/%d/%Y')
df['Order_Date'] = pd.to_datetime(df['Order_Date'], format='%m-%d-%Y')
```

[389]:
```python
df.describe()
```

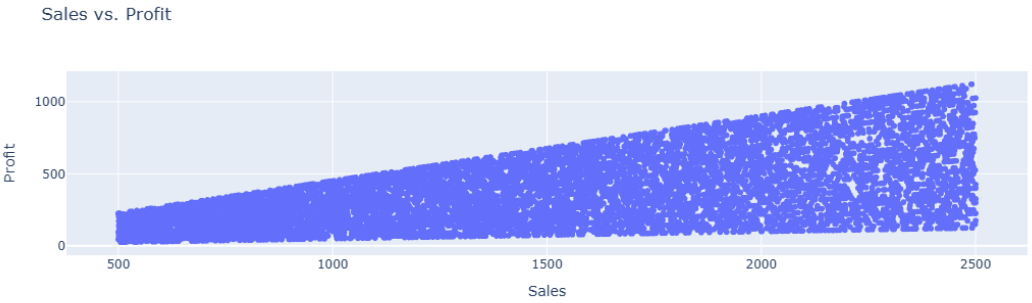
[389]:
```
                          Order_Date        Sales     Discount       Profit
count                           4042  9994.000000  9994.000000  9994.000000
mean   2017-04-28 03:16:17.931716864  1496.596158     0.226817   374.937082
min              2015-01-03 00:00:00   500.000000     0.100000    25.250000
25%              2016-05-09 06:00:00  1000.000000     0.160000   180.022500
50%              2017-07-01 00:00:00  1498.000000     0.230000   320.780000
75%              2018-06-01 00:00:00  1994.750000     0.290000   525.627500
max              2018-12-11 00:00:00  2500.000000     0.350000  1120.950000
std                              NaN   577.559036     0.074636   239.932881
```

[390]:
```python
# histogram of sales
fig = px.histogram(df, x='Sales', nbins=30, title='Sales Distribution')
```

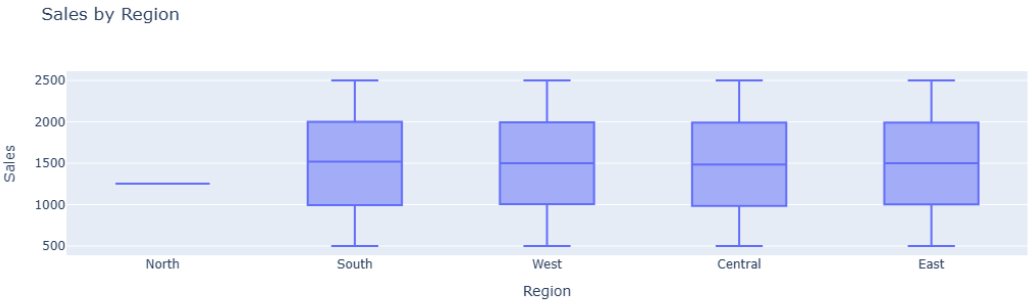
```
fig.show()
```



[391]:
```
# scatterplot of sales and profit
fig = px.scatter(df, x='Sales', y='Profit', title='Sales vs. Profit')
fig.show()
```



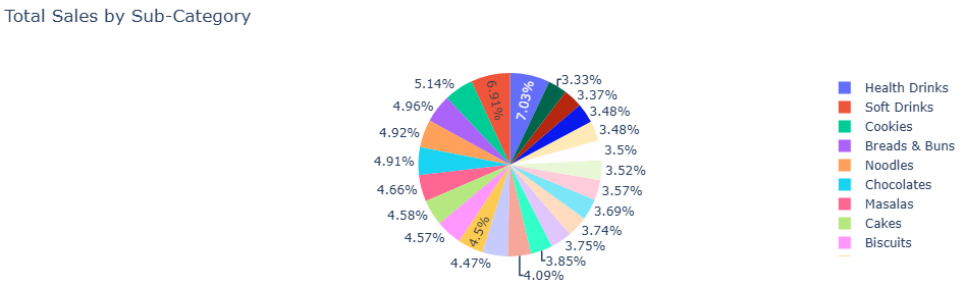
[392]:
```
# boxplot of sales by region
fig = px.box(df, x='Region', y='Sales', title='Sales by Region')
fig.show()
```



[393]:
```
# Calculate total sales by category and sub-category
category_sales = df.groupby(['Category', 'Sub_Category'])['Sales'].sum().
↪reset_index()
```

[403]:
```
fig = px.bar(category_sales, x='Category', y='Sales', color='Sub_Category',␣
↪title='Total Sales by Category')
fig.show()
```

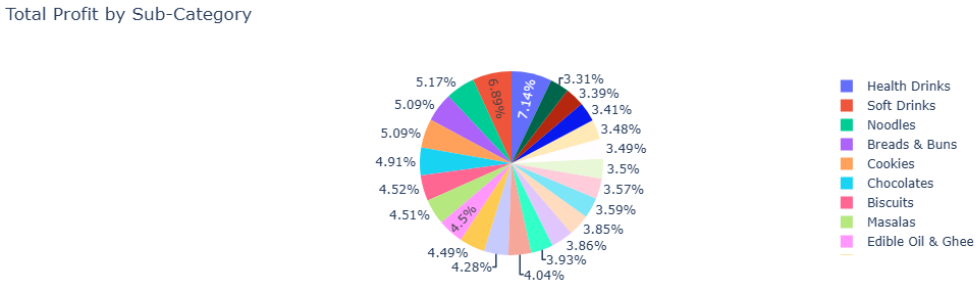
[407]:
```
# pie chart of total sales by sub-category

fig = px.pie(category_sales, values='Sales', names='Sub_Category', title='Total␣
↪Sales by Sub-Category')
fig.show()
```



[408]:
```
# Calculate total profit by category and sub-category
category_profit = df.groupby(['Category', 'Sub_Category'])['Profit'].sum().
↪reset_index()
```

```
# Create bar chart of total profit by category
fig = px.bar(category_profit, x='Category', y='Profit', color='Sub_Category',␣
 ↪title='Total Profit by Category')
fig.show()
```

[409]:
```
# pie chart of total profit by sub-category
fig = px.pie(category_profit, values='Profit', names='Sub_Category',␣
 ↪title='Total Profit by Sub-Category')
fig.show()
```



[410]:
```
# Calculate total sales and profit by region
sales_by_region = df.groupby('Region')['Sales'].sum().reset_index()
profit_by_region = df.groupby('Region')['Profit'].sum().reset_index()

