

sale_analysis

August 7, 2023

1 Diwali Sales Analysis using Python and Pandas

I worked on a practical project focusing on a Diwali sales dataset. This project taught me how to use Python and Pandas for data analysis.

The objective of this project is: 1. Improve customer experience by analyzing data 2. Increase revenue

By scrutinizing the dataset, I endeavored to uncover patterns, preferences, and trends that would lead to an improved understanding of customer behavior. This, in turn, would aid in tailoring strategies to heighten customer satisfaction and optimize revenue generation. Through this practical exercise, I honed my data analysis skills while simultaneously contributing to the goals of enhancing customer engagement and driving financial success

```
[323]: import numpy as np
import pandas as pd
import matplotlib.pyplot as plt #For visualizing Data
%matplotlib inline
import seaborn as sns #For charts and visualization
```

```
[324]: df = pd.read_csv("Diwali Sales Data.csv", encoding='unicode_escape')
df.shape
```

```
[324]: (11251, 15)
```

```
[325]: df.head()
```

```
[325]:   User_ID  Cust_name  Product_ID  Gender  Age  Group  Age  Marital_Status  \
0  1002903  Sanskriti  P00125942      F    26-35  28           0
1  1000732    Kartik  P00110942      F    26-35  35           1
2  1001990    Bindu  P00118542      F    26-35  35           1
3  1001425    Sudevi  P00237842      M     0-17  16           0
4  1000588     Joni  P00057942      M    26-35  28           1
```

```
   State      Zone  Occupation  Product_Category  Orders  \
0  Maharashtra  Western  Healthcare           Auto         1
1  Andhra Pradesh  Southern         Govt           Auto         3
2  Uttar Pradesh  Central    Automobile           Auto         3
3   Karnataka  Southern  Construction           Auto         2
```

4	Gujarat	Western	Food Processing	Auto	2
---	---------	---------	-----------------	------	---

	Amount	Status	unnamed1
0	23952.0	NaN	NaN
1	23934.0	NaN	NaN
2	23924.0	NaN	NaN
3	23912.0	NaN	NaN
4	23877.0	NaN	NaN

- Show information about the dataset.

```
[326]: df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 11251 entries, 0 to 11250
Data columns (total 15 columns):
#   Column                Non-Null Count  Dtype
---  -
0   User_ID               11251 non-null  int64
1   Cust_name             11251 non-null  object
2   Product_ID           11251 non-null  object
3   Gender               11251 non-null  object
4   Age Group            11251 non-null  object
5   Age                  11251 non-null  int64
6   Marital_Status       11251 non-null  int64
7   State                11251 non-null  object
8   Zone                 11251 non-null  object
9   Occupation           11251 non-null  object
10  Product_Category     11251 non-null  object
11  Orders               11251 non-null  int64
12  Amount               11239 non-null  float64
13  Status               0 non-null      float64
14  unnamed1             0 non-null      float64
dtypes: float64(3), int64(4), object(8)
memory usage: 1.3+ MB
```

- Drop Blank or unnamed colum

```
[327]: # Drop Blank or unnamed column
df.drop(['Status', 'unnamed1'], axis= 1, inplace= True)
```

```
[328]: #Check for Null Values
pd.isnull(df).sum()
```

```
[328]: User_ID           0
Cust_name           0
Product_ID         0
Gender             0
```

```

Age Group      0
Age            0
Marital_Status 0
State          0
Zone           0
Occupation     0
Product_Category 0
Orders         0
Amount        12
dtype: int64

