y5n0wxhk0

May 28, 2024

1.Importing all the libraries that are going to be used. 2.Data Pre-processing and cleaning. 3.Exploratory Data Analysis. 4.Data Visualizatiion using various Graphs.

[114]:
```
#Importing Libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
```

[115]:
```
df = pd.read_csv("Diwali Sales Data.csv")
df
```

[115]:

	User_ID	Cust_name	Product_ID	Gender	Age Group	Age	Marital_Status	State	Zone	Occupation	Product_Category	Orders
0	1002903	Sanskriti	P00125942	F	26-35	28	0	Maharashtra	Western	Healthcare	Auto	1
1	1000732	Kartik	P00110942	F	26-35	35	1	Andhra Pradesh	Southern	Govt	Auto	3
2	1001990	Bindu	P00118542	F	26-35	35	1	Uttar Pradesh	Central	Automobile	Auto	3
3	1001425	Sudevi	P00237842	M	0-17	16	0	Karnataka	Southern	Construction	Auto	2
4	1000588	Joni	P00057942	M	26-35	28	1	Gujarat	Western	Food Processing	Auto	2
…	…	…	…	…	…	…	…	…	…	…	…	…
11246	1000695	Manning	P00296942	M	18-25	19	1	Maharashtra	Western	Chemical	Office	4
11247	1004089	Reichenbach	P00171342	M	26-35	33	0	Haryana	Northern	Healthcare	Veterinary	3
11248	1001209	Oshin	P00201342	F	36-45	40	0	Madhya Pradesh	Central	Textile	Office	4
11249	1004023	Noonan	P00059442	M	36-45	37	0	Karnataka	Southern	Agriculture	Office	3
11250	1002744	Brumley	P00281742	F	18-25	19	0	Maharashtra	Western	Healthcare	Office	3

```
         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
…           …     …         …
11246     370.0     NaN       NaN
11247     367.0     NaN       NaN
11248     213.0     NaN       NaN
11249     206.0     NaN       NaN
11250     188.0     NaN       NaN

[11251 rows x 15 columns]
```

1 Pre-processing And Cleaning

[116]:
```
#First 5 Values
df.head()
```

[116]:
```
   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
```

[117]:
```
#Last 5 values
df.tail(5)
```

[117]:
```
        User_ID    Cust_name Product_ID Gender Age Group  Age  Marital_Status  \
11246  1000695      Manning  P00296942      M     18-25   19               1
11247  1004089  Reichenbach  P00171342      M     26-35   33               0
11248  1001209        Oshin  P00201342      F     36-45   40               0
11249  1004023       Noonan  P00059442      M     36-45   37               0
11250  1002744      Brumley  P00281742      F     18-25   19               0

                State      Zone   Occupation Product_Category  Orders  Amount  \
11246     Maharashtra   Western     Chemical           Office       4   370.0
11247         Haryana  Northern   Healthcare       Veterinary       3   367.0
11248  Madhya Pradesh   Central      Textile           Office       4   213.0
11249       Karnataka  Southern  Agriculture           Office       3   206.0
11250     Maharashtra   Western   Healthcare           Office       3   188.0

       Status  unnamed1
11246     NaN       NaN
11247     NaN       NaN
11248     NaN       NaN
11249     NaN       NaN
11250     NaN       NaN
```

[118]:
```
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
```

[119]:
```
df.describe
```

[119]:
```
<bound method NDFrame.describe of        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
…         …           …         …    …       …  …              …
11246   1000695      Manning  P00296942      M     18-25   19                1
11247   1004089  Reichenbach  P00171342      M     26-35   33                0
11248   1001209        Oshin  P00201342      F     36-45   40                0
11249   1004023       Noonan  P00059442      M     36-45   37                0
11250   1002744      Brumley  P00281742      F     18-25   19                0

                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
…               …       …               …                …     …
11246     Maharashtra   Western         Chemical           Office       4
11247         Haryana  Northern       Healthcare       Veterinary       3
11248  Madhya Pradesh   Central          Textile           Office       4
11249       Karnataka  Southern      Agriculture           Office       3
11250     Maharashtra   Western       Healthcare           Office       3

        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
…        …     …       …
11246    370.0     NaN       NaN
11247    367.0     NaN       NaN
11248    213.0     NaN       NaN
11249    206.0     NaN       NaN
11250    188.0     NaN       NaN

[11251 rows x 15 columns]>
```

[120]:
```
df.shape
```

[120]:
```
(11251, 15)
```

[121]:
```
df.drop(['Status','unnamed1'],axis=1,inplace = True)
```

[122]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 11251 entries, 0 to 11250
Data columns (total 13 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
dtypes: float64(1), int64(4), object(8)
memory usage: 1.1+ MB
```

[123]:
```
df.isnull().sum()
```

[123]:
```
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
```

[124]:
```
df.dropna(inplace = True)
```

[125]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 11239 entries, 0 to 11250
Data columns (total 13 columns):
 #   Column            Non-Null Count  Dtype
```

```
---  ------             --------------  -----
 0   User_ID            11239 non-null  int64
 1   Cust_name          11239 non-null  object
 2   Product_ID         11239 non-null  object
 3   Gender             11239 non-null  object
 4   Age Group          11239 non-null  object
 5   Age                11239 non-null  int64
 6   Marital_Status     11239 non-null  int64
 7   State              11239 non-null  object
 8   Zone               11239 non-null  object
 9   Occupation         11239 non-null  object
 10  Product_Category   11239 non-null  object
 11  Orders             11239 non-null  int64
 12  Amount             11239 non-null  float64
dtypes: float64(1), int64(4), object(8)
memory usage: 1.2+ MB
```

[126]:
```
df[['Age','Orders','Amount']].describe()
```

[126]:

	Age	Orders	Amount
count	11239.000000	11239.000000	11239.000000
mean	35.410357	2.489634	9453.610858
std	12.753866	1.114967	5222.355869
min	12.000000	1.000000	188.000000
25%	27.000000	2.000000	5443.000000
50%	33.000000	2.000000	8109.000000
75%	43.000000	3.000000	12675.000000
max	92.000000	4.000000	23952.000000

[127]:
```
age_mean,age_std,*_ = df.Age.describe()
```

[128]:
```
print(age_mean)
print(age_std)
```

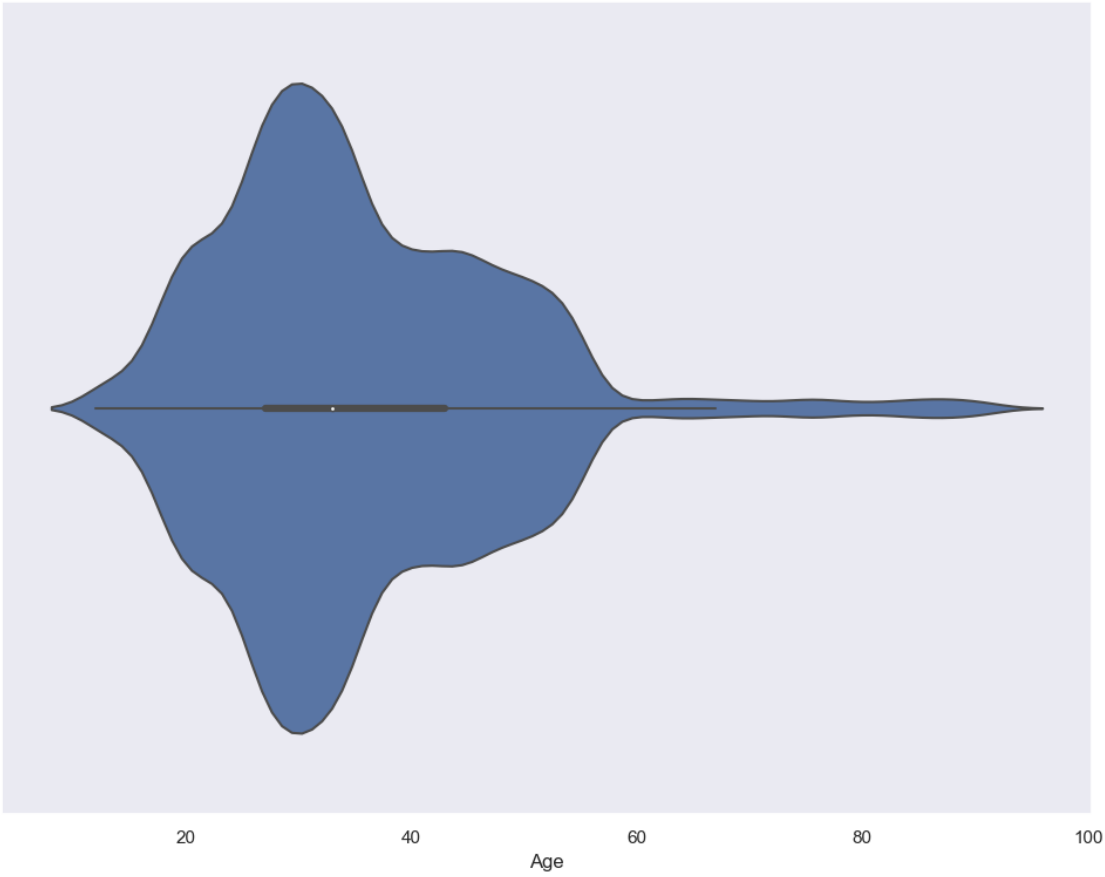
```
11239.0
35.41035679330901
```

[129]:
```
df[df.Age >(age_mean + 3.5*age_std)]
```

[129]:
```
Empty DataFrame
Columns: [User_ID, Cust_name, Product_ID, Gender, Age Group, Age,
Marital_Status, State, Zone, Occupation, Product_Category, Orders, Amount]
Index: []
```

[130]:
```
import warnings
warnings.filterwarnings("ignore")
```

[131]:
```
plt.figure(figsize = (12,9))
sns.violinplot(df.Age)
plt.show()
```



[132]:
```
amount_mean,amount_std, *_ = df.Amount.describe()
print(amount_mean)
print(amount_std)
```

```
11239.0
9453.610857727557
```