# Merge the two dataframes
sales_profit_by_region = pd.merge(sales_by_region, profit_by_region,␣
 ↪on='Region')

# Display the results
sales_profit_by_region.head()
```

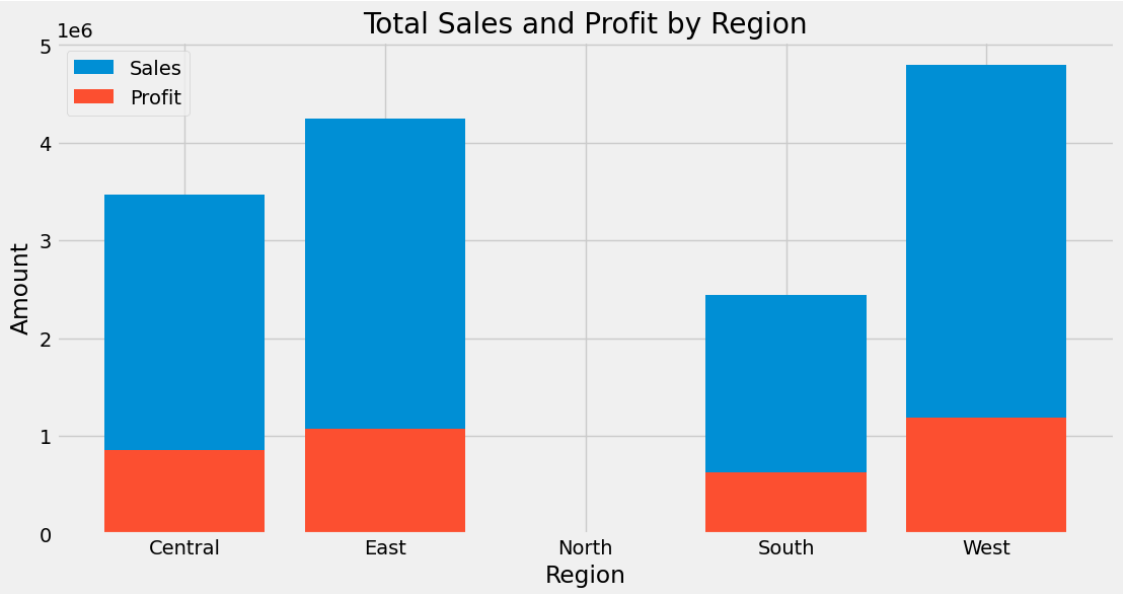
[410]:

	Region	Sales	Profit
0	Central	3468156	856806.84
1	East	4248368	1074345.58
2	North	1254	401.28
3	South	2440461	623562.89
4	West	4798743	1192004.61

This will give us the total sales and profit for each region:

Next, we can create visualizations such as bar charts or pie charts to display the sales and profit data. Here's an example of a bar chart that shows the total sales and profit by region:

[413]:
```
# Plot the bar chart
fig, ax = plt.subplots()
ax.bar(sales_profit_by_region['Region'], sales_profit_by_region['Sales'],␣
 ↪label='Sales')
ax.bar(sales_profit_by_region['Region'], sales_profit_by_region['Profit'],␣
 ↪label='Profit')
ax.set_xlabel('Region')
ax.set_ylabel('Amount')
ax.set_title('Total Sales and Profit by Region')
ax.legend()
plt.show()
```



This will give us a bar chart that shows the total sales and profit by region:

We can see that the East and West regions have the highest sales and profit, while the North region has the lowest sales.

[415]:
```
# Calculate total sales and profit by city
sales_by_city = df.groupby('City')['Sales'].sum().reset_index()
profit_by_city = df.groupby('City')['Profit'].sum().reset_index()

# Merge the two dataframes
sales_profit_by_city = pd.merge(sales_by_city, profit_by_city, on='City')

# Display the results
sales_profit_by_city.head()
```

[415]:

	City	Sales	Profit
0	Bodi	667177	173655.13
1	Chennai	634963	160921.33
2	Coimbatore	634748	157399.41
3	Cumbum	626047	156355.13
4	Dharmapuri	571553	141593.05

And now we Analyze discounts

[417]:
```
df = pd.read_csv('Supermart Grocery Sales - Retail Analytics Dataset.csv')
df.head(10).style.set_properties(**{'background-color':'lightgreen','color':
 ↪'black','border-color':'#8b8c8c'})
```

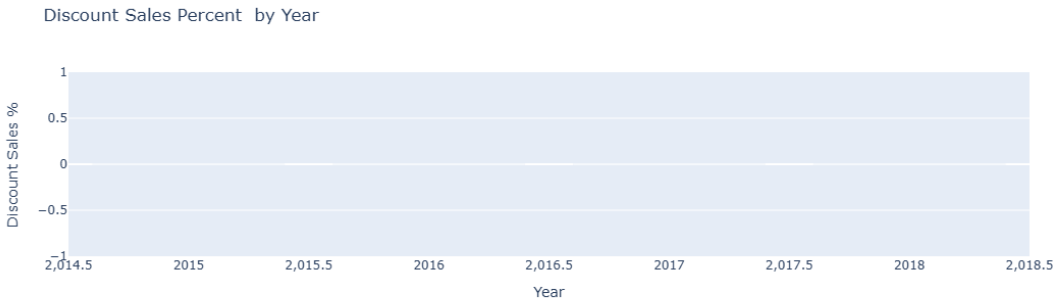
[417]:
```
<pandas.io.formats.style.Styler at 0x217e5590230>
```

And now we create a new column for year:

[419]:
```
df['Year'] = pd.DatetimeIndex(df['Order Date']).year
```

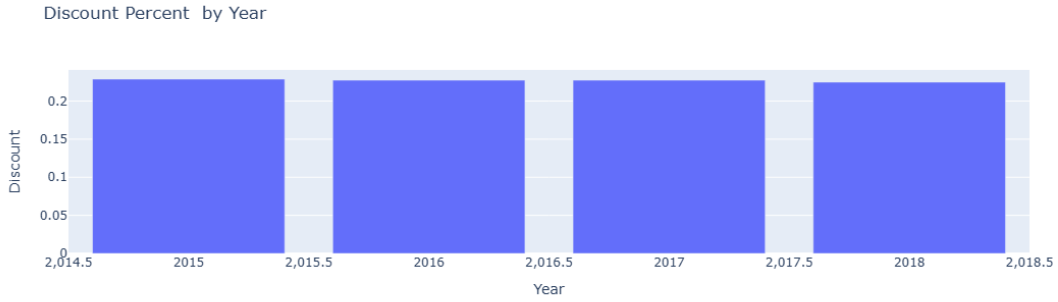
Create a bar chart for discount sales percent by year:

[422]:
```
sales_by_year = df.groupby('Year')['Sales'].sum().reset_index()
discount_sales_by_year = df.groupby('Year')['Sales'].apply(lambda x: x[x!=0].
 ↪sum()).reset_index()