```

```
[329]: #Delete the NULL values
df.dropna(inplace= True)
```

```
[330]: df.shape
```

```
[330]: (11239, 13)
```

```
[331]: #Change Data Type
df['Amount'] = df['Amount'].astype('int')
df['Amount'].dtype
```

```
[331]: dtype('int64')
```

```
[332]: #Check all the columns
df.columns
```

```
[332]: Index(['User_ID', 'Cust_name', 'Product_ID', 'Gender', 'Age Group', 'Age',
          'Marital_Status', 'State', 'Zone', 'Occupation', 'Product_Category',
          'Orders', 'Amount'],
          dtype='object')
```

```
[333]: df[['Amount']].describe()
```

```
[333]:
          Amount
count  11239.000000
mean    9453.610553
std     5222.355168
min      188.000000
25%     5443.000000
50%     8109.000000
75%    12675.000000
max    23952.000000

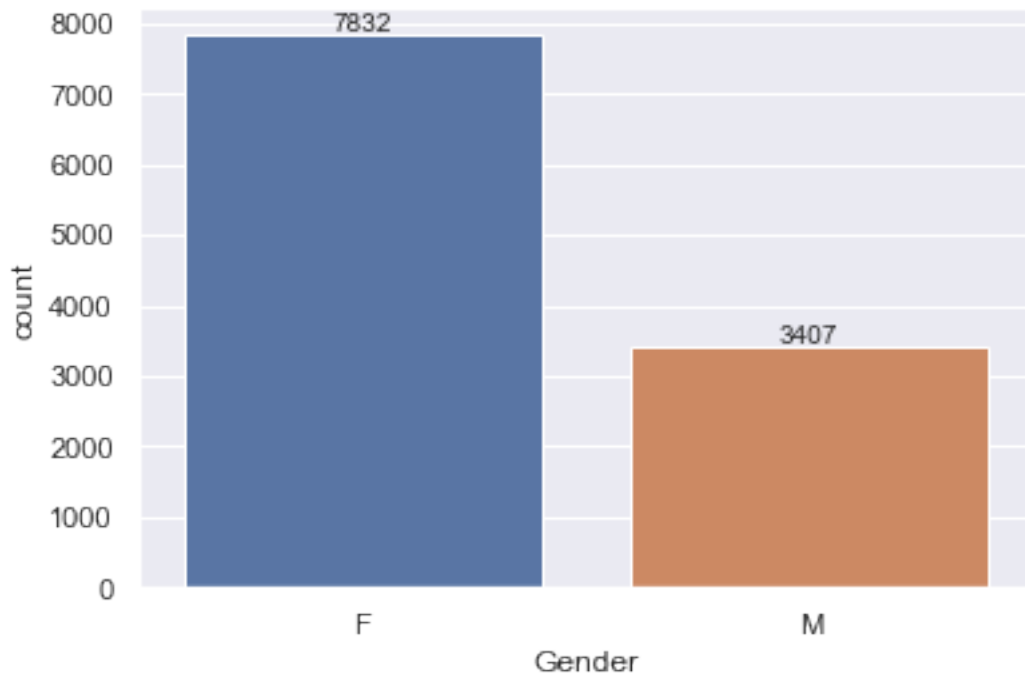
```