[133]:
```
df[df.Amount > amount_mean +(3.5*amount_std)]
```

[133]:
```
Empty DataFrame
Columns: [User_ID, Cust_name, Product_ID, Gender, Age Group, Age,
Marital_Status, State, Zone, Occupation, Product_Category, Orders, Amount]
Index: []
```

[134]:
```
df.describe(include = 'object')
```

[134]:
```
       Cust_name Product_ID Gender Age Group          State     Zone  \
count      11239      11239  11239     11239          11239    11239
unique      1250       2350      2         7             16        5
top      Vishakha  P00265242      F     26-35  Uttar Pradesh  Central
freq          42         53   7832      4541           1944     4289

       Occupation    Product_Category
count       11239               11239
unique         15                  18
top     IT Sector  Clothing & Apparel
freq         1583                2655
```

[135]:
```
df.shape
```

[135]:
```
(11239, 13)
```

[136]:
```
df['Cust_name'].value_counts()
```

[136]:
```
Vishakha       42
Shreyshi       32
Sudevi         30
Akshat         29
Alejandro      28
               ..
Overcash        2
Madan Mohan     2
Madhav          2
Laal            1
Bindu           1
Name: Cust_name, Length: 1250, dtype: int64
```

[137]:
```
df['Cust_name'].value_counts().nlargest(3)
```

[137]:
```
Vishakha    42
Shreyshi    32
Sudevi      30
Name: Cust_name, dtype: int64
```

[138]:
```
df['Cust_name'].value_counts().nsmallest(3)
```

[138]:
```
Laal      1
Bindu     1
Sarita    2
Name: Cust_name, dtype: int64
```

[139]:
```
df['Product_ID'].value_counts().nlargest(10)
```

[139]:
```
P00265242    53
P00110942    44
P00184942    37
P00237542    35
P00112142    34
P00114942    33
P00110742    32
P00112542    30
P00110842    30
P00145042    30
Name: Product_ID, dtype: int64
```

[140]:
```
cat = df.describe(include = 'object').columns
cat
```

[140]:
```
Index(['Cust_name', 'Product_ID', 'Gender', 'Age Group', 'State', 'Zone',
       'Occupation', 'Product_Category'],
      dtype='object')
```

[141]:
```
num = df.describe().columns
num
```

[141]:
```
Index(['User_ID', 'Age', 'Marital_Status', 'Orders', 'Amount'], dtype='object')
```

[142]:
```
df['Gender'].describe()
```

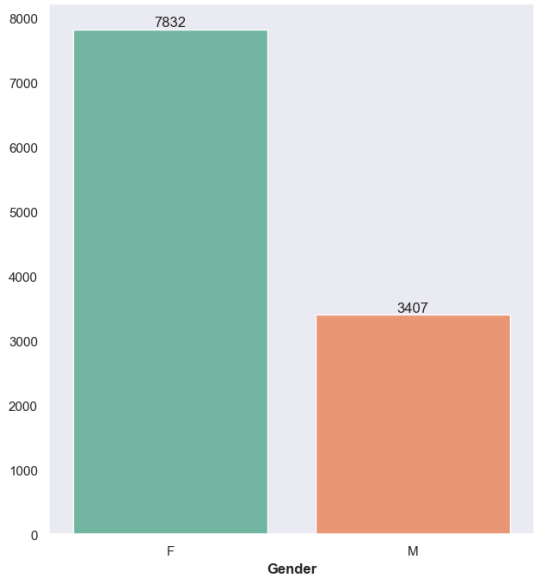
[142]:
```
count     11239
unique        2
top           F
freq       7832
Name: Gender, dtype: object
```

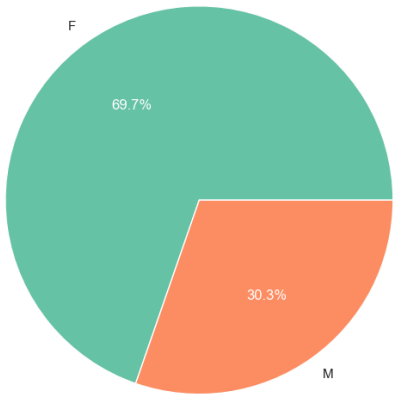
[143]:
```
df['Gender'].value_counts()
```

[143]:
```
F    7832
M    3407
Name: Gender, dtype: int64
```

[144]:
```
# Create subplots
fig, ax = plt.subplots(1, 2, figsize=(16, 8))
# Get the value counts for the Gender column
data = df.Gender.value_counts()
# Set the Seaborn style
sns.set(style="dark", color_codes=True)
# Define the color palette
pal = sns.color_palette("Set2", len(data))
# Create the bar plot
```

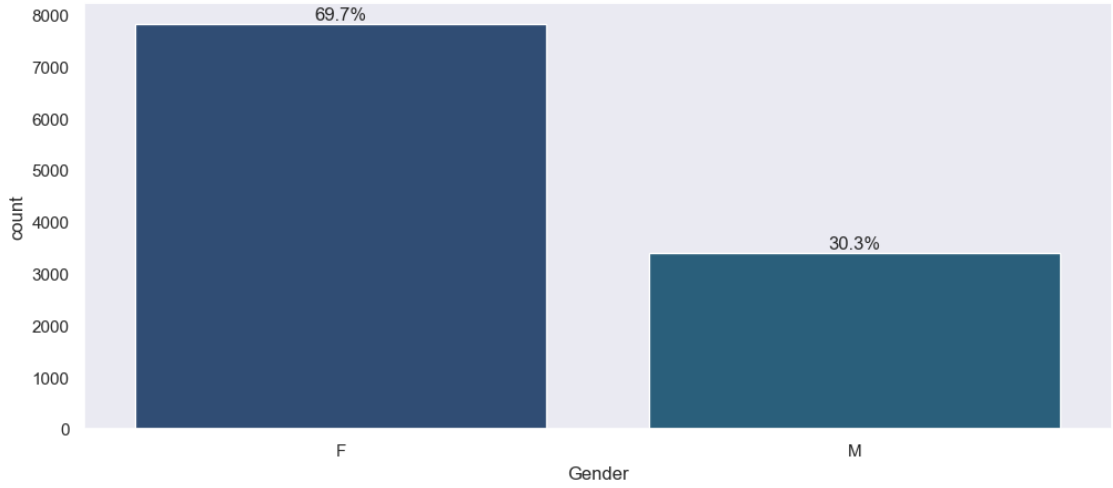
```
sns.barplot(x=data.index, y=data.values, palette=pal, ax=ax[0])
# Add annotations to the bar plot
for bar in ax[0].patches:
    ax[0].annotate(
        '{:.0f}'.format(bar.get_height()),
        (bar.get_x() + bar.get_width() / 2, bar.get_height()),
        ha='center', va='bottom'
    )
# Set the label for the x-axis
ax[0].set_xlabel("Gender", weight="semibold")
# Create the pie chart
_, _, autotexts = ax[1].pie(data.values, labels=data.index, autopct="%.1f%%",␣
 ↪colors=pal)
# Set the color of the text in the pie chart to white
for autotext in autotexts:
    autotext.set_color("white")
# Show the plot
plt.show()
```





[145]:
```
# Set the figure size
plt.figure(figsize=(12, 5))

# Calculate the total number of records
total = len(df)

# Create the count plot with the "magma" color palette
ax = sns.countplot(x='Gender', data=df, palette=sns.color_palette("crest_r"))
```

```
# Add annotations to the bars
for bar in ax.patches:
    height = bar.get_height()
    ax.annotate(
        '{:.1f}%'.format(height / total * 100),
        (bar.get_x() + bar.get_width() / 2, height),
        ha='center', va='bottom'
    )

# Show the plot
plt.show()
```

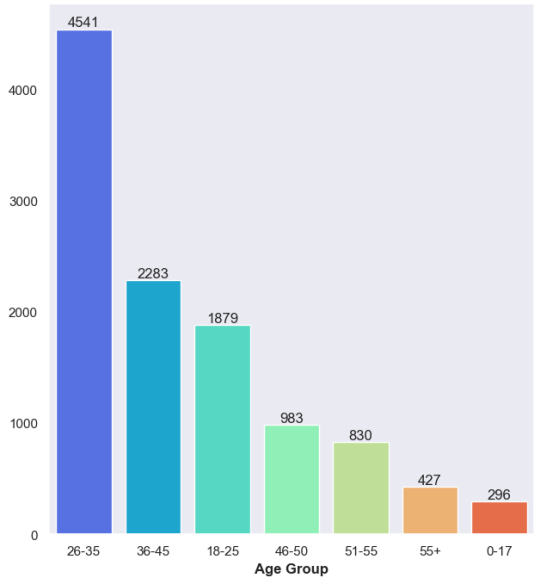


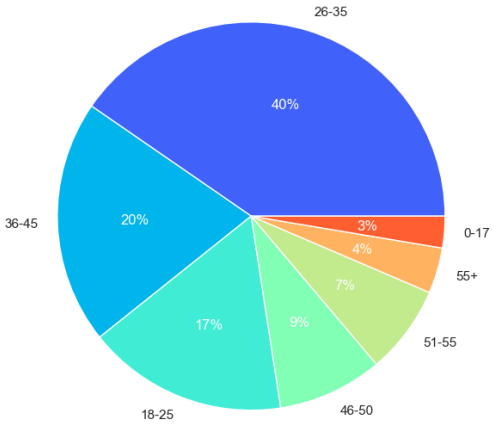
[146]:
```
df['Age Group'].describe()
```

[146]:
```
count     11239
unique        7
top       26-35
freq       4541
Name: Age Group, dtype: object
```

[147]:
```
fig, ax = plt.subplots(1, 2, figsize=(16, 8))

# Get the value counts for the 'Age Group' column
data = df['Age Group'].value_counts()

# Set the Seaborn style and color palette
sns.set(style="dark", color_codes=True)
pal = sns.color_palette("rainbow", len(data))
```