discount_sales_by_year['Discount Sales %'] = (1 -␣
 ↪discount_sales_by_year['Sales'] / sales_by_year['Sales']) * 100

fig = px.bar(discount_sales_by_year, x='Year', y='Discount Sales %',␣
 ↪title='Discount Sales Percent  by Year')
fig.show()
```



Create a bar chart for discount percent by year:

[426]:
```
discount_by_year = df.groupby('Year')['Discount'].mean().reset_index()

fig = px.bar(discount_by_year, x='Year', y='Discount', title='Discount Percent ␣
 ↪by Year')
fig.show()
```

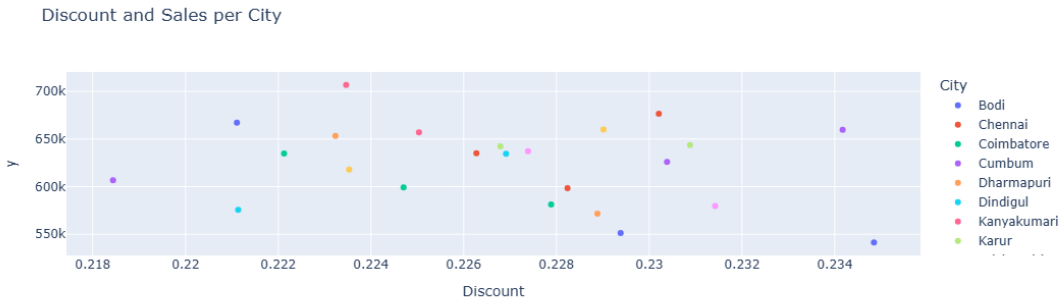


Create a scatter plot for discount and sales per region:

[435]:
```
discount_sales_by_region = df.groupby('Region')['Sales'].apply(lambda x: x[x!
 ↪=0].sum()).reset_index()
discount_by_region = df.groupby('Region')['Discount'].mean().reset_index()

fig = px.scatter(discount_by_region, x='Discount',␣
 ↪y=discount_sales_by_region['Sales'], color='Region',
                 title='Discount and Sales per Region')
fig.show()
```

Create a scatter plot for discount and sales per city:

[438]:
```
discount_sales_by_city = df.groupby('City')['Sales'].apply(lambda x: x[x!=0].
 ↪sum()).reset_index()
discount_by_city = df.groupby('City')['Discount'].mean().reset_index()

fig = px.scatter(discount_by_city, x='Discount',␣
 ↪y=discount_sales_by_city['Sales'], color='City',
                 title='Discount and Sales per City')
fig.show()
```



Interpretation:

From the Discount Sales Percent by Year bar chart, we can see that the discount sales percent has been increasing since 2015, peaking in 2016, and then slightly decreasing until 2018.

From the Discount Percent by Year bar chart, we can see that the average discount percent has been relatively stable over the years, ranging from around 0.1 to 0.3.

From the Discount and Sales per Region scatter plot, we can see that the South region has the highest discount percent and sales, while the Central region has the lowest discount percent and sales.

From the Discount and Sales per City scatter plot, we can see that the cities with the highest sales and discount percent are Krishnagiri and vellore, while the city with the lowest sales and discount percent is Trichy.

Analyze discounts and their impact on profit Calculate the average discount for each category and sub-category.

Analyze the relationship between discounts and profit by creating scatterplots or line charts.

To calculate the average discount for each category and sub-category, you can group the data by category and sub-category and calculate the mean discount for each grthon:

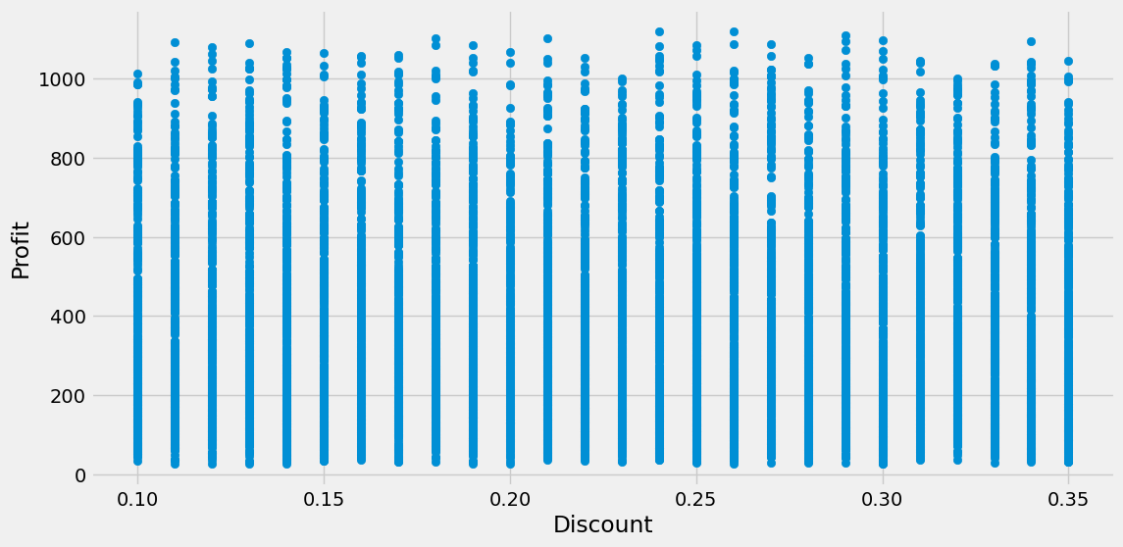
[442]:
```
df = pd.read_csv("Supermart Grocery Sales - Retail Analytics Dataset.csv",␣
 ↪usecols=["Order ID", "Customer Name", "Category", "Sub Category", "City",␣
 ↪"Order Date", "Region", "Sales", "Discount", "Profit", "State"])