2 Exploratory Data Analysis

2.0.1 Gender

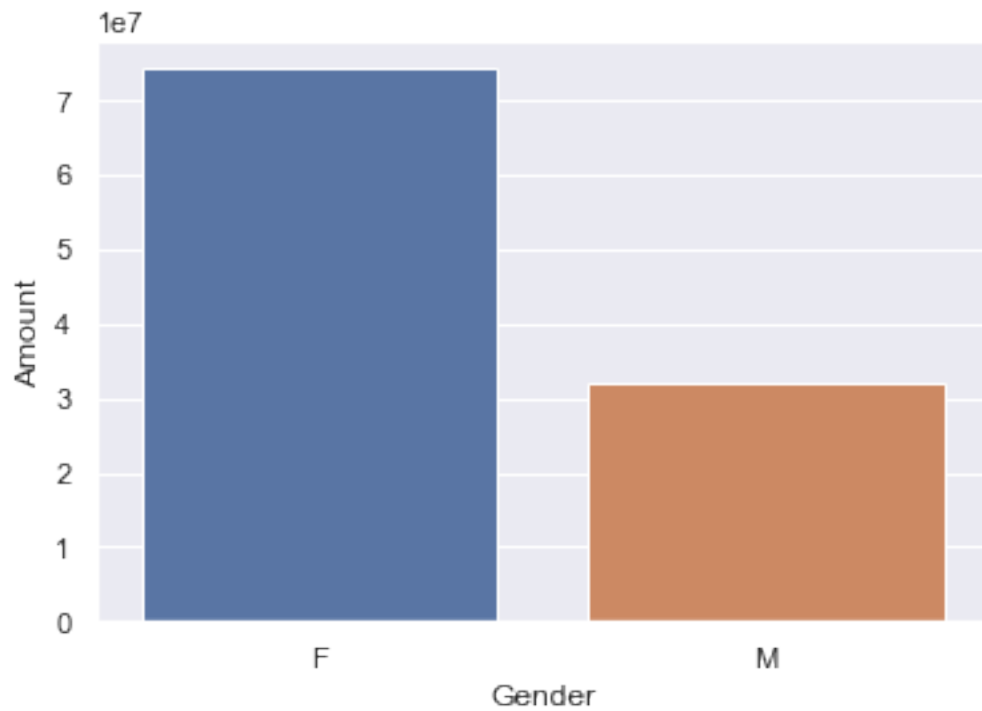
```
[334]: ax = sns.countplot (x = 'Gender', data = df)

for bars in ax.containers:
    ax.bar_label(bars)
```



```
[335]: sales_gen = df.groupby(['Gender'], as_index=False) ['Amount'].sum().
        ↪sort_values(by = 'Amount', ascending=False)
sns.barplot(x = 'Gender', y = 'Amount', data= sales_gen)
```

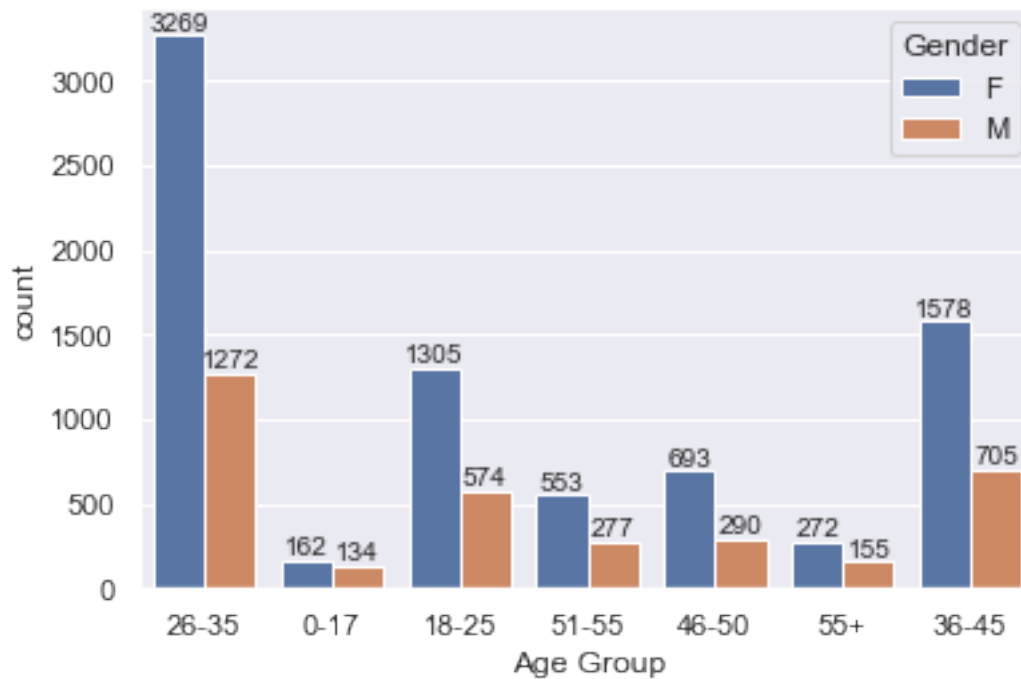
```
[335]: <AxesSubplot:xlabel='Gender', ylabel='Amount'>
```



The graph visually depicts a noteworthy observation: a majority of buyers are identified as female, and their purchasing influence surpasses that of male buyers.