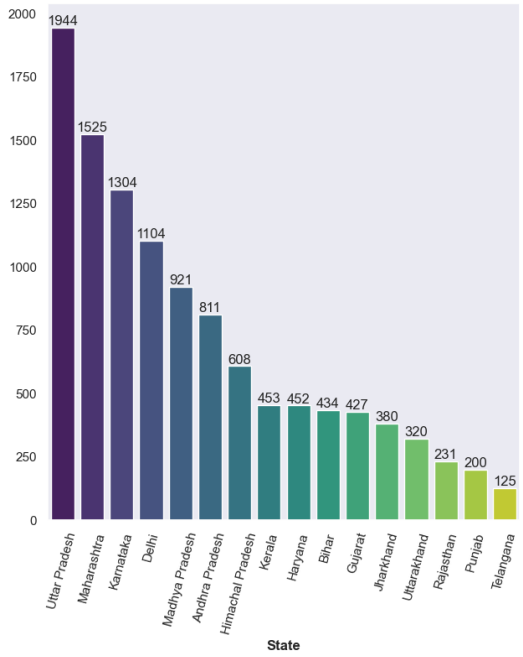
```
# Create the bar plot
sns.barplot(x=data.index, y=data.values, palette=pal, ax=ax[0])

# Add annotations to the bar plot
for bar in ax[0].patches:
    ax[0].annotate(
        '{:.0f}'.format(bar.get_height()),
        (bar.get_x() + bar.get_width() / 2, bar.get_height()),
        ha='center', va='bottom'
    )

# Set the label for the x-axis
ax[0].set_xlabel("Age Group", weight="semibold")

# Create the pie chart
_, _, autotexts = ax[1].pie(data.values, labels=data.index, autopct='%.0f%%',␣
 ↪colors=pal)

# Set the color of the text in the pie chart to white
for autotext in autotexts:
    autotext.set_color("white")

# Show the plot
plt.show()
```

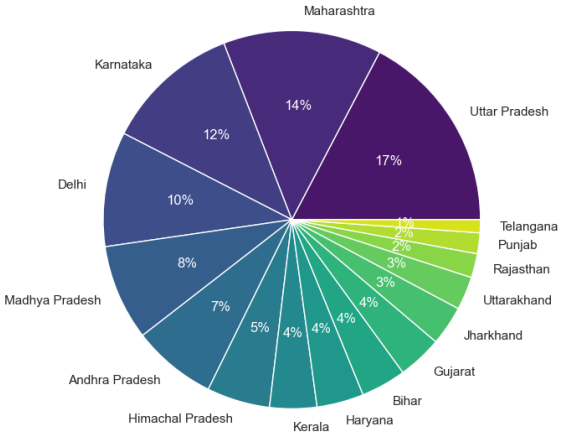




[148]:
```
# Create subplots
fig, ax = plt.subplots(1, 2, figsize=(16, 8))
```

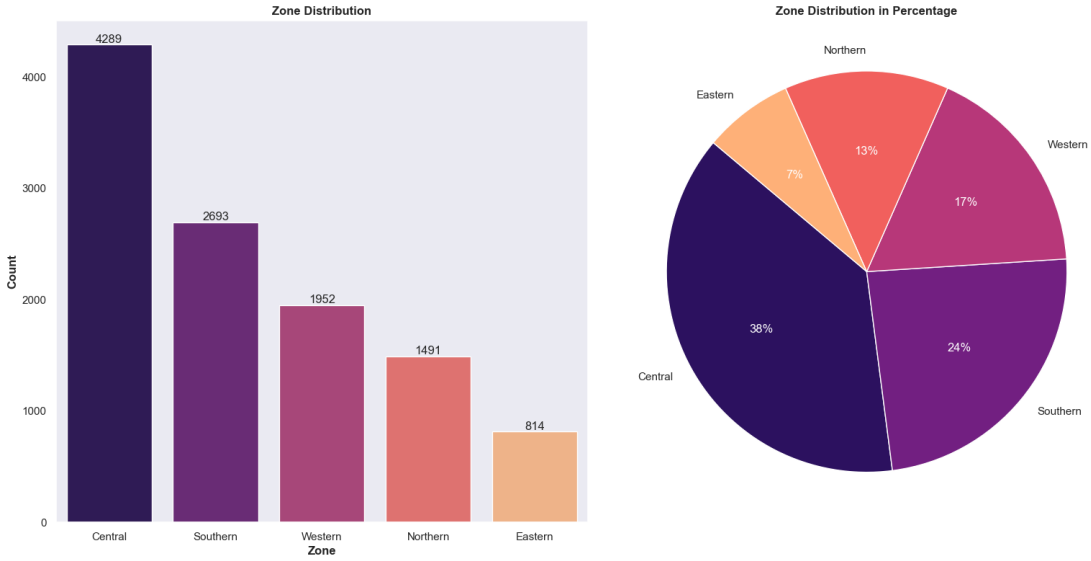
```
# Get the value counts for the 'State' column
data = df['State'].value_counts()

# Set the Seaborn style and color palette
sns.set(style="dark", color_codes=True)
pal = sns.color_palette("viridis", len(data))

# Create the bar plot
my_plot = sns.barplot(x=data.index, y=data.values, palette=pal, ax=ax[0])

# Add annotations to the bar plot
for bar in ax[0].patches:
    ax[0].annotate(
        '{:.0f}'.format(bar.get_height()),
        (bar.get_x() + bar.get_width() / 2, bar.get_height()),
        ha='center', va='bottom'
    )

# Set the label for the x-axis
ax[0].set_xlabel("State", weight="semibold")

# Rotate x-axis labels for better readability
my_plot.set_xticklabels(my_plot.get_xticklabels(), rotation=75)

# Create the pie chart
_, _, autotexts = ax[1].pie(data.values, labels=data.index, autopct='%.0f%%',␣
 ↪colors=pal)

# Set the color of the text in the pie chart to white
for autotext in autotexts:
    autotext.set_color("white")

# Show the plot
plt.show()
```





[149]:
```
# Create subplots
fig, ax = plt.subplots(1, 2, figsize=(16, 8))

# Get the value counts for the 'Zone' column
data = df['Zone'].value_counts()

# Set the Seaborn style and use the "husl" palette for an attractive color␣
 ↪scheme
sns.set(style="dark", color_codes=True)
pal = sns.color_palette("magma", len(data))

# Create the bar plot
sns.barplot(x=data.index, y=data.values, palette=pal, ax=ax[0])

# Add annotations to the bar plot
for bar in ax[0].patches:
    ax[0].annotate(
        '{:.0f}'.format(bar.get_height()),
        (bar.get_x() + bar.get_width() / 2, bar.get_height()),
        ha='center', va='bottom'
    )

# Set the labels and title for the bar plot
ax[0].set_xlabel("Zone", weight="semibold")
ax[0].set_ylabel("Count", weight="semibold")
```

```
ax[0].set_title("Zone Distribution", weight="bold")

# Create the pie chart
_, _, autotexts = ax[1].pie(data.values, labels=data.index, autopct='%.0f%%',␣
 ↪colors=pal, startangle=140)

# Set the color of the text in the pie chart to white
for autotext in autotexts:
    autotext.set_color("white")

# Set the title for the pie chart
ax[1].set_title("Zone Distribution in Percentage", weight="bold")

# Adjust layout to prevent overlap
plt.tight_layout()

# Show the plot
plt.show()
```



[150]:
```
df['Occupation'].describe()
```

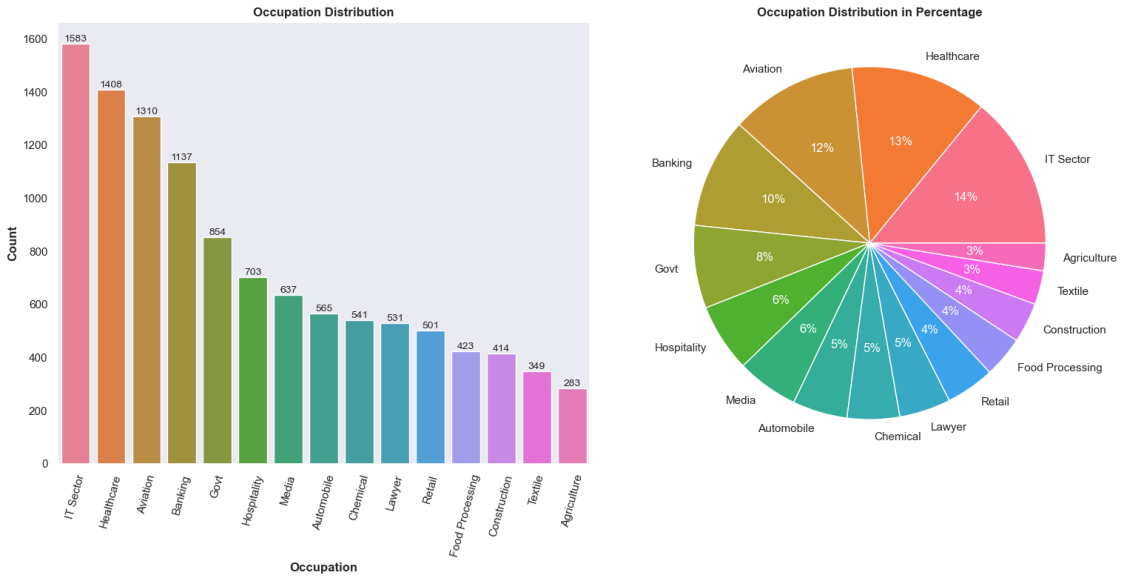
[150]:
```
count         11239
unique           15
top       IT Sector
freq           1583
Name: Occupation, dtype: object
```

[151]:
```
df['Occupation'].value_counts()
```

[151]:
```
IT Sector          1583
Healthcare         1408
Aviation           1310
Banking            1137
Govt                854
Hospitality         703
Media               637
Automobile          565
Chemical            541
Lawyer              531
Retail              501
Food Processing     423
Construction        414
Textile             349
Agriculture         283
Name: Occupation, dtype: int64
```