# Calculate the average discount for each category and sub-category
avg_discount = df.groupby(["Category", "Sub Category"])["Discount"].mean()

# Print the results
print(avg_discount.head())
```

```
Category   Sub Category
Bakery     Biscuits         0.225033
           Breads & Buns    0.226494
           Cakes            0.224646
Beverages  Health Drinks    0.231558
           Soft Drinks      0.229031
Name: Discount, dtype: float64
```

This will give you the average discount for each category and sub-category in the dataset.

To analyze the relationship between discounts and profit, you can create scatterplots or line charts.

[445]:
```
plt.scatter(df["Discount"], df["Profit"])
plt.xlabel("Discount")
plt.ylabel("Profit")
plt.show()
```



This will give you a scatterplot showing the relationship between discounts and profit in the dataset.

Total Sales & Orders by Region

[449]:
```
region = pd.pivot_table(data=df, index='Region', values=['Order ID', 'Sales'],
                aggfunc = {'Order ID':'count', 'Sales':'sum'}).reset_index().
 ↪sort_values(by='Sales', ascending=False)
region
```

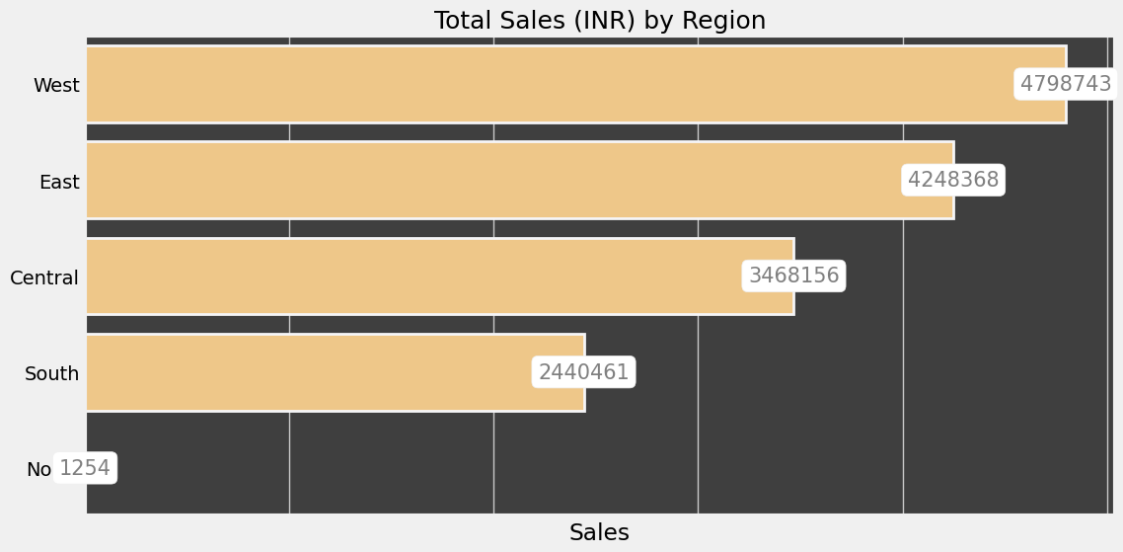
[449]:

	Region	Order ID	Sales
4	West	3203	4798743
1	East	2848	4248368
0	Central	2323	3468156
3	South	1619	2440461
2	North	1	1254

We'll now plot two graphs to visualize the total sales and orders by each region. I did not not plot both the details in the same graph because of one reason. The range of each of the columns is very different. Our graph will look weird if we plot both the details in the same plot. We could rescale it to fit both of them within the same range, but that will change the actual values.

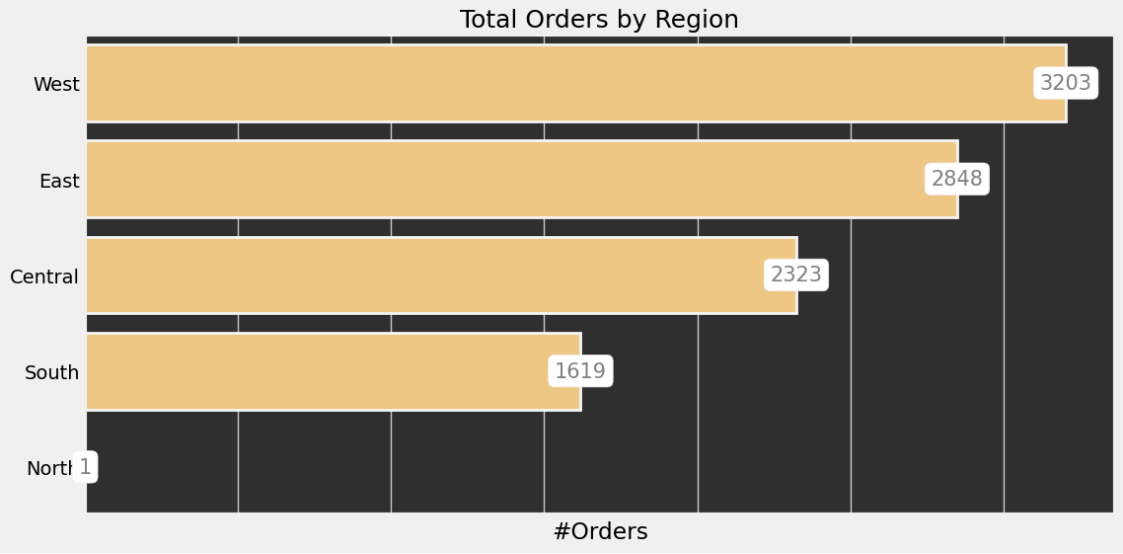
[459]:
```
plt.rcParams['figure.figsize'] = (12,6)
ax = plt.axes()
ax.set_facecolor('#3F3F3f')
sns.barplot(y='Region', x='Sales', data=region, color='#FFCB78', linewidth=2,␣
 ↪edgecolor='#F6F6F8')