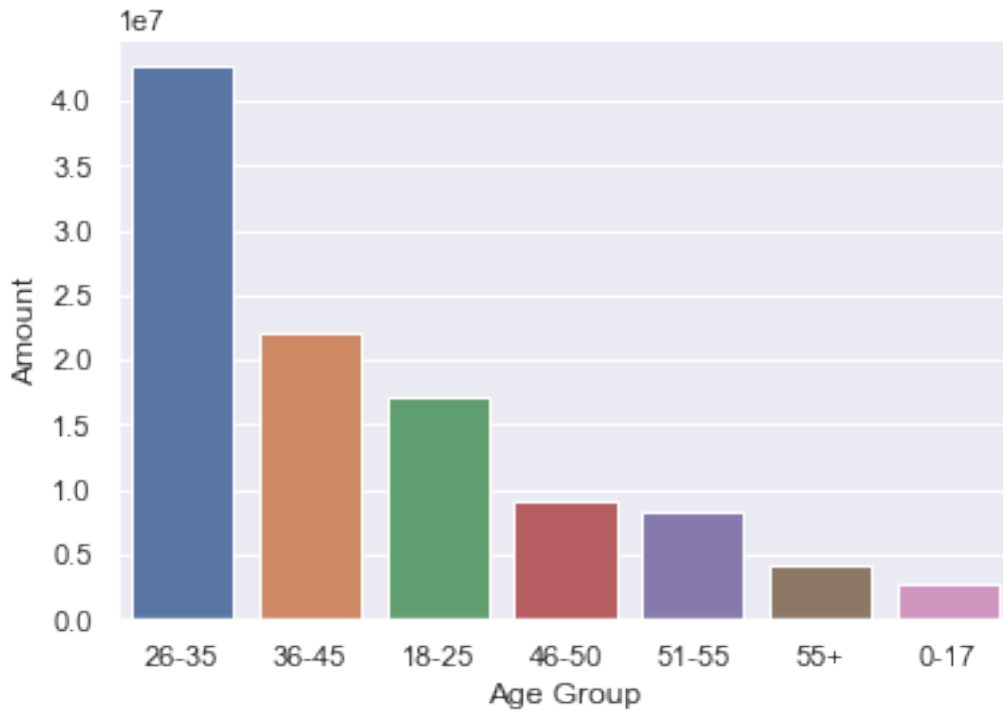
2.0.2 Age Group

```
[336]: ax = sns.countplot(data= df, x = 'Age Group', hue= 'Gender')  
  
for bars in ax.containers:  
    ax.bar_label(bars)
```



```
[337]: # Total Amount vs age group
sales_age = df.groupby(['Age Group'], as_index= False)['Amount'].sum().
    ↪sort_values(by = 'Amount', ascending= False)
sns.barplot(x = 'Age Group', y = 'Amount', data= sales_age)
```

```
[337]: <AxesSubplot:xlabel='Age Group', ylabel='Amount'>
```



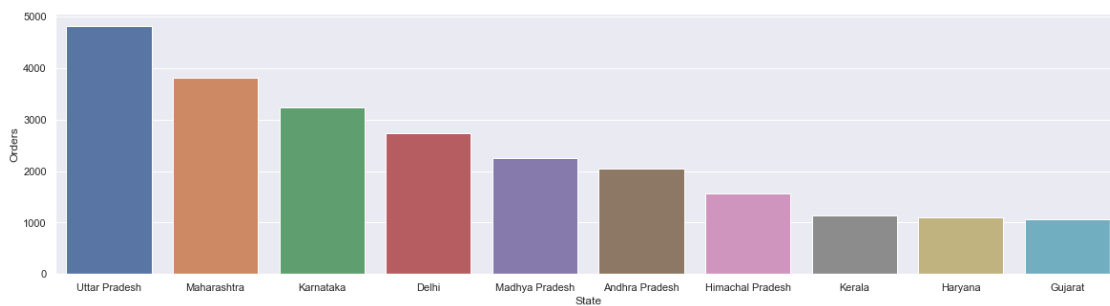
The chart indicates a predominant female presence among buyers, particularly within the age bracket of 26 to 35 years.