[152]:
```
# Create subplots
fig, ax = plt.subplots(1, 2, figsize=(16, 8))

# Get the value counts for the 'Occupation' column
data = df['Occupation'].value_counts()

# Set a custom palette with distinct colors for each category
unique_colors = sns.color_palette("husl", len(data))
pal = {occupation: color for occupation, color in zip(data.index,␣
 ↪unique_colors)}

# Set the Seaborn style
sns.set(style="dark", color_codes=True)

# Create the bar plot
my_plot = sns.barplot(x=data.index, y=data.values, palette=pal, ax=ax[0])

# Add annotations to the bar plot
for bar in ax[0].patches:
    ax[0].annotate(
        '{:.0f}'.format(bar.get_height()),
        (bar.get_x() + bar.get_width() / 2, bar.get_height()),
        ha='center', va='bottom', fontsize=10  # Increase font size for␣
 ↪visibility
    )

# Set the labels and title for the bar plot
ax[0].set_xlabel("Occupation", weight="semibold")
ax[0].set_ylabel("Count", weight="semibold")
ax[0].set_title("Occupation Distribution", weight="bold")
```

```
# Rotate x-axis labels for better readability
my_plot.set_xticklabels(my_plot.get_xticklabels(), rotation=75)

# Create the pie chart
_, _, autotexts = ax[1].pie(data.values, labels=data.index, autopct='%.0f%%',␣
 ↪colors=unique_colors)

# Set the color of the text in the pie chart to white and increase font size
for autotext in autotexts:
    autotext.set_color("white")
    autotext.set_fontsize(12)  # Increase font size for visibility

# Set the title for the pie chart
ax[1].set_title("Occupation Distribution in Percentage", weight="bold")

# Adjust layout to prevent overlap
plt.tight_layout()

# Show the plot
plt.show()
```



[153]:
```
df['Product_Category'].describe()
```

[153]:
```
count                 11239
unique                   18
top       Clothing & Apparel
freq                   2655
```

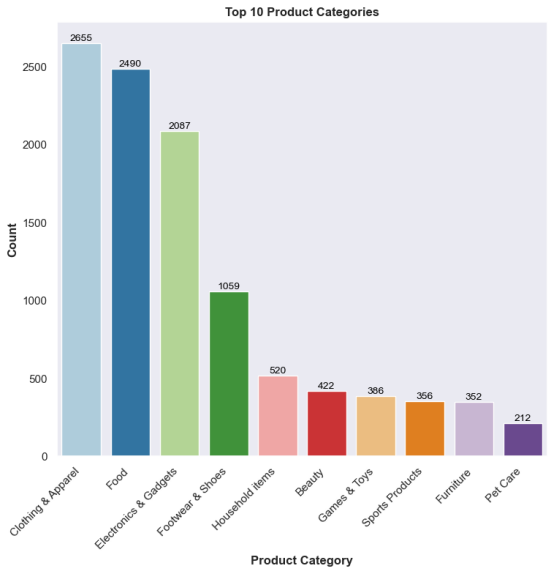
```
Name: Product_Category, dtype: object
```

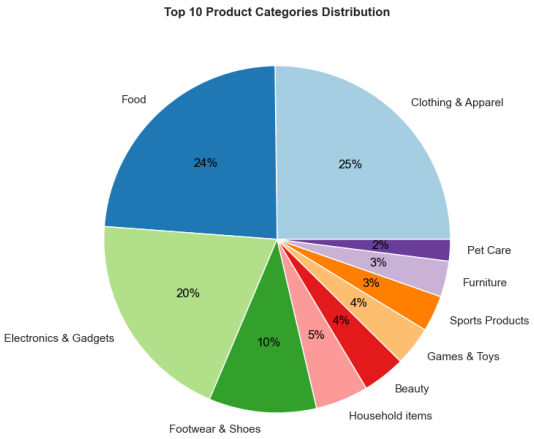
[154]:
```
df['Product_Category'].value_counts()
```

[154]:
```
Clothing & Apparel       2655
Food                     2490
Electronics & Gadgets    2087
Footwear & Shoes         1059
Household items           520
Beauty                    422
Games & Toys              386
Sports Products           356
Furniture                 352
Pet Care                  212
Office                    113
Stationery                112
Books                     103
Auto                       97
Decor                      96
Veterinary                 81
Tupperware                 72
Hand & Power Tools         26
Name: Product_Category, dtype: int64
```

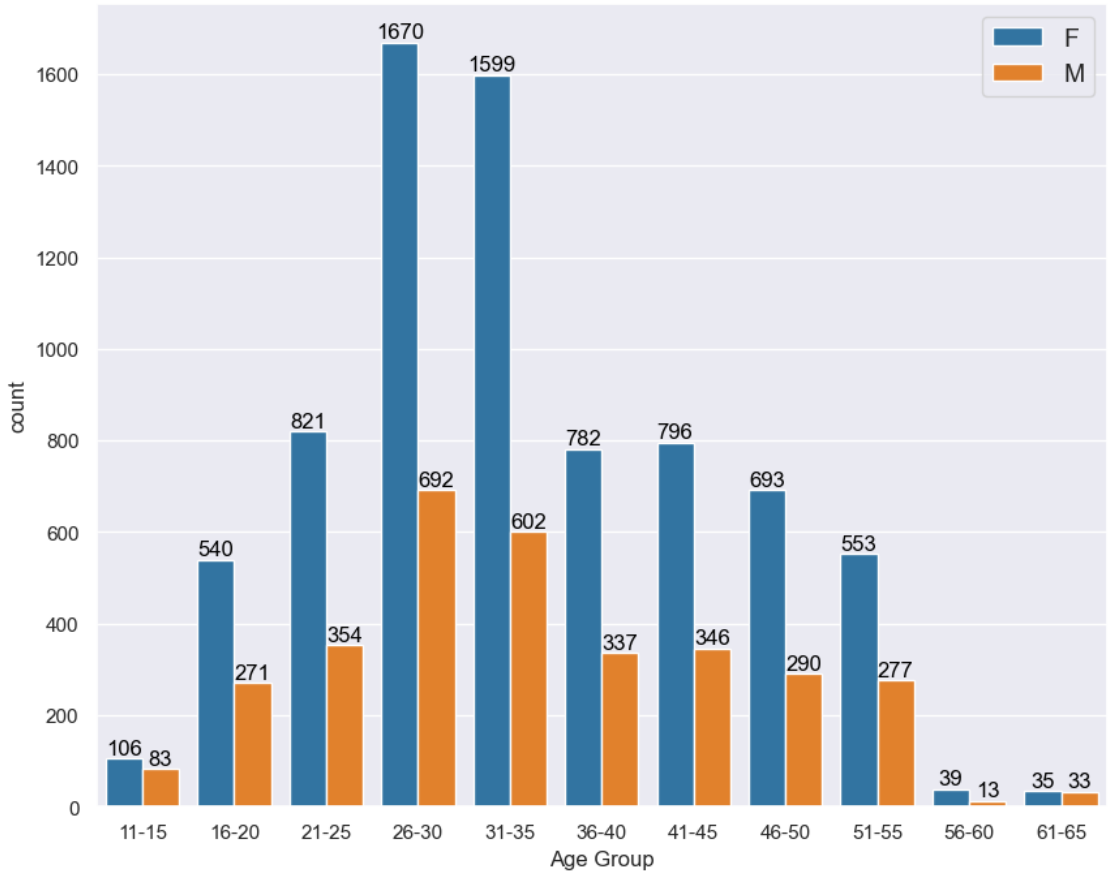
[155]:
```
# Filter the top 10 observations for 'Product_Category'
top_categories = df['Product_Category'].value_counts().head(10)

# Create subplots
fig, ax = plt.subplots(1, 2, figsize=(16, 8))

# Set a visually appealing palette
pal = sns.color_palette("Paired")

# Set the Seaborn style
sns.set(style="darkgrid", color_codes=True)

# Create the bar plot with the top 10 categories
my_plot = sns.barplot(x=top_categories.index, y=top_categories.values,␣
 ↪palette=pal, ax=ax[0])

# Add annotations to the bar plot
for bar in ax[0].patches:
    ax[0].annotate(
        '{:.0f}'.format(bar.get_height()),
        (bar.get_x() + bar.get_width() / 2, bar.get_height()),
        ha='center', va='bottom', fontsize=10, color='black'  # Font properties␣
 ↪for visibility
```

```
    )

# Set the labels and title for the bar plot
ax[0].set_xlabel("Product Category", weight="semibold")
ax[0].set_ylabel("Count", weight="semibold")
ax[0].set_title("Top 10 Product Categories", weight="bold")

# Rotate x-axis labels for better readability
my_plot.set_xticklabels(my_plot.get_xticklabels(), rotation=45, ha='right')

# Create the pie chart with the top 10 categories
_, _, autotexts = ax[1].pie(top_categories.values, labels=top_categories.index,␣
 ↪autopct='%.0f%%', colors=pal)

# Set the color of the text in the pie chart to black for visibility
for autotext in autotexts:
    autotext.set_color("black")

# Set the title for the pie chart
ax[1].set_title("Top 10 Product Categories Distribution", weight="bold")

# Adjust layout to prevent overlap
plt.tight_layout()

# Show the plot
plt.show()
```