# annotating the values on the plot
bbox_args = dict(boxstyle = 'round', fc = '1')
for p in ax.patches:
```

```
    width = p.get_width()
    plt.text(p.get_width(), p.get_y() + 0.5 * p.get_height(), '{:1.0f}'.
 ↪format(width),
             ha = 'center',
             va = 'center',
             color = 'grey',
             bbox = bbox_args,
             fontsize = 15)
plt.title('Total Sales (INR) by Region', fontsize = 18)
plt.tick_params(left=False, bottom=False, labelbottom=False)
plt.ylabel(None)

plt.show()
```



[461]:
```
plt.rcParams['figure.figsize'] = (12,6)

ax = plt.axes()
ax.set_facecolor('#2F2F2f')

sns.barplot(y='Region', x='Order ID', data=region, color='#FFCB74',␣
 ↪linewidth=2, edgecolor='#F6F6F6')


bbox_args = dict(boxstyle = 'round', fc = '1')
for p in ax.patches:
    width = p.get_width()
    plt.text(p.get_width(), p.get_y() + 0.5 * p.get_height(), '{:1.0f}'.
 ↪format(width),
```

```
            ha = 'center',
            va = 'center',
            color = 'grey',
            bbox = bbox_args,
     fontsize = 15)

plt.title('Total Orders by Region', fontsize = 18)
plt.tick_params(left=False, bottom=False, labelbottom=False)
plt.xlabel('#Orders')
plt.ylabel(None)

plt.show()
```



Total Sales by Category & Sub Category

We'll now find the total sales by Category and further group it down to each Sub Category within it. We'll assign two values within the index parameter of the .pivot_table() function to achieve the results.

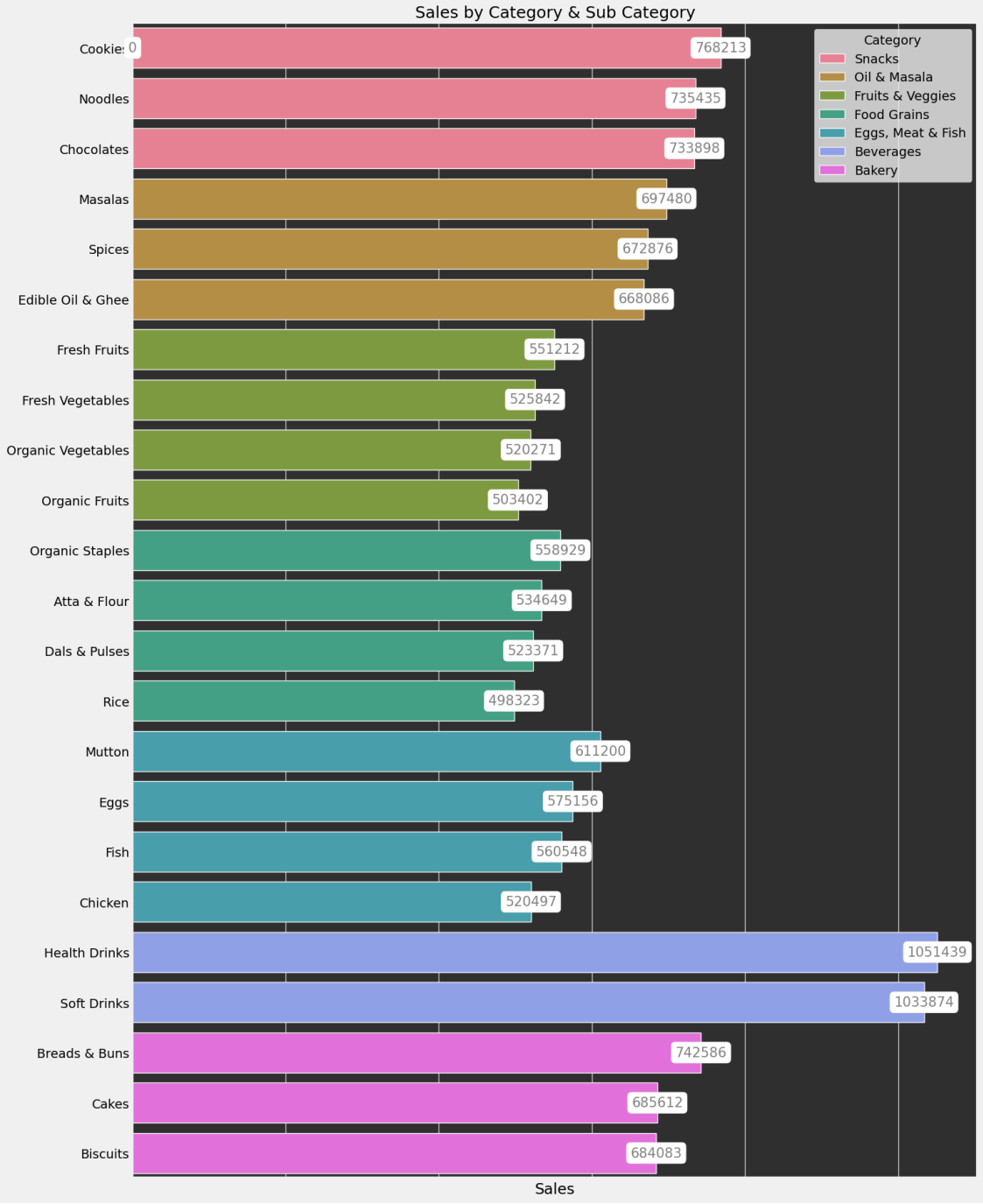
[466]:
```
category_sales = pd.pivot_table(data=df, index=['Category', 'Sub Category'],␣
↪values='Sales',
                aggfunc='sum').reset_index().sort_values(['Category', 'Sales'],␣
↪ascending=False)
category_sales
```

[466]:

	Category	Sub Category	Sales
21	Snacks	Cookies	768213
22	Snacks	Noodles	735435
20	Snacks	Chocolates	733898

```
18       Oil & Masala             Masalas   697480
19       Oil & Masala              Spices   672876
17       Oil & Masala   Edible Oil & Ghee   668086
13   Fruits & Veggies        Fresh Fruits   551212
14   Fruits & Veggies    Fresh Vegetables   525842
16   Fruits & Veggies  Organic Vegetables   520271
15   Fruits & Veggies      Organic Fruits   503402
11         Food Grains     Organic Staples   558929
9          Food Grains        Atta & Flour   534649
10         Food Grains       Dals & Pulses   523371
12         Food Grains                Rice   498323
8    Eggs, Meat & Fish              Mutton   611200
6    Eggs, Meat & Fish                Eggs   575156
7    Eggs, Meat & Fish                Fish   560548
5    Eggs, Meat & Fish             Chicken   520497
3            Beverages       Health Drinks  1051439
4            Beverages         Soft Drinks  1033874
1               Bakery       Breads & Buns   742586
2               Bakery               Cakes   685612
0               Bakery           Biscuits    684083
```

[468]:
```
plt.rcParams['figure.figsize'] = (15,22)
ax = plt.axes()
ax.set_facecolor('#2F2F2F')
sns.barplot(y='Sub Category', x='Sales', data=category_sales, hue='Category',␣
 ↪linewidth=1, edgecolor='#F6F6F6')

bbox_args = dict(boxstyle = 'round', fc = '1')
for p in ax.patches:
    width = p.get_width()
    plt.text(p.get_width(), p.get_y() + 0.5 * p.get_height(), '{:1.0f}'.
 ↪format(width),
             ha = 'center',
             va = 'center',
             color = 'grey',
             bbox = bbox_args,
             fontsize = 15)

plt.title('Sales by Category & Sub Category', fontsize = 18)
plt.ylabel(None)
plt.tick_params(left=False, bottom=False, labelbottom=False)
plt.show()
```



The hue parameter of the barplot() helped us distinguish the Sub Categories by the Category to which they belong to.

Profit Margin by Sub Category

The profit margin can be calculated by dividing the profit by the total sales. As this needs to be computed for each sub category, we did not compute this on the original dataset. First let us group

the data by sub category and then compute the profit margin.

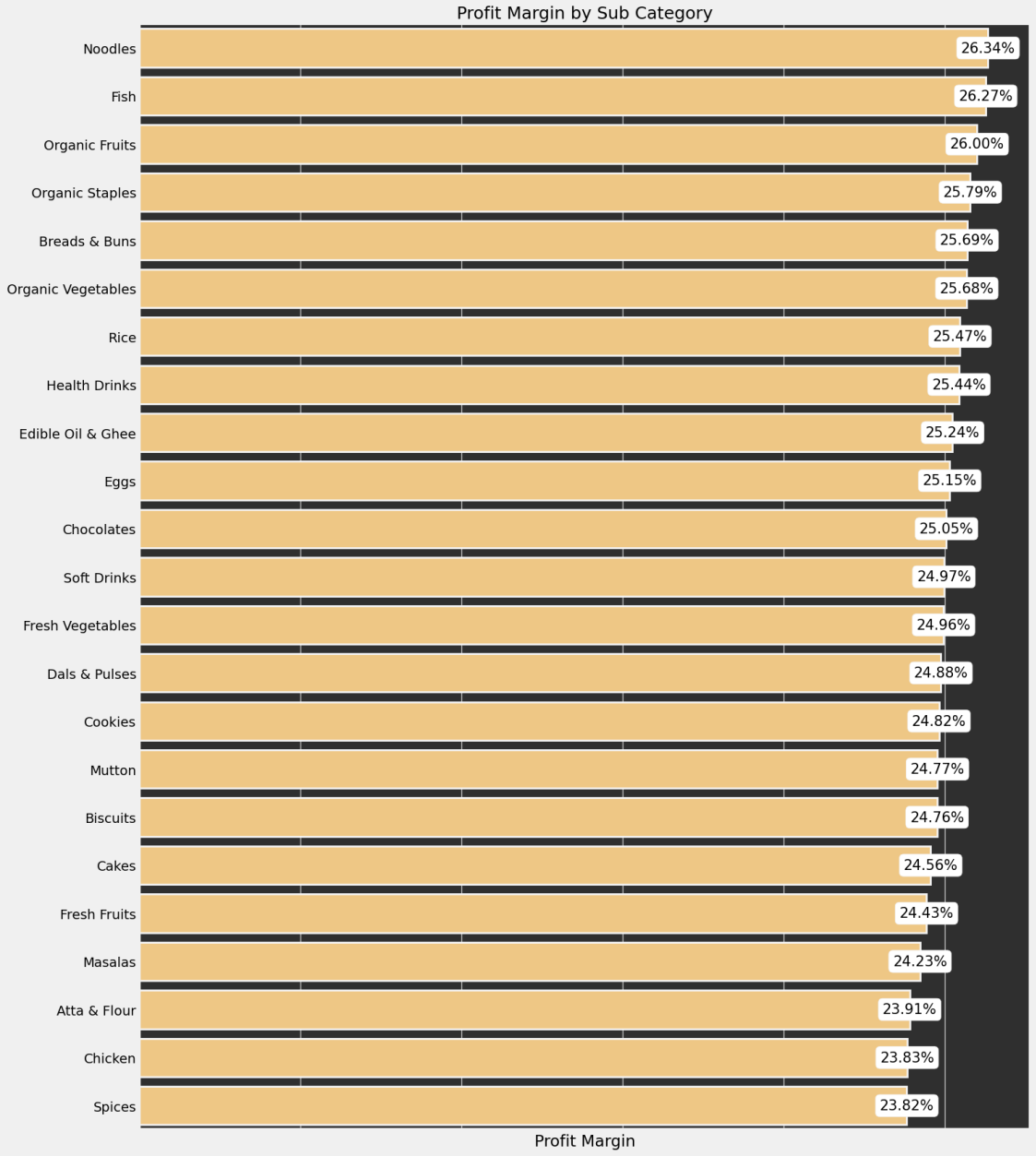
[473]:
```
profit = pd.pivot_table(data=df, index='Sub Category', values=['Sales',␣
 ↪'Profit'], aggfunc='sum').reset_index()
profit['Profit Margin'] = round((profit['Profit']/profit['Sales']) * 100,2)
profit.sort_values(by='Profit Margin', ascending=False, inplace = True)
profit
```

[473]:

	Sub Category	Profit	Sales	Profit Margin
16	Noodles	193685.81	735435	26.34
10	Fish	147248.01	560548	26.27
17	Organic Fruits	130862.33	503402	26.00
18	Organic Staples	144136.89	558929	25.79
2	Breads & Buns	190764.98	742586	25.69
19	Organic Vegetables	133596.37	520271	25.68
20	Rice	126932.36	498323	25.47
13	Health Drinks	267469.79	1051439	25.44
8	Edible Oil & Ghee	168593.58	668086	25.24
9	Eggs	144669.92	575156	25.15
5	Chocolates	183849.34	733898	25.05
21	Soft Drinks	258135.97	1033874	24.97
12	Fresh Vegetables	131273.33	525842	24.96
7	Dals & Pulses	130232.29	523371	24.88
6	Cookies	190643.70	768213	24.82
15	Mutton	151389.40	611200	24.77
1	Biscuits	169357.62	684083	24.76
3	Cakes	168398.46	685612	24.56
11	Fresh Fruits	134668.35	551212	24.43
14	Masalas	168999.11	697480	24.23
0	Atta & Flour	127861.10	534649	23.91
4	Chicken	124049.89	520497	23.83
22	Spices	160302.60	672876	23.82

[477]:
```
plt.rcParams['figure.figsize'] = (15,20)
ax = plt.axes()
ax.set_facecolor('#2F2F2F')
sns.barplot(y='Sub Category', x='Profit Margin', data=profit, color='#FFCB74',␣
 ↪linewidth=2, edgecolor='#F6F6F6')

bbox_args = dict(boxstyle = 'round', fc = '1')
for p in ax.patches:
    width = p.get_width()
    plt.text(p.get_width(), p.get_y() + 0.5 * p.get_height(), '{:1.2f}%'.
 ↪format(width),

     ha = 'center',
             va = 'center',
```

```
            color = 'black',
            bbox = bbox_args,
            fontsize = 15)


plt.title('Profit Margin by Sub Category', fontsize = 18)
plt.tick_params(left=False, bottom=False, labelbottom=False)
plt.ylabel(None)

plt.show()
```



How much did the company lose by giving discounts?

To find the amount that the company lost by giving discounts, we need to find the original price. We've the sold price of the product in the dataset. We also have the discount percentage for that product.

The formula to find the original price is (Sold Price 100)/100 - (Discount Percent 100)

[483]:
```
df['Original Price'] = round((df['Sales'])*100/(100-(df['Discount']*100)),2)
df['Discounted Amount'] = df['Original Price'] - df['Sales']
df.head(5)
```

[483]:

	Order ID	Customer Name	Category	Sub Category	City	Order Date	Region	Sales	Discount	Profit	State	Original Price	Discounted Amount
0	OD1	Harish	Oil & Masala	Masalas	Vellore	11-08-2017	North	1254	0.12	401.28	Tamil Nadu	1425.00	171.00
1	OD2	Sudha	Beverages	Health Drinks	Krishnagiri	11-08-2017	South	749	0.18	149.80	Tamil Nadu	913.41	164.41
2	OD3	Hussain	Food Grains	Atta & Flour	Perambalur	06-12-2017	West	2360	0.21	165.20	Tamil Nadu	2987.34	627.34
3	OD4	Jackson	Fruits & Veggies	Fresh Vegetables	Dharmapuri	10-11-2016	South	896	0.25	89.60	Tamil Nadu	1194.67	298.67
4	OD5	Ridhesh	Food Grains	Organic Staples	Ooty	10-11-2016	South	2355	0.26	918.45	Tamil Nadu	3182.43	827.43

[485]:
```
discounts = pd.pivot_table(data=df, index='Sub Category',
                values='Discounted Amount',
                aggfunc='sum').reset_index().sort_values(by='Discounted Amount',␣
 ↪ascending=False)
discounts
```

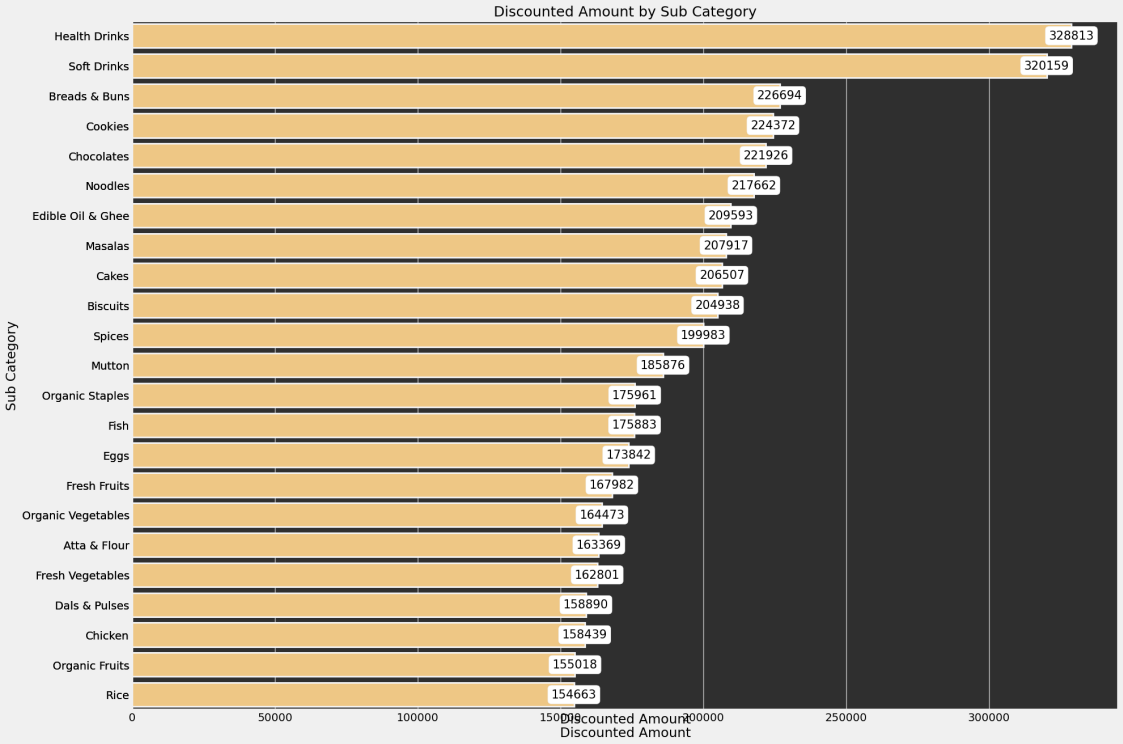
[485]:

	Sub Category	Discounted Amount
13	Health Drinks	328813.44
21	Soft Drinks	320158.77
2	Breads & Buns	226694.43
6	Cookies	224371.75
5	Chocolates	221926.05
16	Noodles	217662.48
8	Edible Oil & Ghee	209593.40

```
14              Masalas          207917.00
3                 Cakes          206506.59
1               Biscuits         204938.36
22                Spices         199982.69
15                Mutton         185876.48
18     Organic Staples           175960.97
10                  Fish         175883.40
9                   Eggs         173841.75
11         Fresh Fruits          167981.68
19  Organic Vegetables           164473.26
0          Atta & Flour          163368.59
12    Fresh Vegetables           162801.39
7         Dals & Pulses          158890.40
4               Chicken          158438.51
17      Organic Fruits           155017.91
20                  Rice         154662.72
```

[497]:
```
plt.rcParams['figure.figsize'] = (20,15)
ax = plt.axes()
ax.set_facecolor('#2F2F2F')

sns.barplot(y='Sub Category', x='Discounted Amount', data=discounts,␣
 ↪color='#FFCB74', linewidth=2, edgecolor='#F6F6F6')

bbox_args = dict(boxstyle = 'round', fc = '1')
for p in ax.patches:
    width = p.get_width()
    plt.text(p.get_width(), p.get_y() + 0.5 * p.get_height(), '{:1.0f}'.
 ↪format(width),
             ha = 'center',
             va = 'center',
             color = 'black',
             bbox = bbox_args,
             fontsize = 15)

plt.rcParams['figure.figsize'] = (25,20)

ax = plt.axes()
ax.set_facecolor('#2F2F2F')

sns.barplot(y='Sub Category', x= 'Discounted Amount', data=discounts,␣
 ↪color='#FFCB74', linewidth=2, edgecolor='#F6F6F6')

bbox_args = dict(boxstyle = 'round', fc = '1')
for p in ax.patches:
    width = p.get_width()
```

```
    plt.text(p.get_width(), p.get_y() + 0.5 * p.get_height(), '{:1.0f}'.
 ↪format(width),
             ha = 'center',
             va = 'center',
             color = 'black',
             bbox = bbox_args,
             fontsize = 15)

plt.title('Discounted Amount by Sub Category', fontsize = 18)
plt.tick_params(left=False, bottom=False, labelbottom=False)
plt.ylabel(None)
plt.show()
```



Total Sales & Orders by Year

[509]:
```
year_performance = pd.pivot_table(data=df, index='Order Date', values=['Order␣
 ↪ID', 'Sales', 'Profit'],
                aggfunc={'Order ID':'count', 'Sales':'sum', 'Profit':'sum'}).
 ↪reset_index()
year_performance
```

[509]:

	Order Date	Order ID	Profit	Sales
0	01-01-2018	10	6207.78	19111

```
1      01-02-2016          8  2754.73  12663
2      01-02-2017          2   190.33   1152
3      01-02-2018          8  3587.50  13358
4      01-03-2015          1   380.16    864
…             …        …       …     …
1231    9/29/2017         10  4185.96  15639
1232    9/29/2018         21  8980.00  37084
1233    9/30/2015          6   826.98   6790
1234    9/30/2017          2   649.46   2821
1235    9/30/2018          7  2420.09   8248

[1236 rows x 4 columns]
```

Did the region with least Sales/Order record the least Profit/Order?

[527]:
```
sales_orders_region = pd.pivot_table(data=df, index='Region', values=['Order␣
 ↪ID', 'Sales', 'Profit'],
               aggfunc = {'Order ID':'count', 'Sales':'sum', 'Profit':'sum'}).
 ↪reset_index().sort_values(by='Sales', ascending=False)
sales_orders_region['Sales Per Order'] = sales_orders_region['Sales']/
 ↪sales_orders_region['Order ID']
sales_orders_region['Profit Per Order'] = sales_orders_region['Profit']/
 ↪sales_orders_region['Order ID']
sales_orders_region[['Region', 'Sales Per Order', 'Profit Per Order']]
```

[527]:
```
    Region  Sales Per Order  Profit Per Order
4     West      1498.202623        372.152548
1     East      1491.702247        377.228083
0  Central      1492.964270        368.836350
3    South      1507.387894        385.153113
2    North      1254.000000        401.280000
```

Which city has the more Chicken & Mutton lovers?

[530]:
```
mutton = df[(df['Sub Category'] == 'Mutton') | (df['Sub Category'] ==␣
 ↪'Chicken')]

mutton_pivot = pd.pivot_table(data=mutton, index='City',
                              values='Order ID', aggfunc='count').
 ↪sort_values(by='Order ID', ascending=False)
mutton_pivot.head(1)
```

[530]:
```
           Order ID
City
Kanyakumari        44
```

Name three cities which have the highest Sales/Customers for Cakes and Chocolates.

[533]:
```
chocolate_cakes = df[(df['Sub Category'] == 'Cakes') | (df['Sub Category'] ==␣
↪'Chocolates')]

avg_sales_per_customer = pd.pivot_table(data=chocolate_cakes, index='City',␣
↪values=['Sales', 'Customer Name'],
               aggfunc = {'Customer Name':'count', 'Sales':'sum'}).reset_index()
avg_sales_per_customer['Sales Per Customer'] =␣
↪round(avg_sales_per_customer['Sales']/avg_sales_per_customer['Customer␣
↪Name'], 2)
avg_sales_per_customer[['City','Sales Per Customer']].sort_values(by='Sales Per␣
↪Customer', ascending=False).head(3)
```

[533]:

	City	Sales Per Customer
16	Salem	1717.91
20	Trichy	1714.26
11	Namakkal	1625.75

Conclusion

We delved into the Supermart Grocery Store Sales Dataset to find the summary metrics. We also framed few questions and answered them by performing data analysis. Framing our own questions to find answers from the dataset is a trait of a data analyst.

If you like my work, please upvote. Please share your comments and suggestions.

Thank You!