2.0.3 State

```
[338]: sales_state = df.groupby(['State'], as_index= False)['Orders'].sum().
        ↪sort_values(by = 'Orders', ascending= False).head(10)

sns.set(rc = {'figure.figsize':(20,5)})
sns.barplot(data= sales_state, x = 'State', y = 'Orders')
```

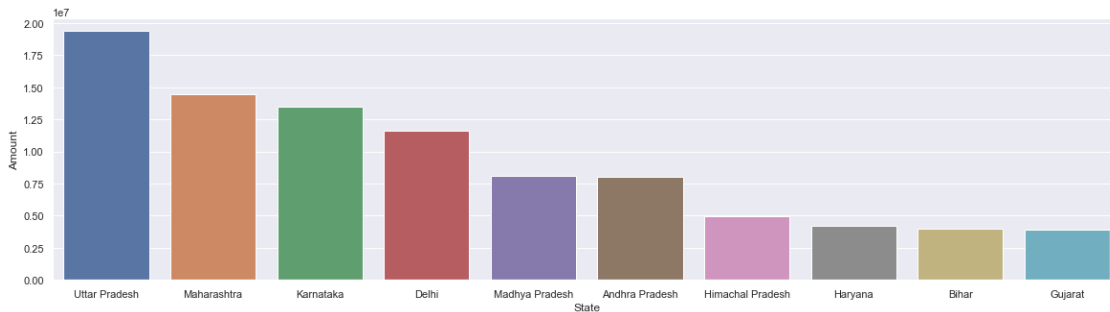
```
[338]: <AxesSubplot:xlabel='State', ylabel='Orders'>
```



```
[339]: # Total amount of sales from states
sales_state = df.groupby(['State'], as_index= False)['Amount'].sum().
↳sort_values(by = 'Amount', ascending= False).head(10)

sns.barplot(data= sales_state, x = 'State', y = 'Amount')
```

```
[339]: <AxesSubplot:xlabel='State', ylabel='Amount'>
```

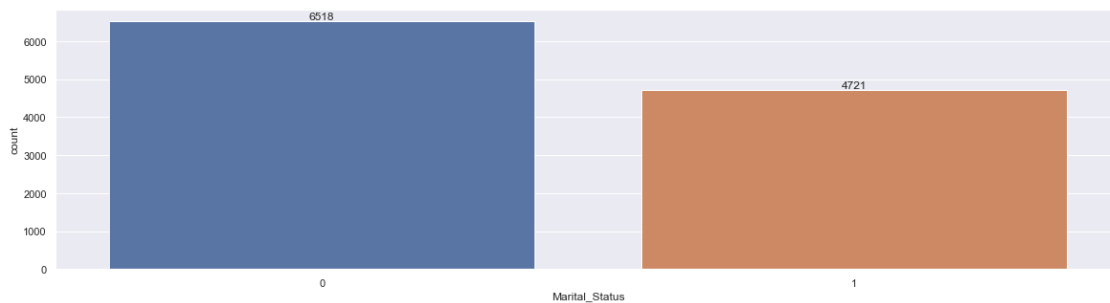


The preceding graphs focus on the top 10 states. It's evident from these graphs that a significant portion of orders originates from Uttar Pradesh, followed by Maharashtra and Karnataka in terms of order volume.

2.0.4 Gender by Marital Status

```
[340]: ax = sns.countplot(data=df, x= 'Marital_Status')

sns.set(rc = {'figure.figsize': (6,5)})
for bars in ax.containers:
    ax.bar_label(bars)
```

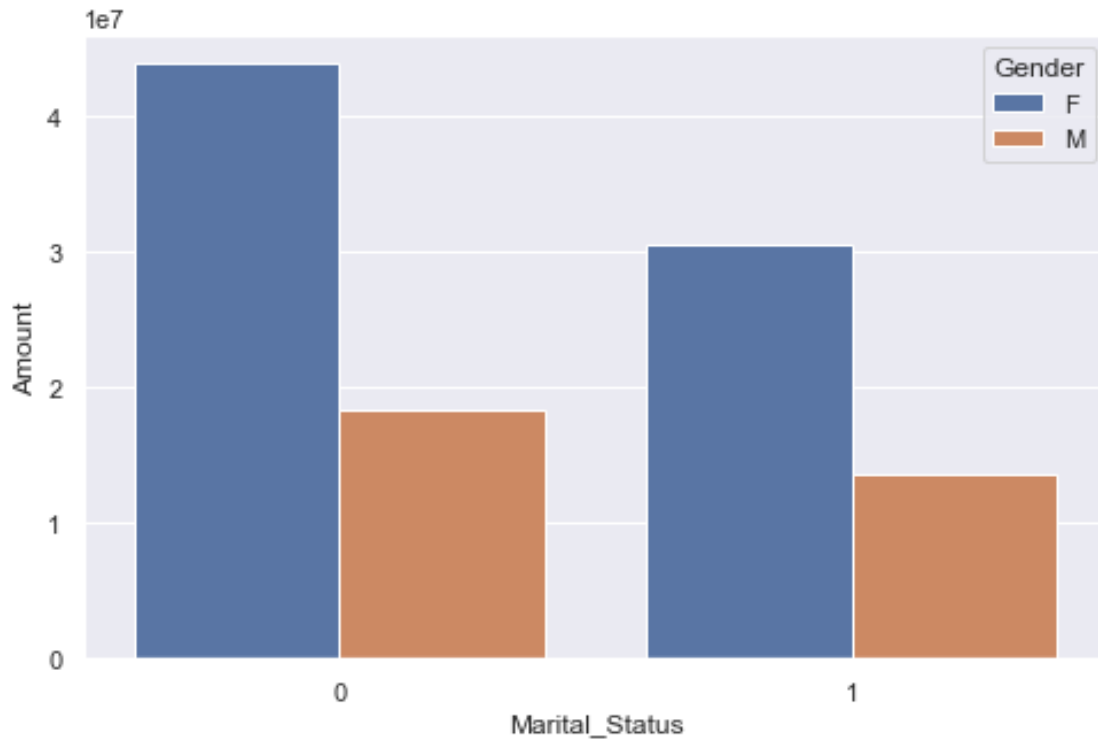


```
[341]: sales_state = df.groupby(['Marital_Status', 'Gender'], as_index=
↳False)['Amount'].sum().sort_values(by = 'Amount', ascending= False)
```



```
sns.set(rc = {'figure.figsize': (8,5)})
sns.barplot(data = sales_state, x = 'Marital_Status', y = 'Amount', hue=
↳ 'Gender')
```

[341]: <AxesSubplot:xlabel='Marital_Status', ylabel='Amount'>

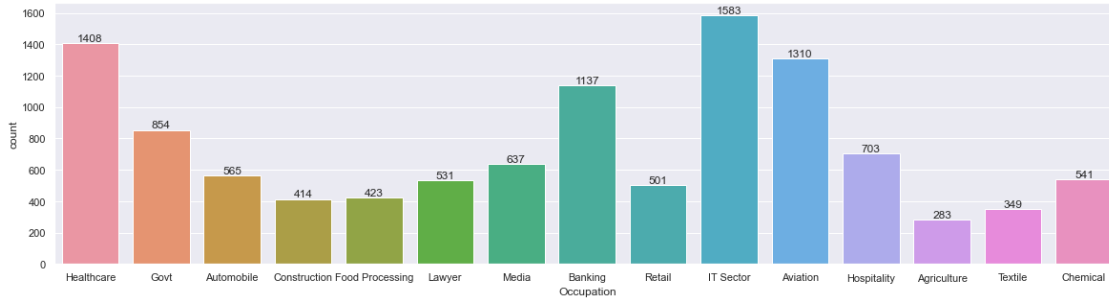


The provided graphs illustrate that a considerable number of buyers are married women, and this demographic exhibits substantial purchasing power.