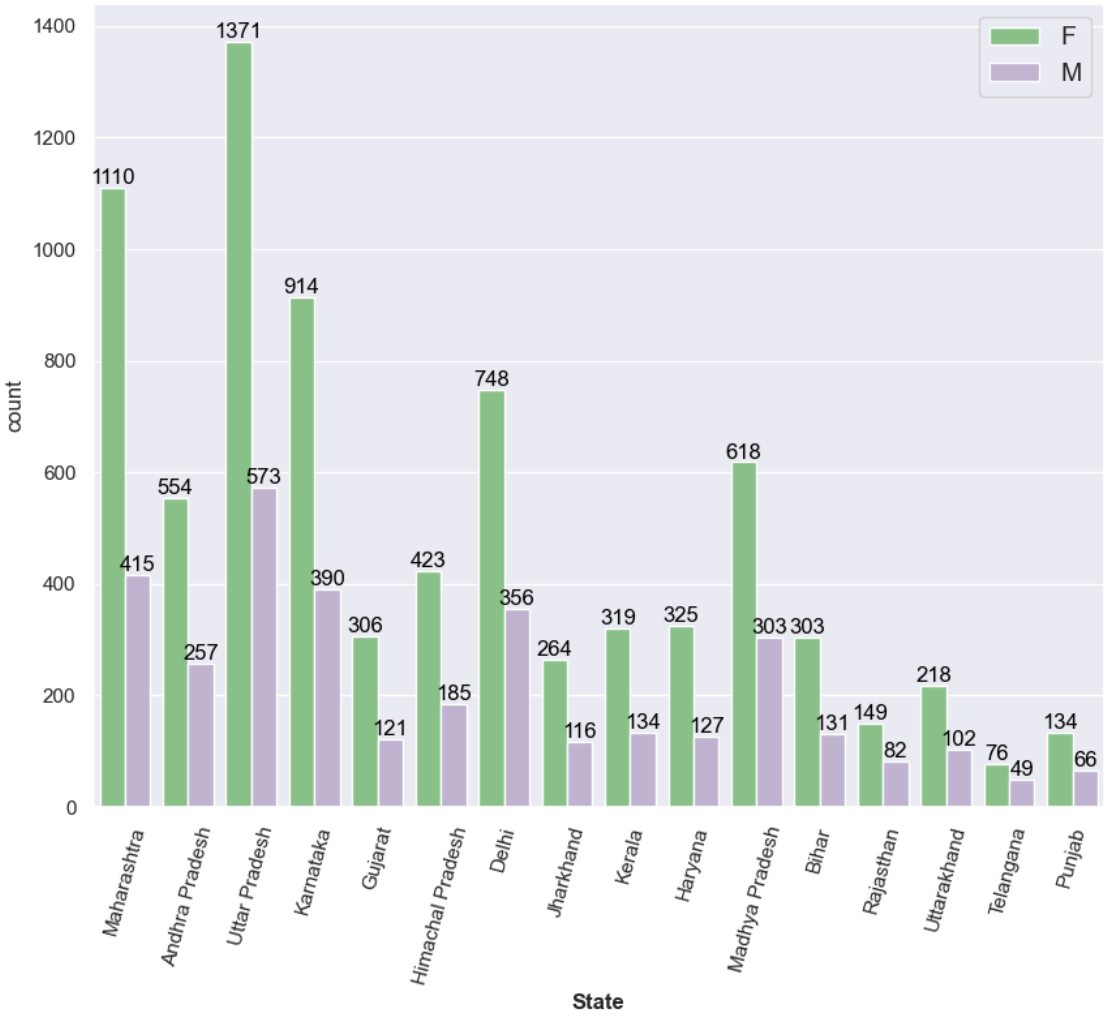


[156]:
```
# Set the figure size
plt.figure(figsize=(10, 8))

# Define the age group categories in increasing order
age_groups = ['11-15', '16-20', '21-25', '26-30', '31-35', '36-40', '41-45',␣
 ↪'46-50', '51-55', '56-60', '61-65']

# Re-categorize the 'Age Group' column based on the defined categories
df['Age Group'] = pd.cut(df['Age'], bins=[10, 15, 20, 25, 30, 35, 40, 45, 50,␣
 ↪55, 60, 65], labels=age_groups)

# Get the value counts for 'Age Group' and choose a palette
data = df['Age Group'].value_counts()
pal = sns.color_palette("tab10", len(data))

# Set the Seaborn style
sns.set(style="darkgrid")

# Create the countplot with hue based on 'Gender'
ax = sns.countplot(x='Age Group', data=df, hue='Gender', palette=pal,␣
 ↪order=age_groups)

# Add annotations to the bars
for bar in ax.patches:
    ax.annotate('{:.0f}'.format(bar.get_height()),
                (bar.get_x() + bar.get_width() / 2, bar.get_height()),
                ha='center', va='bottom', fontsize=12, color='black')

# Set legend with increased font size
plt.legend(loc='best', fontsize=14)

# Show the plot
plt.show()
```



[157]:
```
# Set the figure size
plt.figure(figsize=(10, 8))

# Choose a visually appealing palette
pal = sns.color_palette("Accent")

# Set the Seaborn style
sns.set(style="darkgrid")

# Create the countplot with hue based on 'Gender'
ax = sns.countplot(x='State', data=df, hue='Gender', palette=pal)

# Add annotations to the bars
for bar in ax.patches:
    ax.annotate('{:.0f}'.format(bar.get_height()),
                (bar.get_x() + bar.get_width() / 2, bar.get_height()),
                ha='center', va='bottom', fontsize=12, color='black')

# Set legend with increased font size
```

```
plt.legend(loc='best', fontsize=14)

# Rotate x-axis labels for better readability
plt.xticks(rotation=75)

# Set bold x-axis title
plt.xlabel("State", weight="bold")

# Show the plot
plt.show()
```

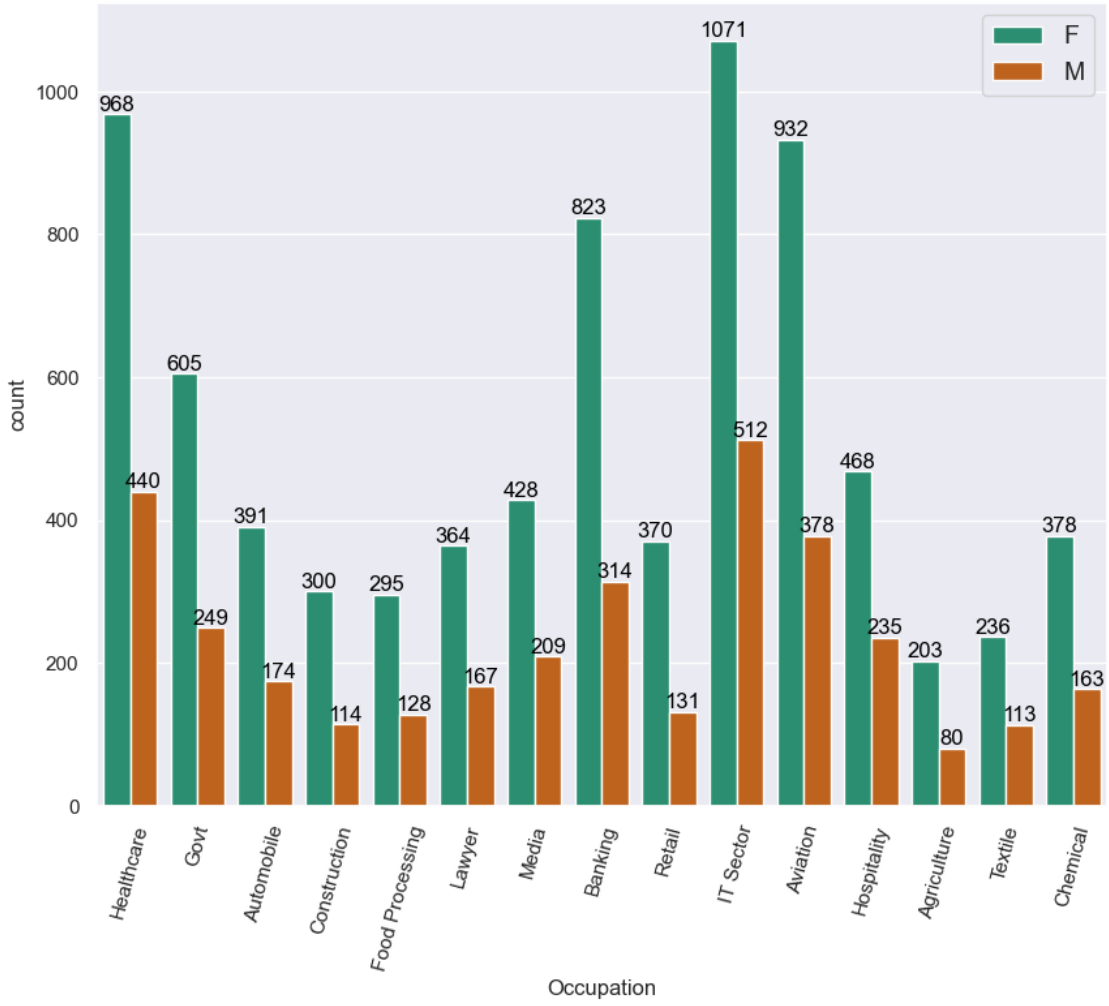


[158]:
```
cat
```

[158]:
```
Index(['Cust_name', 'Product_ID', 'Gender', 'Age Group', 'State', 'Zone',
       'Occupation', 'Product_Category'],
```