2.0.5 Occupation

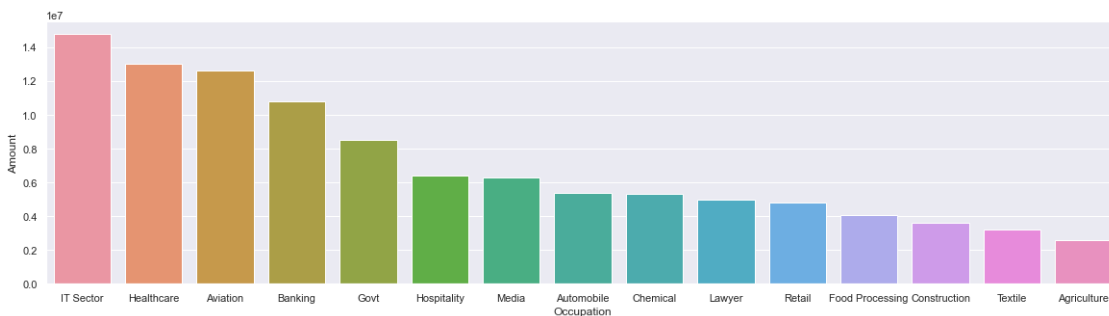
```
[342]: sns.set(rc = {'figure.figsize': (20,5)})
ax = sns.countplot(data= df, x = 'Occupation')

for bars in ax.containers:
    ax.bar_label(bars)
```



```
[343]: sales_state = df.groupby(['Occupation'], as_index= False)['Amount'].sum().
        ↪sort_values(by = 'Amount', ascending= False)
sns.set(rc = {'figure.figsize': (20,5)})
sns.barplot(data = sales_state, x = 'Occupation', y = 'Amount')
```

```
[343]: <AxesSubplot:xlabel='Occupation', ylabel='Amount'>
```

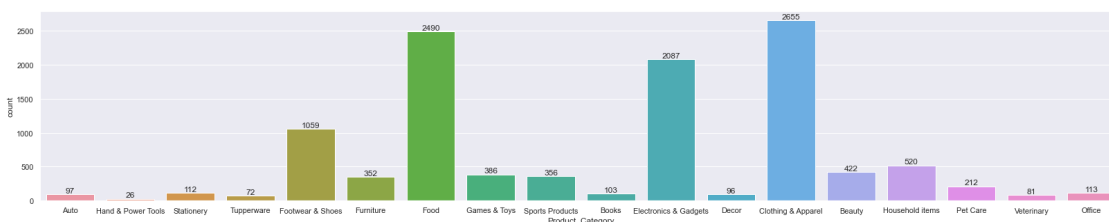


The aforementioned graphs reveal that a substantial portion of buyers are employed in the IT, Healthcare, and Aviation sectors.

2.0.6 Product Category

```
[344]: sns.set(rc={'figure.figsize':(28,5)})
ax = sns.countplot(data = df, x = 'Product_Category')

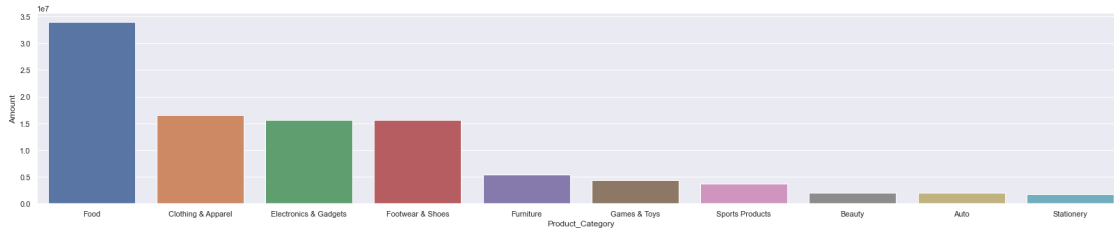
for bars in ax.containers:
    ax.bar_label(bars)
```



```
[345]: sales_state = df.groupby(['Product_Category'], as_index=False)['Amount'].sum().
        ↪sort_values(by='Amount', ascending=False).head(10)

sns.set(rc={'figure.figsize':(28,5)})
sns.barplot(data = sales_state, x = 'Product_Category',y= 'Amount')
```

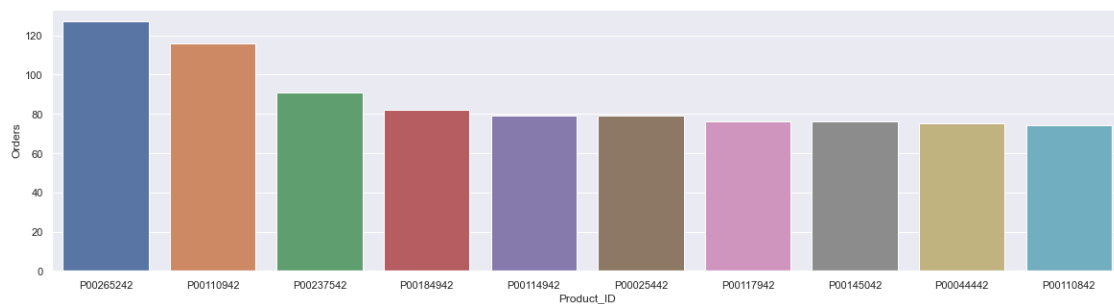
```
[345]: <AxesSubplot:xlabel='Product_Category', ylabel='Amount'>
```



```
[346]: sales_state = df.groupby(['Product_ID'], as_index=False)['Orders'].sum().
        ↪sort_values(by='Orders', ascending=False).head(10)

sns.set(rc={'figure.figsize':(20,5)})
sns.barplot(data = sales_state, x = 'Product_ID',y= 'Orders')
```

```
[346]: <AxesSubplot:xlabel='Product_ID', ylabel='Orders'>
```



2.1 Conclusion

The data indicates that married women aged 26-35 years, employed in the IT, Healthcare, and Aviation sectors in Uttar Pradesh, Maharashtra, and Karnataka, show a higher propensity to purchase items from the Food, Clothing, and Electronics categories.

Key insights derived from the analysis.

1. Customer Demographics and Behavior:

- **Gender and Spending:** Women emerged as the primary purchasers, spending more than their male counterparts, highlighting the importance of tailoring marketing strategies to appeal to female consumers.

- **Age Group Preferences:** The 26-35 age group, especially among women, was the most active, suggesting this demographic is a crucial target for marketing campaigns during Diwali.

2. Geographic Trends:

- **State-wise Sales:** Uttar Pradesh, Maharashtra, and Karnataka were the top states in terms of order volume and sales amount. This indicates regions where marketing and stock should be intensified during the festive season.

3. Marital Status and Consumption:

- **Marital Status Impact:** Married individuals, particularly women, demonstrated significant purchasing power. This could influence marketing messages and product offerings to cater specifically to married couples or families.

4. Occupational Influence:

- **Occupation and Purchasing Power:** Individuals in the IT, Healthcare, and Aviation sectors showed higher spending habits. Tailored promotions targeting these professions could be beneficial.

5. Product Popularity and Sales:

- **Product Categories:** Food, Clothing, and Electronics were the most popular categories. Stocking up more on these products and creating targeted promotions could enhance sales in these segments.

- **Specific Products:** Some products consistently outperformed others in terms of orders, which could guide inventory and promotional strategies.

6. Sales Optimization Strategies:

- **Enhanced Customer Experience:** Understanding customer preferences helps in improving service and customer satisfaction, which can lead to increased sales and customer loyalty.

- **Revenue Increase:** By aligning sales strategies with the insights on demographics, product preferences, and geographic sales distribution, businesses can optimize their revenue during festive seasons like Diwali.