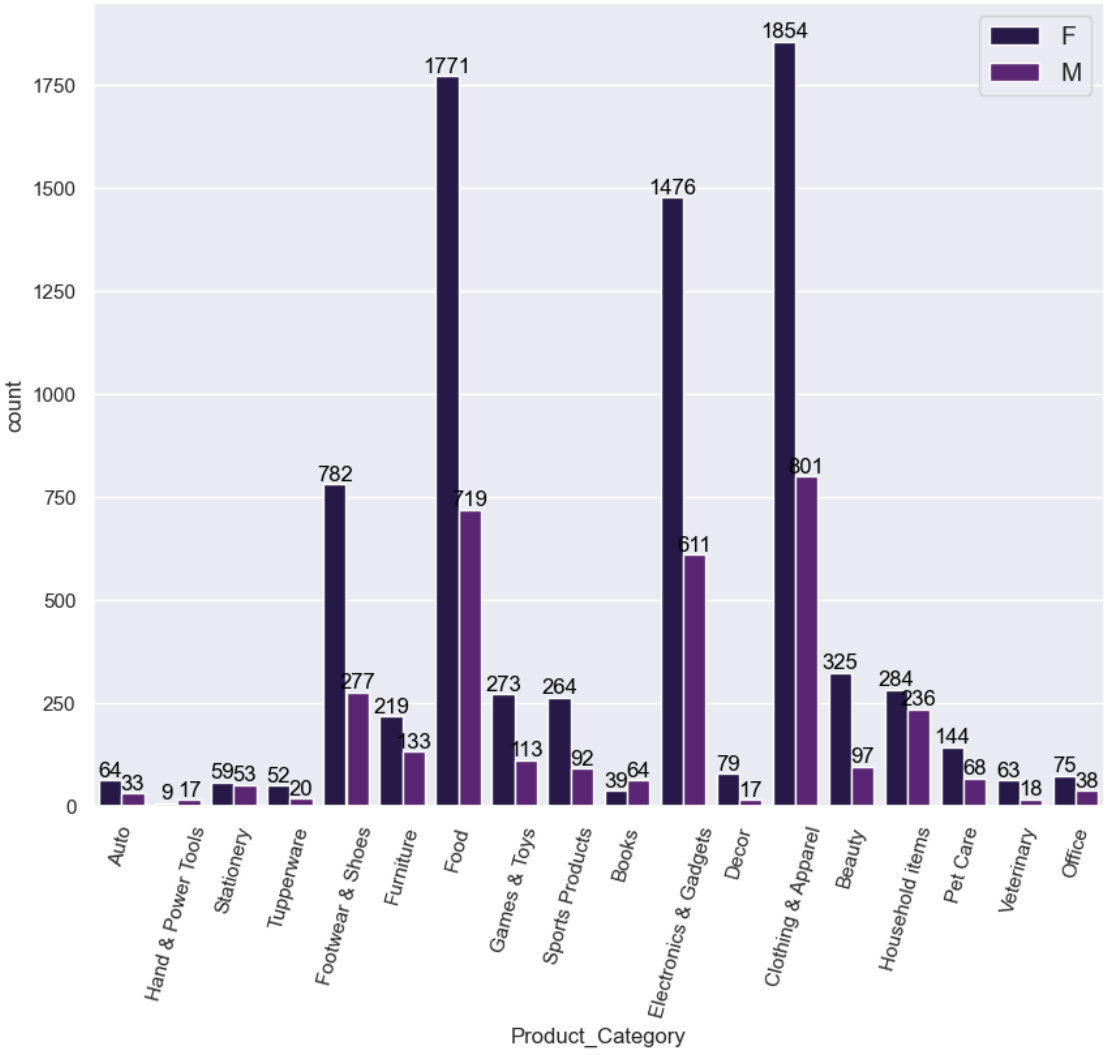
```
      dtype='object')
```

[159]:
```
plt.figure(figsize=(10, 8))

# Choose a visually appealing palette
pal = sns.color_palette("Dark2")

# Set the Seaborn style
sns.set(style="darkgrid")

# Create the countplot with hue based on 'Gender'
ax = sns.countplot(x='Occupation', data=df, hue='Gender', palette=pal)

# Add annotations to the bars
for bar in ax.patches:
    ax.annotate('{:.0f}'.format(bar.get_height()),
                (bar.get_x() + bar.get_width() / 2, bar.get_height()),
                ha='center', va='bottom', fontsize=12, color='black')

# Set legend with increased font size
plt.legend(loc='best', fontsize=14)

# Rotate x-axis labels for better readability
plt.xticks(rotation=75)

# Show the plot
plt.show()
```



[160]:
```
# Set the figure size
plt.figure(figsize=(10, 8))

# Choose a visually appealing palette
pal = sns.color_palette("magma")

# Set the Seaborn style
sns.set(style="darkgrid")

# Create the countplot with hue based on 'Gender'
ax = sns.countplot(x='Product_Category', data=df, hue='Gender', palette=pal)

# Add annotations to the bars
for bar in ax.patches:
    ax.annotate('{:.0f}'.format(bar.get_height()),
                (bar.get_x() + bar.get_width() / 2, bar.get_height()),
```

```
                ha='center', va='bottom', fontsize=12, color='black')

# Set legend with increased font size
plt.legend(loc='best', fontsize=14)

# Rotate x-axis labels for better readability
plt.xticks(rotation=75)

# Show the plot
plt.show()
```

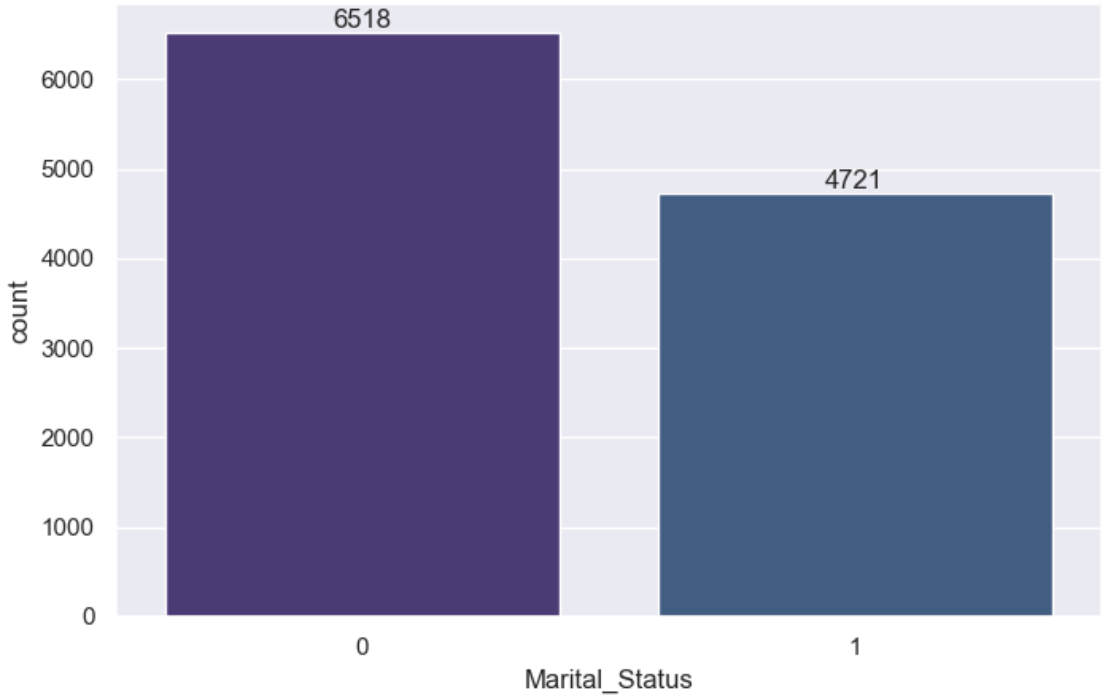


[161]:
```
df['Marital_Status'] = df['Marital_Status'].astype('str')
```

[162]:
```
df.Marital_Status.value_counts()
```

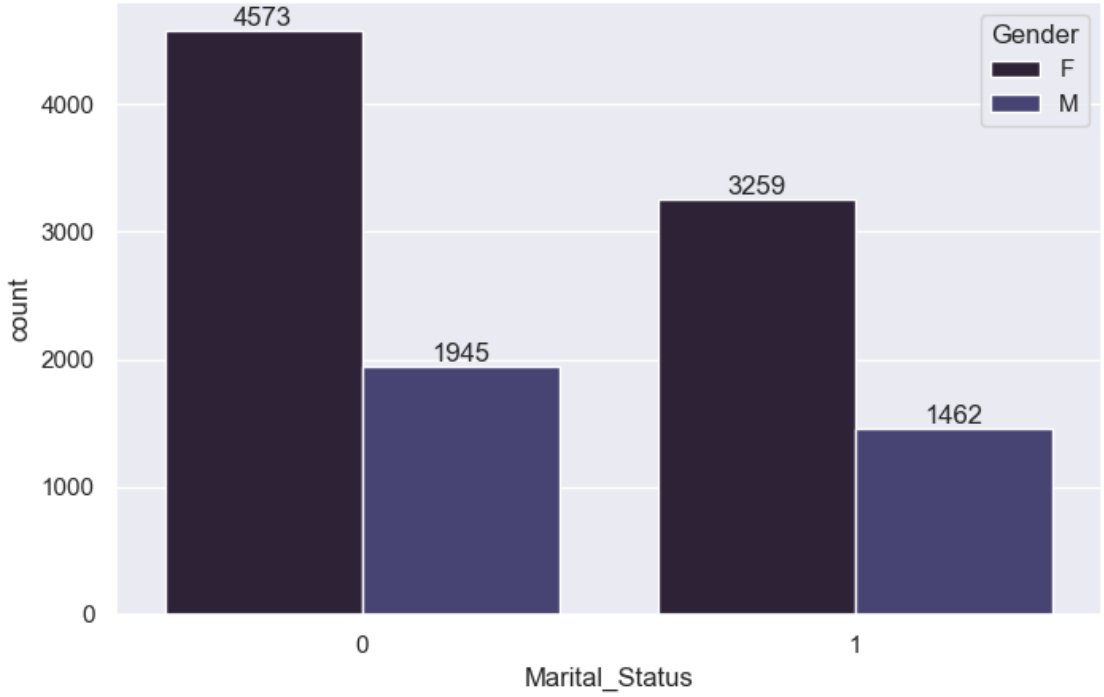
[162]:
```
0    6518
1    4721
Name: Marital_Status, dtype: int64
```

[163]:
```
# Set the figure size
plt.figure(figsize=(8, 5))

# Choose a different visually appealing palette
pal = sns.color_palette('viridis')

# Create the countplot with the chosen palette
ax = sns.countplot(x='Marital_Status', data=df, palette=pal)

# Add annotations to the bars
for bar in ax.containers:
    ax.bar_label(bar)

# Show the plot
plt.show()
```



[164]:
```
# Set the figure size
plt.figure(figsize=(8, 5))

# Choose a visually appealing palette
```

```
pal = sns.color_palette('mako')

# Create the countplot with hue based on 'Gender' and the chosen palette
ax = sns.countplot(x='Marital_Status', data=df, hue='Gender', palette=pal)

# Add annotations to the bars
for bar in ax.containers:
    ax.bar_label(bar)

# Show the plot
plt.show()
```



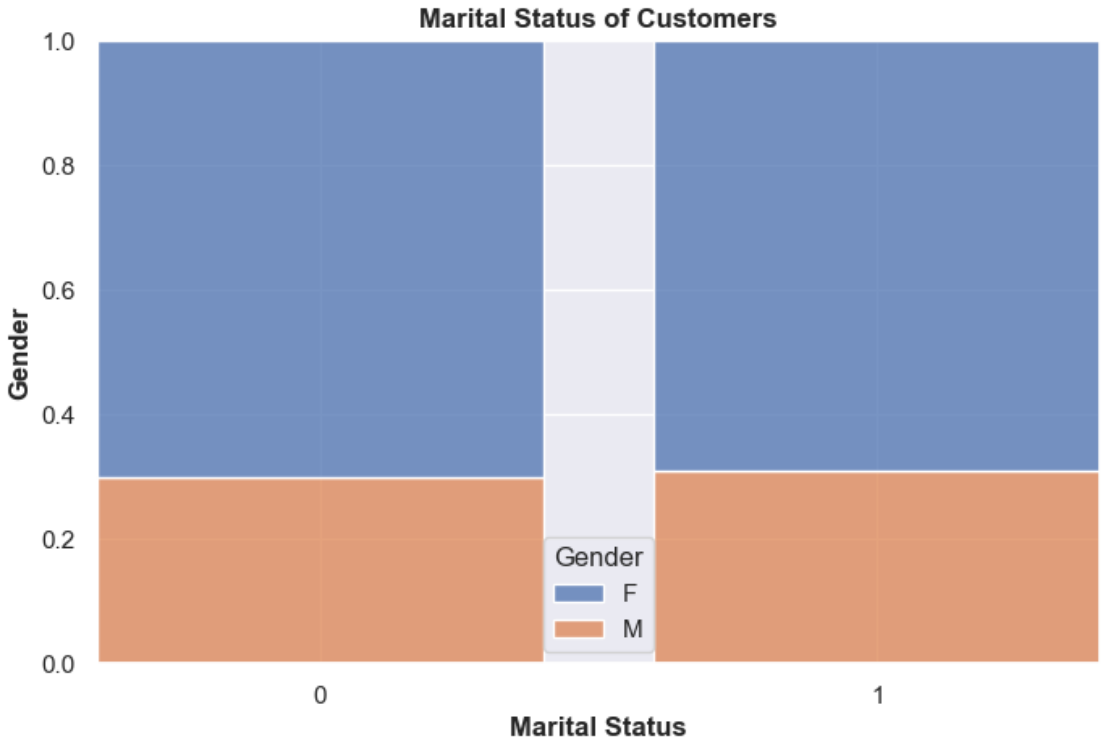
[165]:
```
df.describe(include = 'object')
```

[165]:

	Cust_name	Product_ID	Gender	Marital_Status	State	Zone	Occupation	Product_Category
count	11239	11239	11239	11239	11239	11239	11239	11239
unique	1250	2350	2	2	16	5	15	18
top	Vishakha	P00265242	F	0	Uttar Pradesh	Central	IT Sector	Clothing & Apparel
freq	42	53	7832	6518	1944	4289		

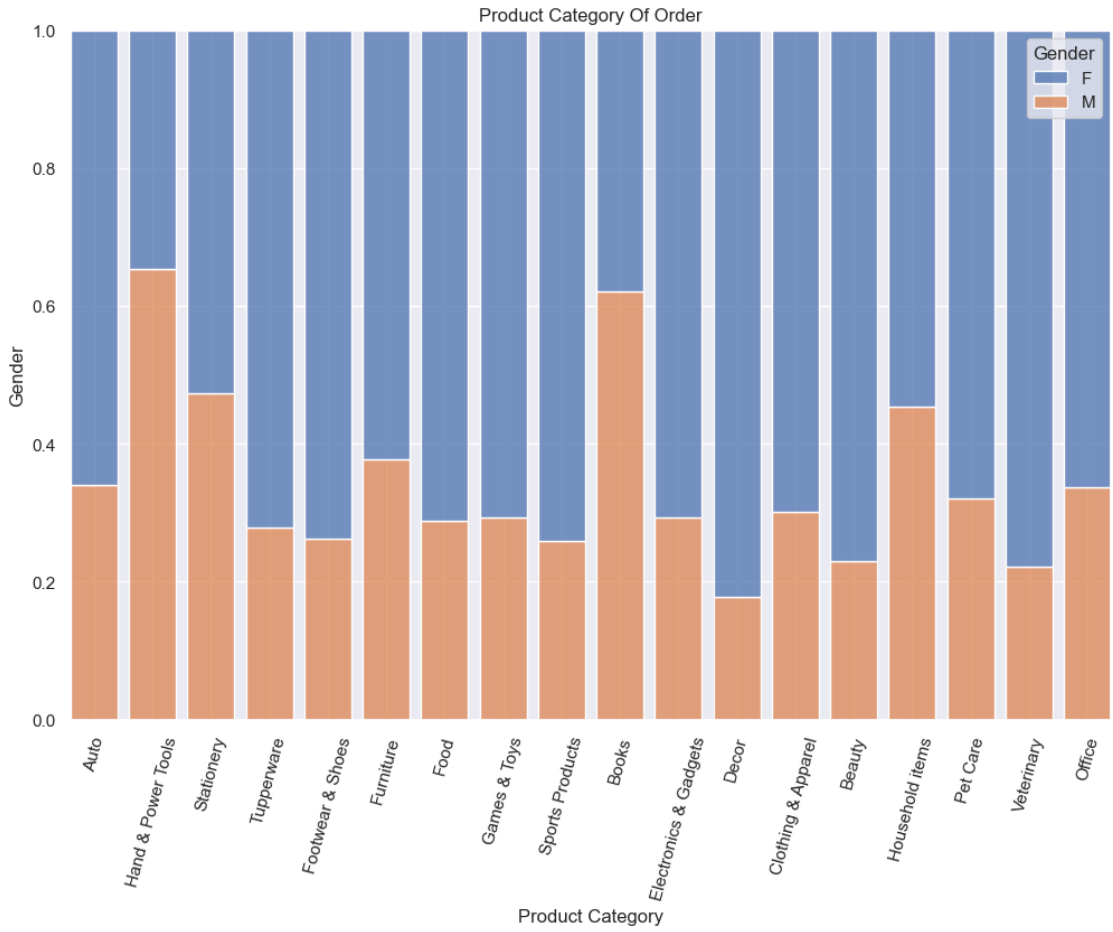
```
freq          1583                  2655
```

[166]:
```
# Set the figure size
plt.figure(figsize=(8, 5))

# Create the histogram with hue based on 'Gender'
ax = sns.histplot(
    data=df,
    x="Marital_Status",
    hue="Gender",
    multiple="fill",
    stat="proportion",
    discrete=True,
    shrink=.8
)

# Set title with bold font
plt.title('Marital Status of Customers', fontweight='bold')

# Set x-axis label with bold font
plt.xlabel('Marital Status', fontweight='bold')

# Set y-axis label with bold font
plt.ylabel('Gender', fontweight='bold')

# Show the plot
plt.show()
```



[167]:
```
plt.figure(figsize = (12,8))
ax = sns.histplot(
data=df,
x="Product_Category", hue="Gender",
multiple="fill", stat="proportion",
discrete=True, shrink=.8
)
plt.xticks(rotation = 75)
plt.title('Product Category Of Order')
plt.xlabel('Product Category')
plt.ylabel('Gender')
```

[167]:
```
Text(0, 0.5, 'Gender')
```

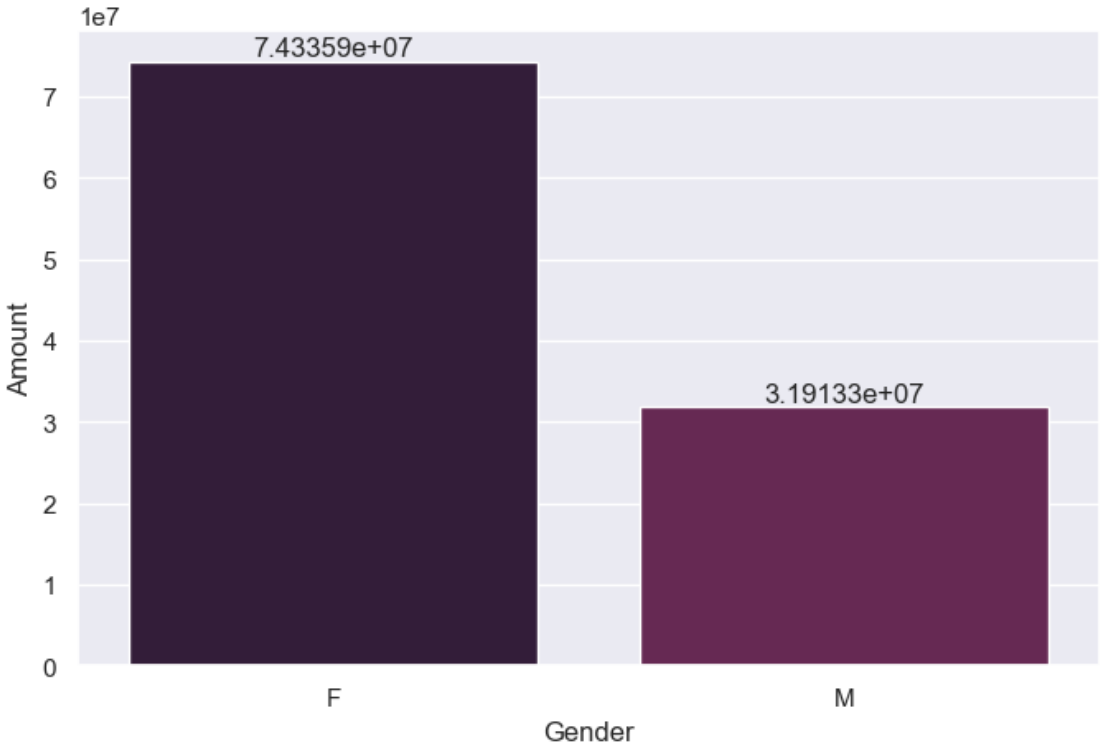


[168]:
```
num
```

[168]:
```
Index(['User_ID', 'Age', 'Marital_Status', 'Orders', 'Amount'], dtype='object')
```

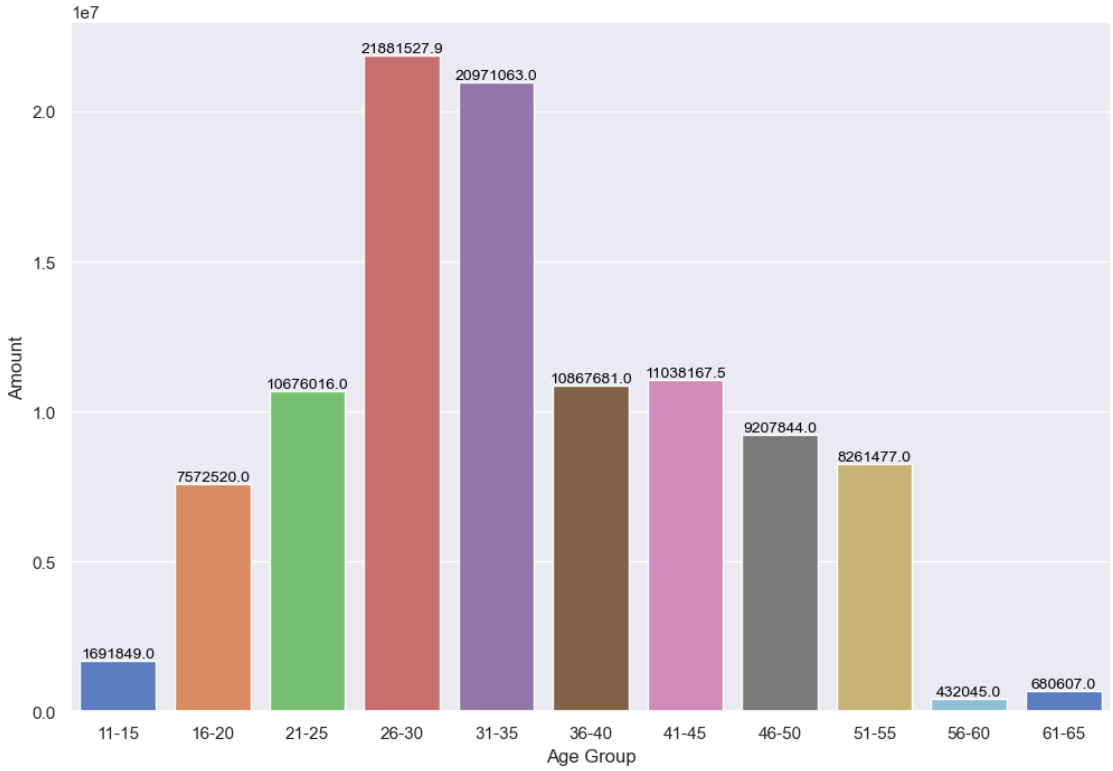
[169]:
```
# Set the figure size
plt.figure(figsize=(8, 5))

# Choose a different palette
pal = sns.color_palette('rocket')

# Create the grouped data
data = df.groupby('Gender', as_index=False)['Amount'].sum().
 ↪sort_values(by='Amount', ascending=False)

# Create the bar plot with the chosen palette
ax = sns.barplot(x='Gender', y='Amount', data=data, palette=pal)

# Add annotations to the bars
```

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

# Show the plot
plt.show()
```



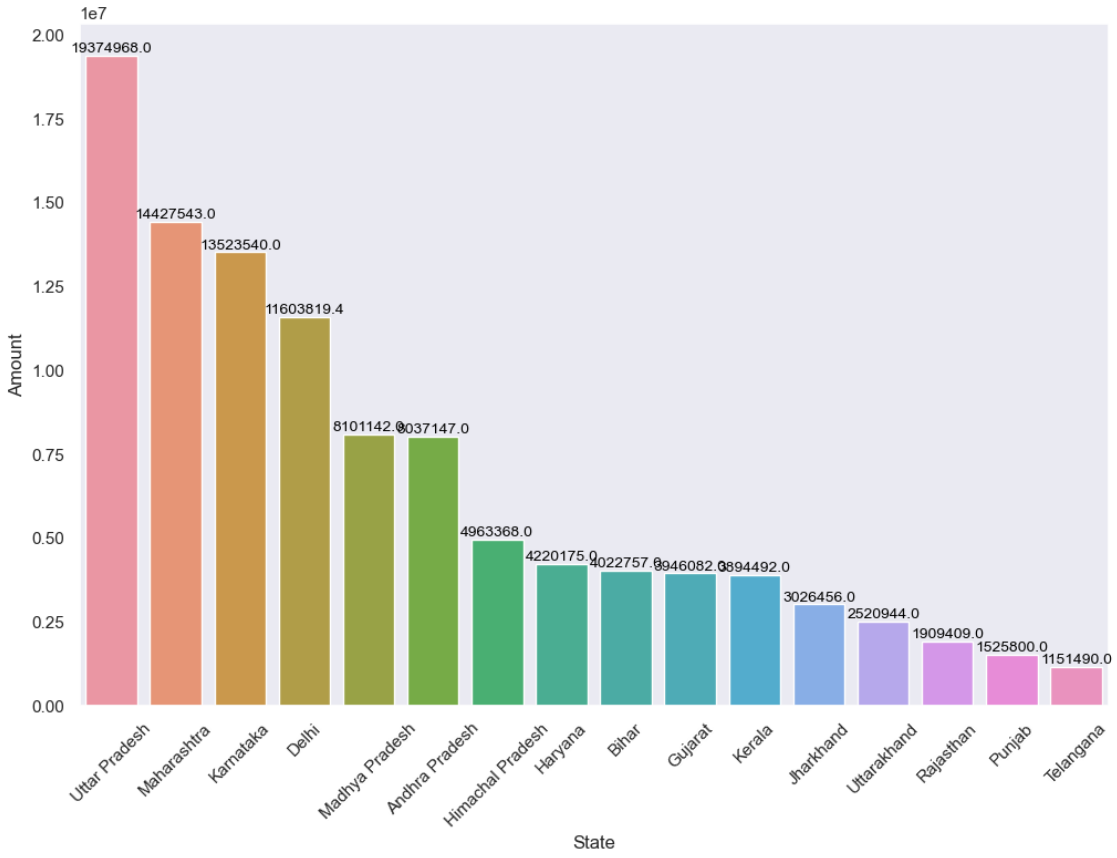
[170]:
```
# Set the figure size
plt.figure(figsize=(12, 8))

# Choose a different palette
pal = sns.color_palette('muted')

# Create the grouped data
data = df.groupby('Age Group', as_index=False)['Amount'].sum().
 ↪sort_values(by='Amount', ascending=False)

# Create the bar plot with the chosen palette
ax = sns.barplot(x='Age Group', y='Amount', data=data, palette=pal)

# Add annotations to the bars
for bar in ax.patches:
    ax.annotate('{:.1f}'.format(bar.get_height()),
```

```
                (bar.get_x() + bar.get_width() / 2, bar.get_height()),
                ha='center', va='bottom', fontsize=10, color='black')

# Show the plot
plt.show()
```



[171]:
```
# Set the figure size
plt.figure(figsize=(12, 8))

# Set the Seaborn style and color codes
sns.set(style='dark', color_codes=True)

# Create the grouped data
data = df.groupby('State', as_index=False)['Amount'].sum().
 ↪sort_values(by='Amount', ascending=False)

# Create the bar plot
ax = sns.barplot(x='State', y='Amount', data=data)

# Add annotations to the bars
for bar in ax.patches:
    ax.annotate('{:.1f}'.format(bar.get_height()),
```

```
                (bar.get_x() + bar.get_width()/2, bar.get_height()),
                ha='center', va='bottom', fontsize=10, color='black')

# Rotate x-axis labels for better readability
plt.xticks(rotation=45)

# Show the plot
plt.show()
```



2 Interactive Graphs

[172]:
```
data = df.groupby('State', as_index=False)['Amount'].sum().
 ↪sort_values(by='Amount', ascending=False)

# Define a custom color palette
colors = px.colors.qualitative.Dark24

fig = px.bar(data, x='State', y='Amount', title='Total Amount by State',␣
 ↪color_discrete_sequence=colors)
```

```
fig.update_traces(marker_line_color='rgb(8,48,107)', marker_line_width=1.5,␣
 ↪opacity=0.6)
fig.update_layout(xaxis_tickangle=-45, xaxis_title='State',␣
 ↪yaxis_title='Amount')
fig.show()
```

[173]:
```
data = df.groupby('Product_Category', as_index=False)['Amount'].sum().
 ↪sort_values(by='Amount', ascending=False)

# Create the interactive bar plot using Plotly Express
fig = px.bar(data, x='Product_Category', y='Amount', title='Total Amount by␣
 ↪Product Category',
             color='Product_Category', color_discrete_sequence=px.colors.
 ↪qualitative.Set3)

# Update the layout for better readability
fig.update_layout(xaxis_tickangle=-45, xaxis_title='Product Category',␣
 ↪yaxis_title='Amount')

# Show the plot
fig.show()
```

[174]:
```
import plotly.express as px
data = df.groupby('Occupation', as_index=False)['Amount'].sum().
 ↪sort_values(by='Amount', ascending=False)

# Create the interactive bar plot using Plotly Express
fig = px.bar(data, x='Occupation', y='Amount', title='Total Amount by␣
 ↪Occupation',
             color='Occupation', color_continuous_scale='magma')

# Update the layout for better readability
fig.update_layout(xaxis_tickangle=-45, xaxis_title='Occupation',␣
 ↪yaxis_title='Amount')

# Show the plot
fig.show()
```

[176]:
```
data = df.groupby('Zone', as_index=False)['Amount'].sum().
 ↪sort_values(by='Amount', ascending=False)

# Define a custom color palette
colors = ['blue', 'green', 'orange', 'red', 'purple', 'pink', 'cyan']

# Create the interactive bar plot using Plotly Express with the custom color␣
 ↪palette
```

```
fig = px.bar(data, x='Zone', y='Amount', title='Total Amount by Zone',
             color='Zone', color_discrete_sequence=colors)

# Update the layout for better readability
fig.update_layout(xaxis_tickangle=-45, xaxis_title='Zone', yaxis_title='Amount')

# Show the plot
fig.show()
```

[179]:
```
# Create the interactive scatter plot using Plotly Express
fig = px.scatter(df, x='Age', y='Amount', color='Gender', title='Scatter Plot␣
 ↪by Age and Amount',
                 labels={'Age': 'Age', 'Amount': 'Amount', 'Gender': 'Gender'})

# Update the layout for better readability
fig.update_layout(xaxis_title='Age', yaxis_title='Amount')

# Show the plot
fig.show()
```

[180]:
```
# Create the interactive scatter plot using Plotly Express
fig = px.scatter(df, x='Orders', y='Age', color='Gender', title='Scatter Plot␣
 ↪by Orders and Age',
                 labels={'Orders': 'Orders', 'Age': 'Age', 'Gender': 'Gender'})

# Update the layout for better readability
fig.update_layout(xaxis_title='Orders', yaxis_title='Age')

# Show the plot
fig.show()
```

[ ]:

[ ]: