new-year-sales-analysis

August 28, 2025

1 New Year Sales Analysis

2 Step 1: Import Libraries

[1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

3 Step 2: Load and Explore the Dataset

[2]:
```
df = pd.read_csv('New _Year _Sales _Data.csv', encoding='latin1')
```

[3]:
```
df.head()
```

[3]:

	User_ID	Cust_name	Product_ID	Gender	Age Group	Age	Marital_Status	State	Zone	Occupation	Product_Category	Orders	Amount	Status	unnamed1
0	1002903	Sanskriti	P00125942	F	26-35	28	0	Maharashtra	Western	Healthcare	Auto	1	23952.0	NaN	NaN
1	1000732	Kartik	P00110942	F	26-35	35	1	Andhra Pradesh	Southern	Govt	Auto	3	23934.0	NaN	NaN
2	1001990	Bindu	P00118542	F	26-35	35	1	Uttar Pradesh	Central	Automobile	Auto	3	23924.0	NaN	NaN
3	1001425	Sudevi	P00237842	M	0-17	16	0	Karnataka	Southern	Construction	Auto	2	23912.0	NaN	NaN
4	1000588	Joni	P00057942	M	26-35	28	1	Gujarat	Western	Food Processing	Auto	2	23877.0	NaN	NaN

4 Step 3: Data Cleaning

[4]:
```
df.isnull().sum()
```

[4]:
```
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
Status              11251
unnamed1            11251
dtype: int64
```

[5]:
```
df.drop(['unnamed1', 'Status'], axis=1, inplace=True)
```

[6]:
```
df = df.dropna(subset=['Amount'])
```

[7]:
```
df['Amount'] = df['Amount'].astype(int)
```

[8]:
```
df.isnull().sum()
```

[8]:
```
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              0
dtype: int64
```

[9]:
```
df.head()
```

[9]:

	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	Amount
0	Maharashtra	Western	Healthcare	Auto	1	23952
1	Andhra Pradesh	Southern	Govt	Auto	3	23934
2	Uttar Pradesh	Central	Automobile	Auto	3	23924
3	Karnataka	Southern	Construction	Auto	2	23912
4	Gujarat	Western	Food Processing	Auto	2	23877

[50]:
```
df.tail()
```

[50]:

	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
11247	Haryana	Northern	Healthcare	Veterinary	3	367
11248	Madhya Pradesh	Central	Textile	Office	4	213
11249	Karnataka	Southern	Agriculture	Office	3	206
11250	Maharashtra	Western	Healthcare	Office	3	188

5 Step 4: Data Overview and Summary

[46]:
```
df.describe()
```

[46]:

	User_ID	Age	Marital_Status	Orders	Amount
count	1.123900e+04	11239.000000	11239.000000	11239.000000	11239.000000
mean	1.003004e+06	35.410357	0.420055	2.489634	9453.610553
std	1.716039e+03	12.753866	0.493589	1.114967	5222.355168
min	1.000001e+06	12.000000	0.000000	1.000000	188.000000
25%	1.001492e+06	27.000000	0.000000	2.000000	5443.000000
50%	1.003064e+06	33.000000	0.000000	2.000000	8109.000000
75%	1.004426e+06	43.000000	1.000000	3.000000	12675.000000
max	1.006040e+06	92.000000	1.000000	4.000000	23952.000000

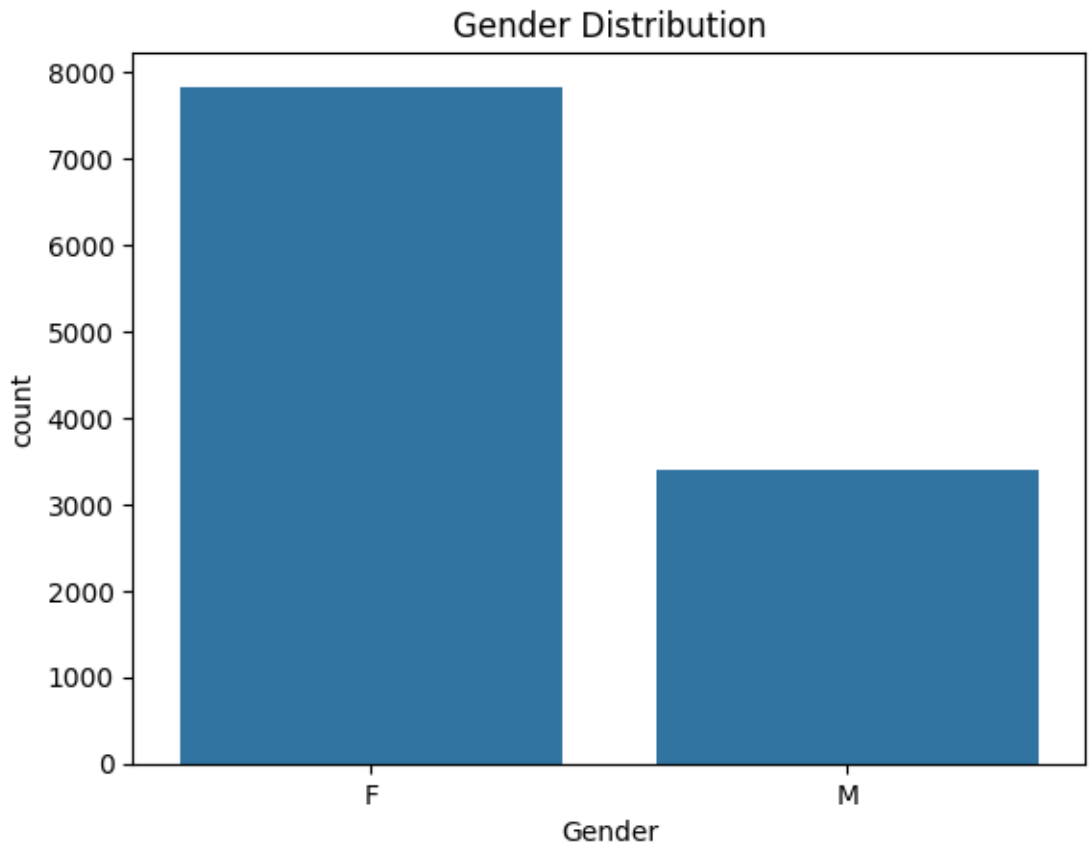
[47]:
```
df.nunique()
```

[47]:
```
User_ID             3752
Cust_name           1250
Product_ID          2350
Gender                 2
Age Group              7
Age                   81
Marital_Status         2
State                 16
Zone                   5
Occupation            15
Product_Category      18
Orders                 4
Amount              6583
dtype: int64
```

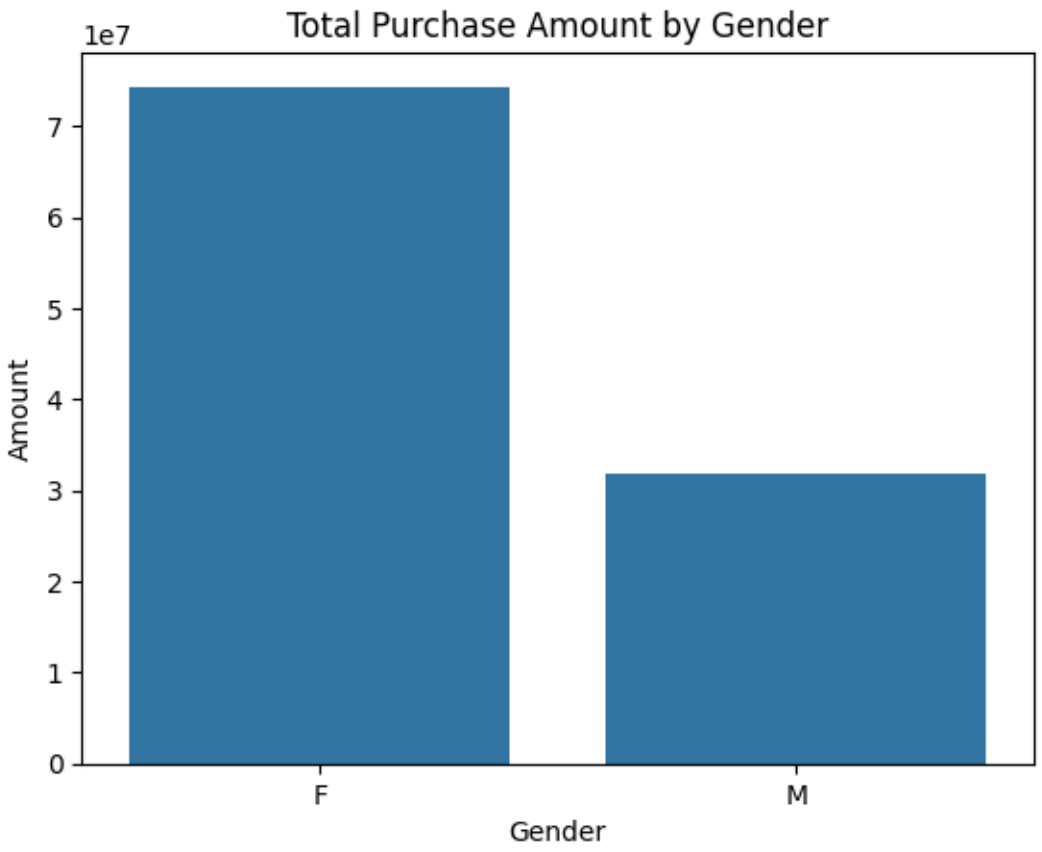
6 Exploratory Data Analysis (EDA)

7 1. Gender Analysis

[12]:
```
# Count plot for gender
sns.countplot(x='Gender', data=df)
plt.title('Gender Distribution')
plt.show()
```

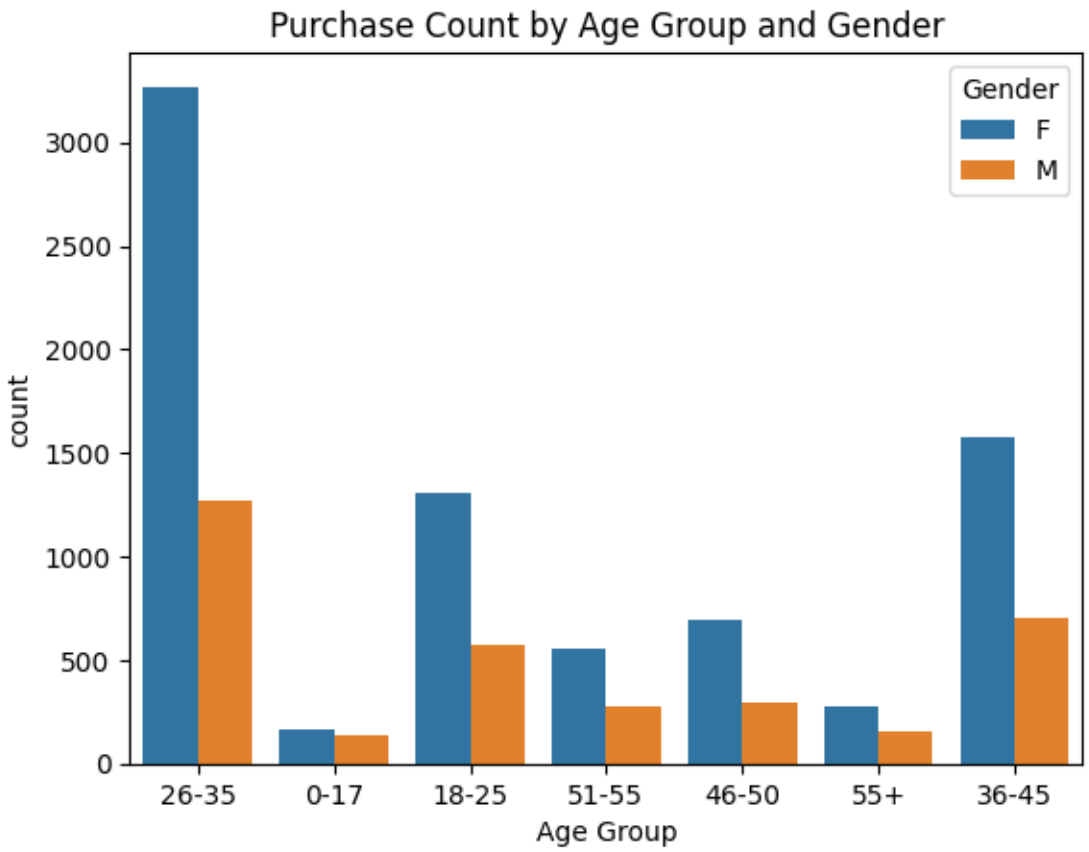


[13]:
```
# Bar chart: Total purchase amount by gender
gender_sales = df.groupby('Gender')['Amount'].sum().reset_index()
sns.barplot(x='Gender', y='Amount', data=gender_sales)
plt.title('Total Purchase Amount by Gender')
plt.show()
```

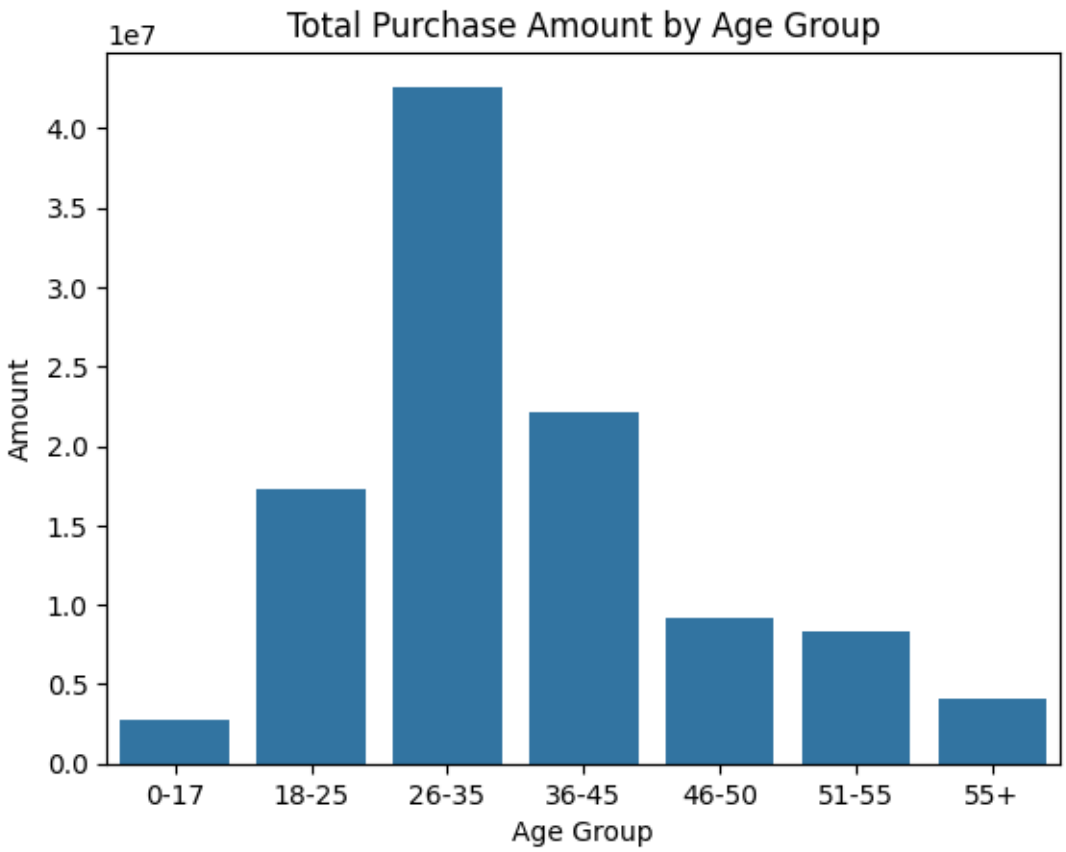


8 2. Age Group Analysis

[14]:
```
# Count plot by age group with hue for gender
sns.countplot(x='Age Group', hue='Gender', data=df)
plt.title('Purchase Count by Age Group and Gender')
plt.show()
```

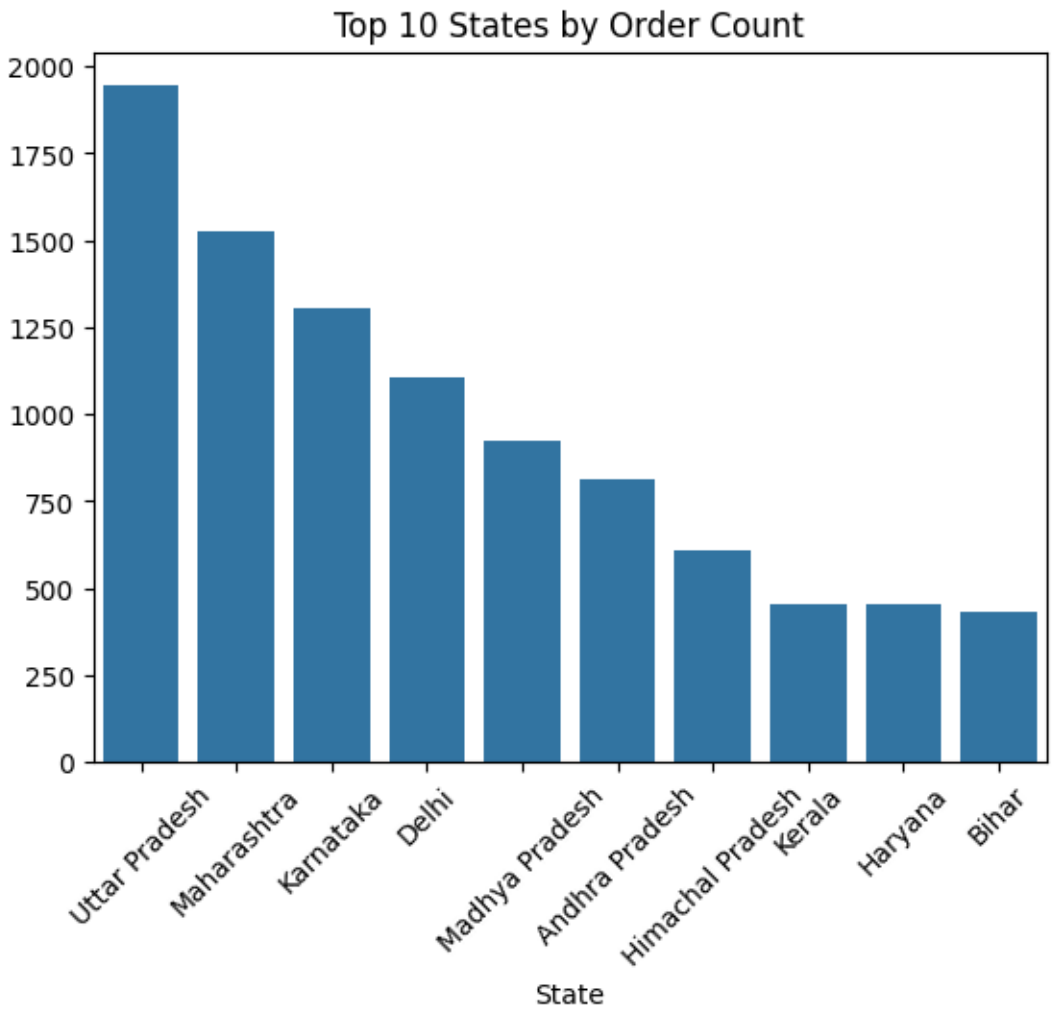


[15]:
```
# Total purchase amount by age group
age_sales = df.groupby('Age Group')['Amount'].sum().reset_index()
sns.barplot(x='Age Group', y='Amount', data=age_sales)
plt.title('Total Purchase Amount by Age Group')
plt.show()
```

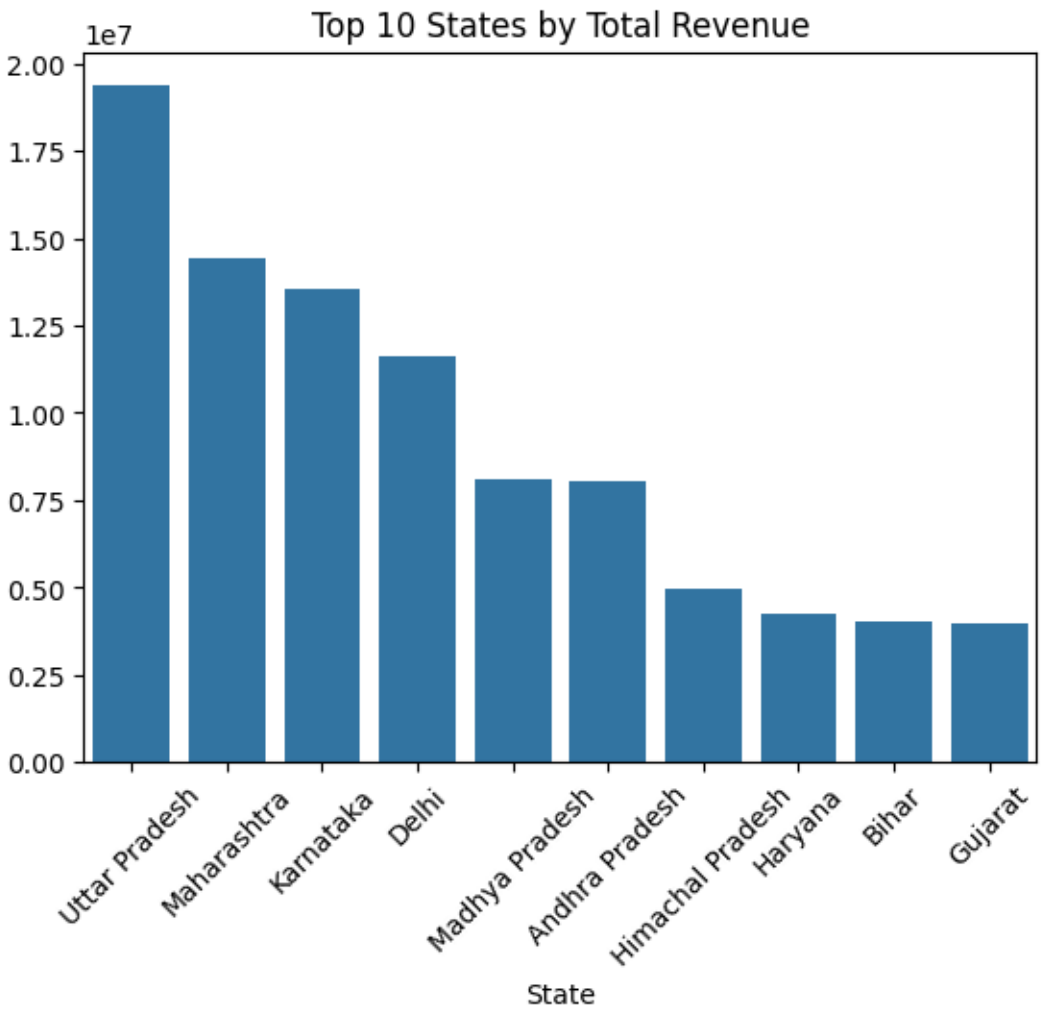


9 3. State Analysis

[16]:
```
# Top 10 states by order count
top_states_orders = df['State'].value_counts().nlargest(10)
sns.barplot(x=top_states_orders.index, y=top_states_orders.values)
plt.title('Top 10 States by Order Count')
plt.xticks(rotation=45)
plt.show()
```

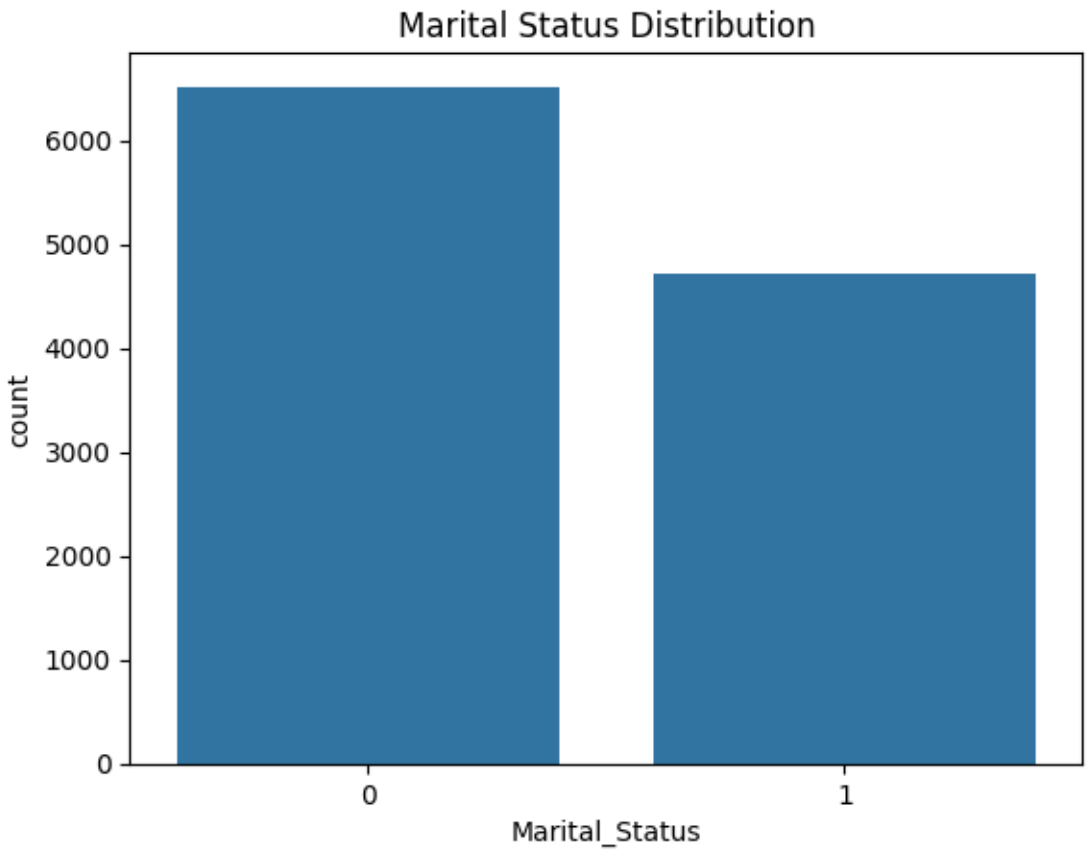


[17]:
```
# Top 10 states by total revenue
top_states_amount = df.groupby('State')['Amount'].sum().nlargest(10)
sns.barplot(x=top_states_amount.index, y=top_states_amount.values)
plt.title('Top 10 States by Total Revenue')
plt.xticks(rotation=45)
plt.show()
```

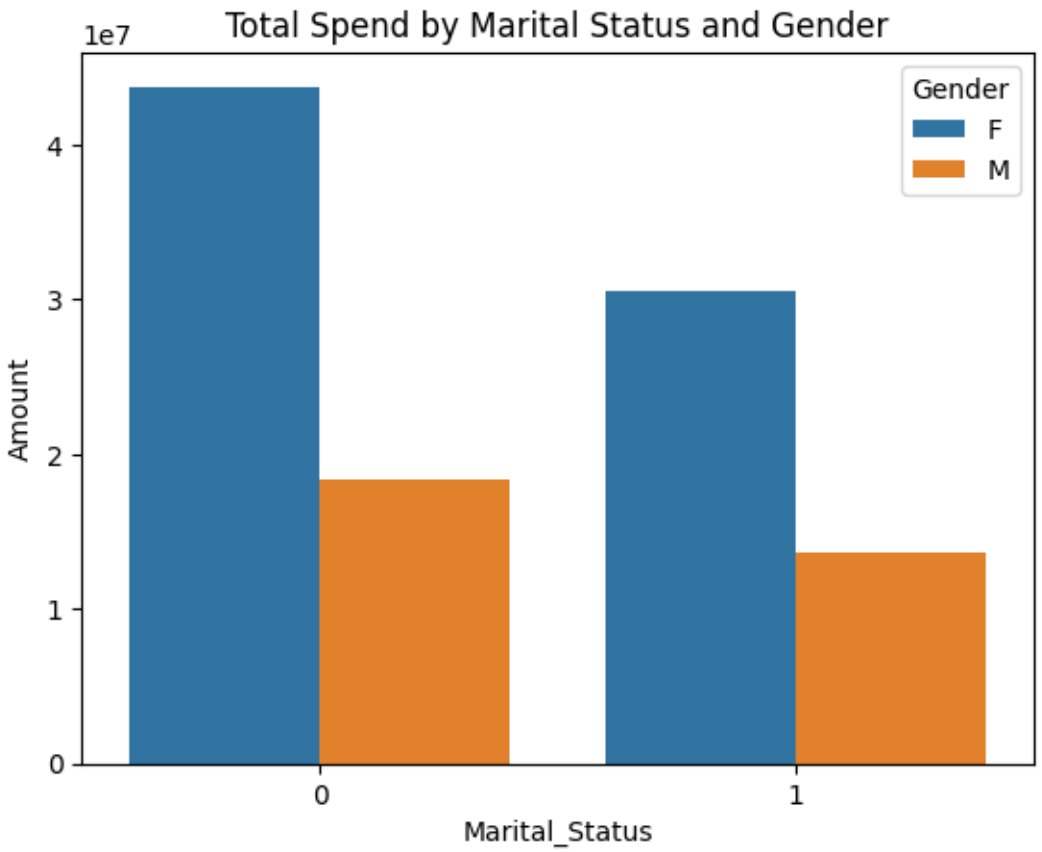


10 4. Marital Status Analysis

[18]:
```
# Count plot for marital status
sns.countplot(x='Marital_Status', data=df)
plt.title('Marital Status Distribution')
plt.show()
```

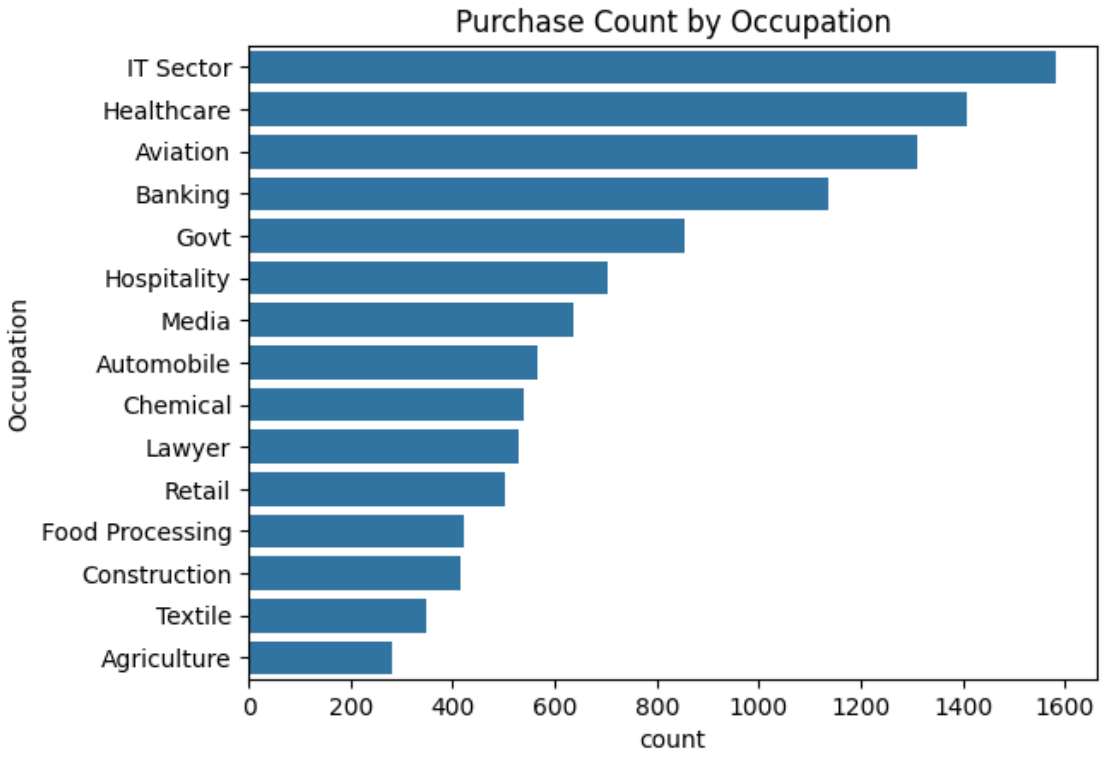


[19]:
```
# Bar chart: Total amount spent by marital status, with gender as hue
marital_sales = df.groupby(['Marital_Status', 'Gender'])['Amount'].sum().
 ↪reset_index()
sns.barplot(x='Marital_Status', y='Amount', hue='Gender', data=marital_sales)
plt.title('Total Spend by Marital Status and Gender')
plt.show()
```

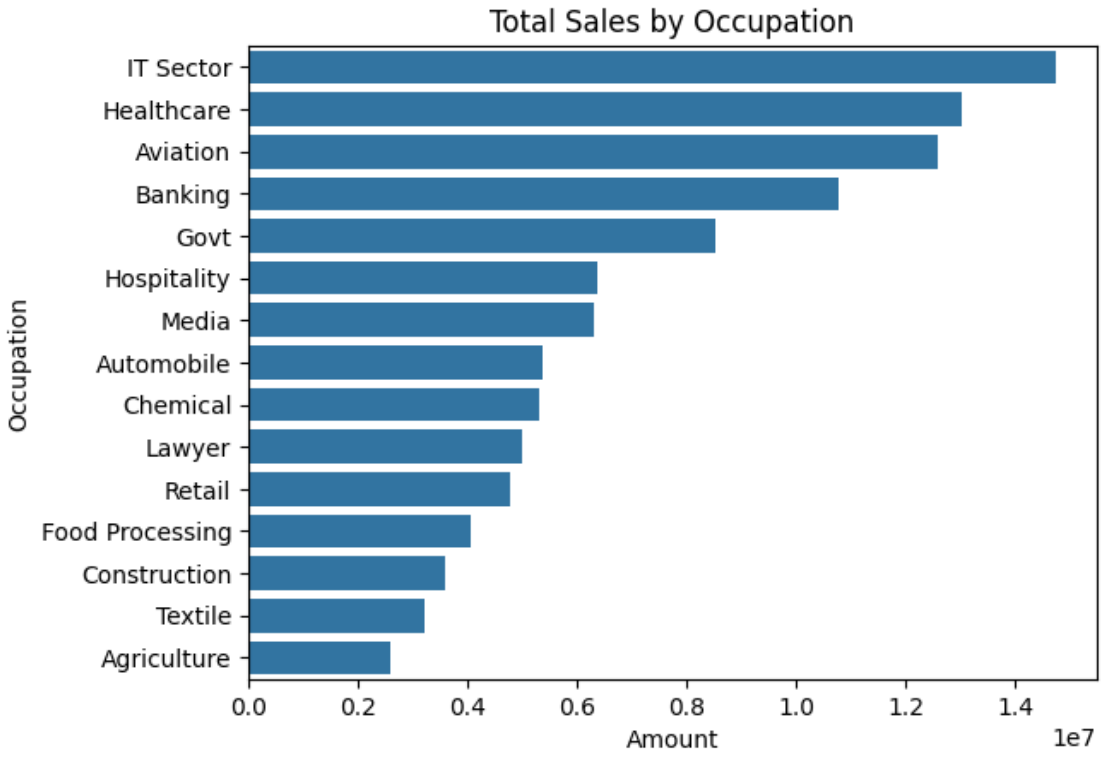


11 5. Occupation Analysis

[20]:
```
# Count plot for occupation
sns.countplot(y='Occupation', data=df, order=df['Occupation'].value_counts().
  ↪index)
plt.title('Purchase Count by Occupation')
plt.show()
```

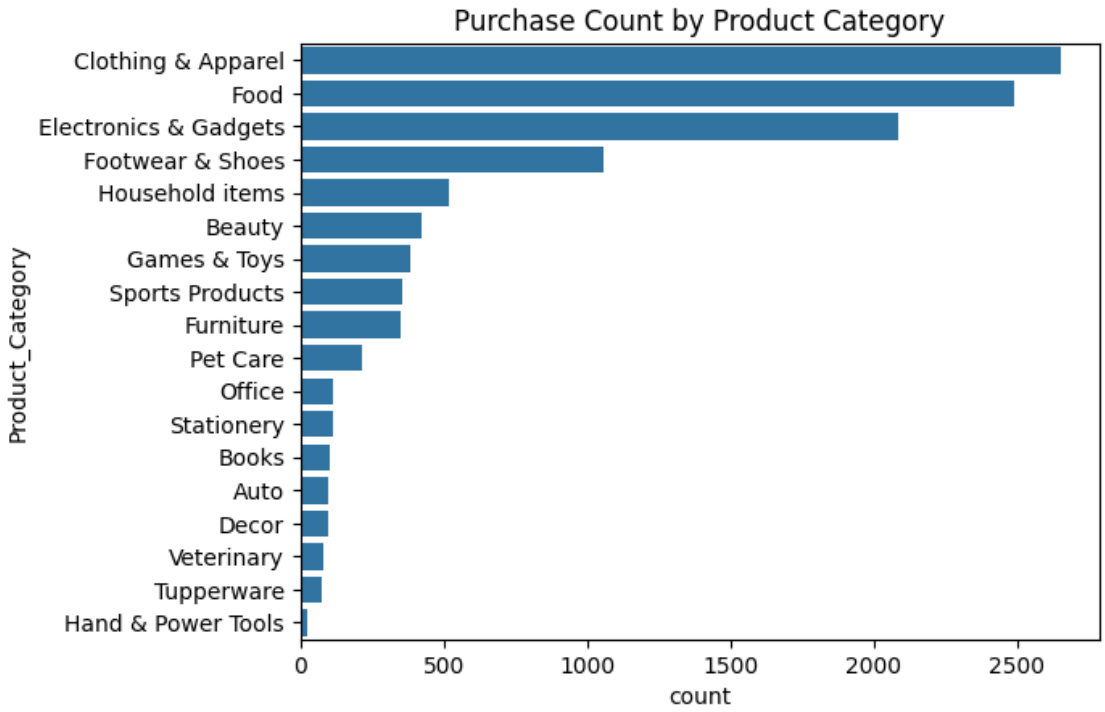


[21]:
```
# Bar chart: Total sales by occupation
occupation_sales = df.groupby('Occupation')['Amount'].sum().
  ↪sort_values(ascending=False).reset_index()
sns.barplot(x='Amount', y='Occupation', data=occupation_sales)
plt.title('Total Sales by Occupation')
plt.show()
```

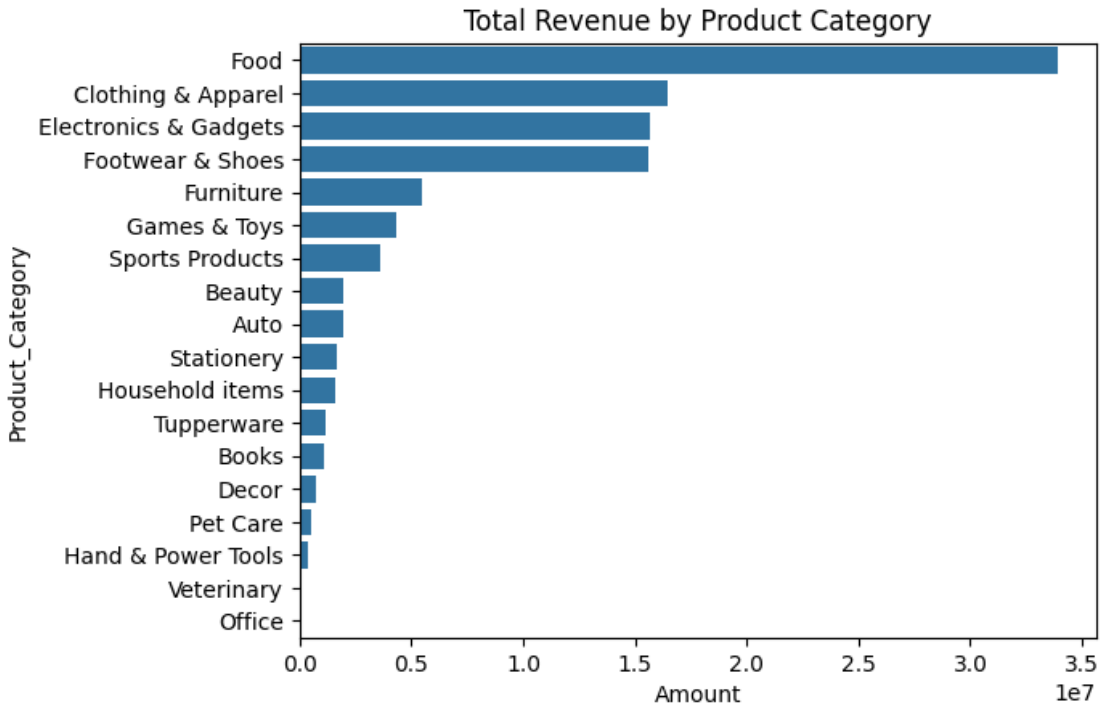


12 6. Product Category Analysis

[22]:
```
# Count plot for product category
sns.countplot(y='Product_Category', data=df, order=df['Product_Category'].
 ↪value_counts().index)
plt.title('Purchase Count by Product Category')
plt.show()
```



[23]:
```
# Bar chart: Top categories by revenue
category_sales = df.groupby('Product_Category')['Amount'].sum().
 ↪sort_values(ascending=False).reset_index()
sns.barplot(x='Amount', y='Product_Category', data=category_sales)
plt.title('Total Revenue by Product Category')
plt.show()
```



13 summary insights

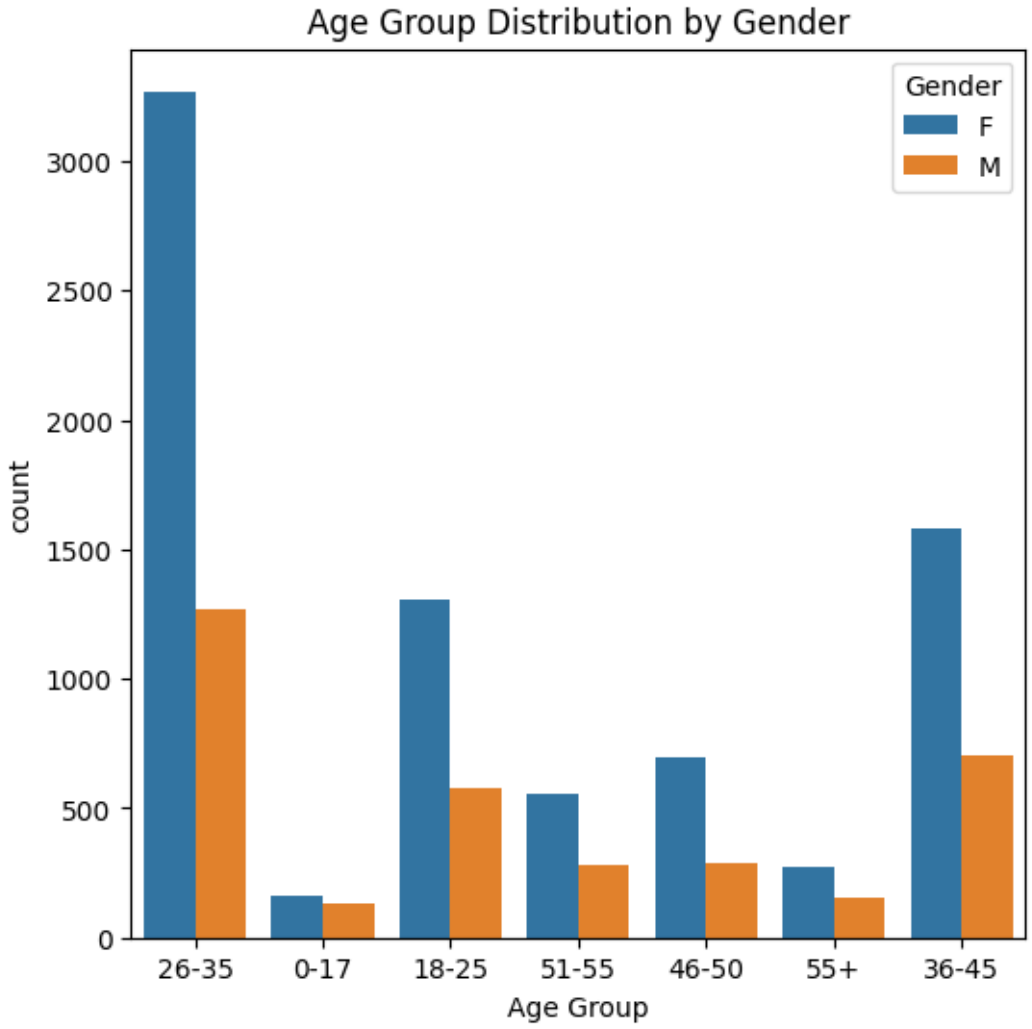
[49]:
```
# Example: Print summary insights
print("Summary of Findings:")
print("- Gender with highest purchasing power:", gender_sales.
  ↪loc[gender_sales['Amount'].idxmax(), 'Gender'])
print("- Age group with most purchases:", age_sales.loc[age_sales['Amount'].
  ↪idxmax(), 'Age Group'])
print("- State generating highest revenue:", top_states_amount.idxmax())
print("- Top contributing occupation:", occupation_sales.loc[0, 'Occupation'])
print("- Most popular product category:", category_sales.loc[0,␣
  ↪'Product_Category'])
```

```
Summary of Findings:
- Gender with highest purchasing power: F
- Age group with most purchases: 26-35
- State generating highest revenue: Uttar Pradesh
- Top contributing occupation: IT Sector
- Most popular product category: Food
```

14 # Additional Questions

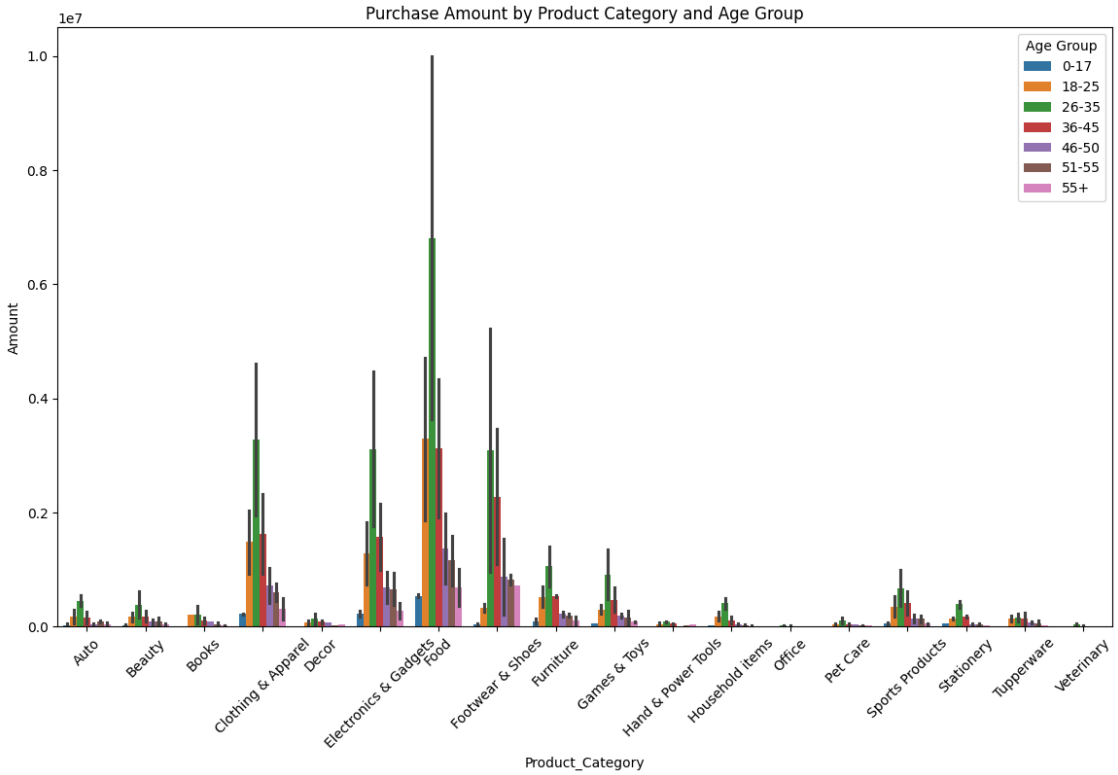
15 # 1. Which age group contributes the most to each product category, and does this vary by gender?

[26]:
```
plt.figure(figsize=(6, 6))
sns.countplot(x='Age Group', hue='Gender', data=df)
plt.title('Age Group Distribution by Gender')
plt.show()
```



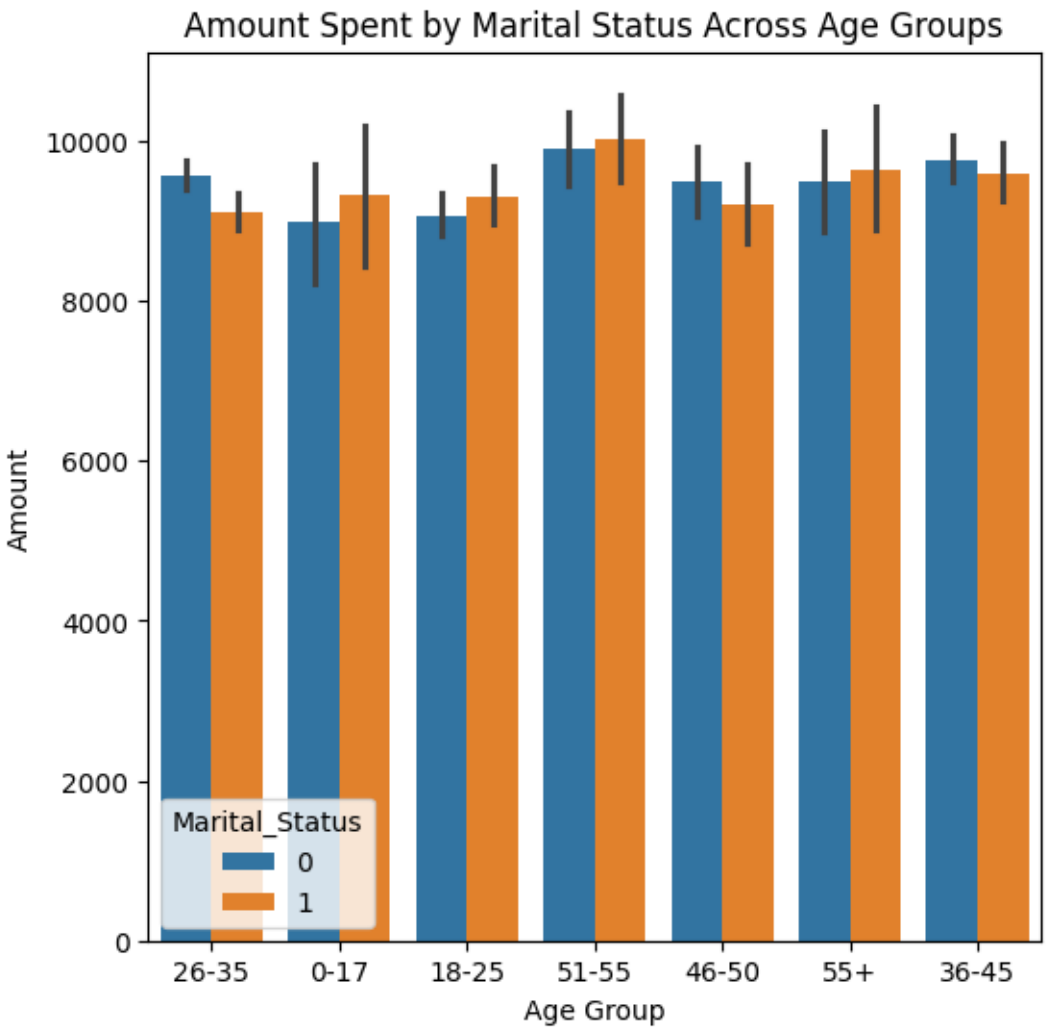
[30]:
```
product_age_gender_sales = df.groupby(['Product_Category', 'Age Group',␣
↪'Gender'])['Amount'].sum().reset_index()
plt.figure(figsize=(14, 8))
```

```
sns.barplot(x='Product_Category', y='Amount', hue='Age Group',␣
 ↪data=product_age_gender_sales)
plt.title('Purchase Amount by Product Category and Age Group')
plt.xticks(rotation=45)
plt.show()
```



16 2. How does the amount spent vary by marital status across different age groups?

[52]:
```
plt.figure(figsize=(6, 6))
sns.barplot(x='Age Group', y='Amount', hue='Marital_Status', data=df)
plt.title('Amount Spent by Marital Status Across Age Groups')
plt.show()
```



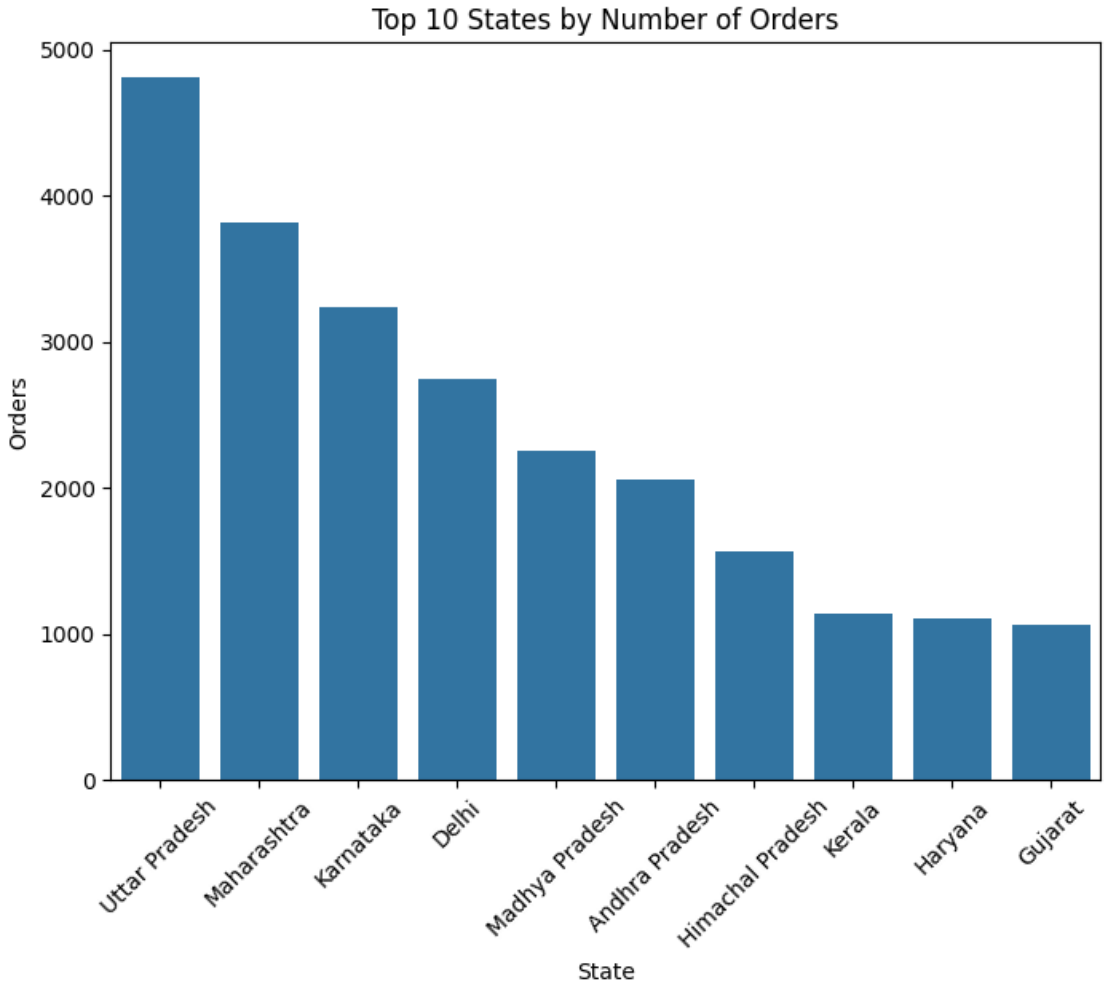
17 3. Which states show the highest growth in orders and revenue, and are there seasonal spikes in sales?

18 Since we don't have explicit date or time data for seasonal spikes, ignoring seasonal spikes here.

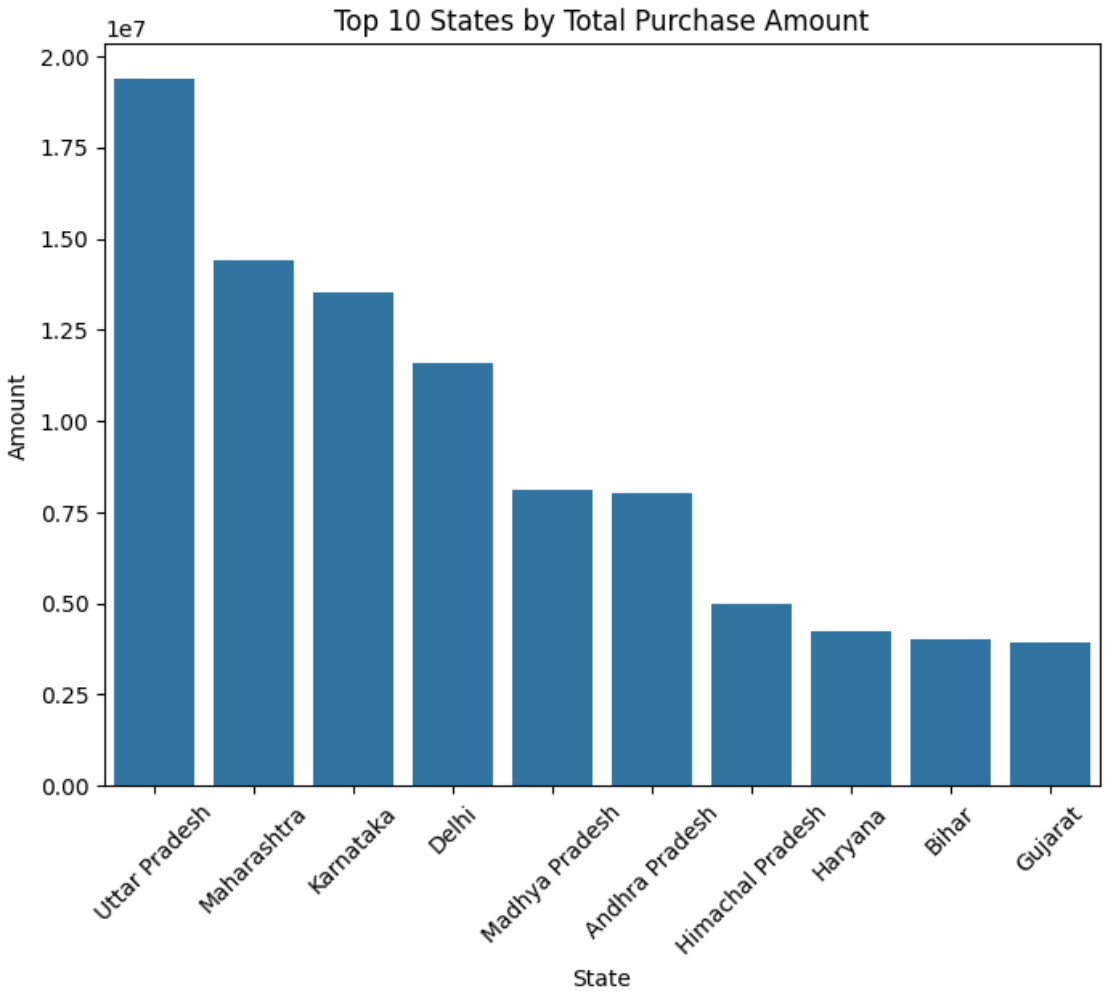
[45]:
```
state_orders_revenue = df.groupby('State').agg({'Orders':'sum', 'Amount':
 ↪'sum'}).reset_index()
top_states = state_orders_revenue.sort_values(by='Orders', ascending=False).
 ↪head(10)

plt.figure(figsize=(8, 6))
sns.barplot(x='State', y='Orders', data=top_states)
```

```
plt.title('Top 10 States by Number of Orders')
plt.xticks(rotation=45)
plt.show()
```

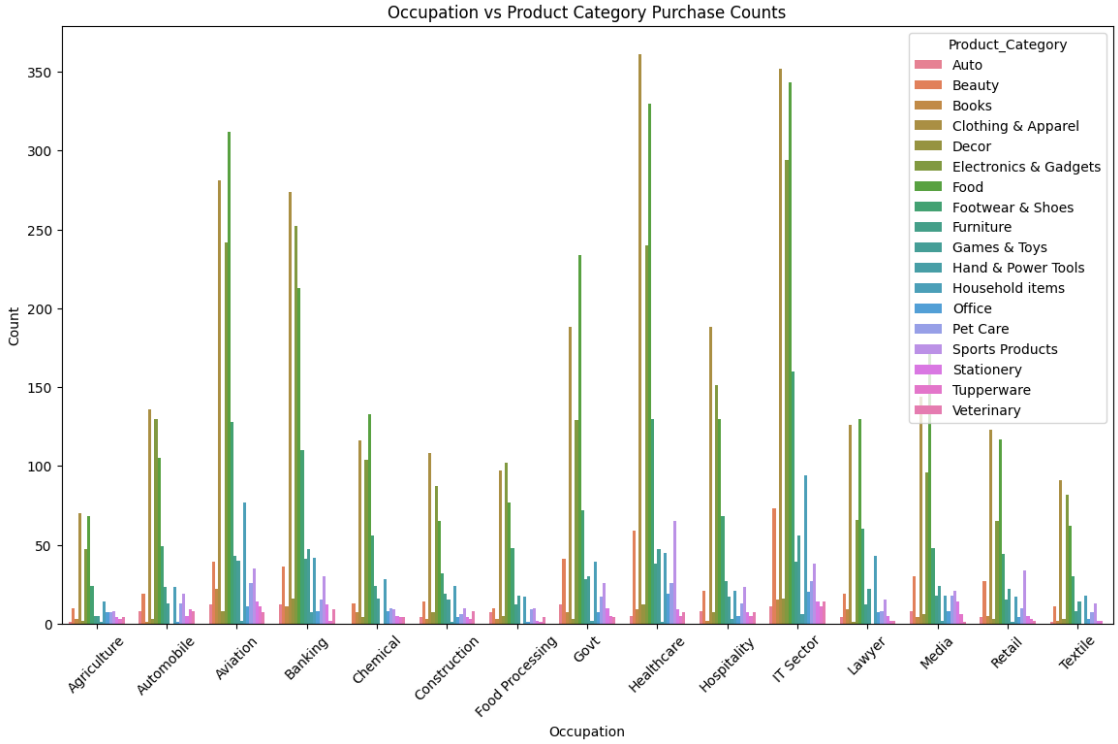


[38]:
```
plt.figure(figsize=(8, 6))
top_states_revenue = state_orders_revenue.sort_values(by='Amount',␣
 ↪ascending=False).head(10)
sns.barplot(x='State', y='Amount', data=top_states_revenue)
plt.title('Top 10 States by Total Purchase Amount')
plt.xticks(rotation=45)
plt.show()
```



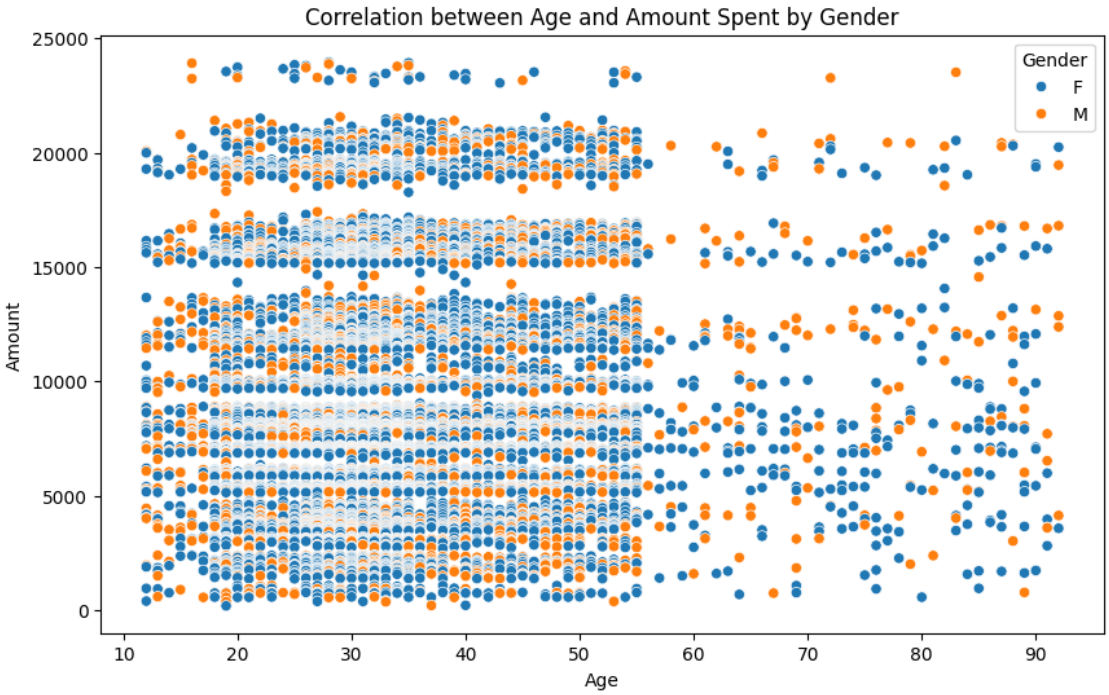
19 4. Are there specific occupations that prefer particular product categories more than others?

[54]:
```
occupation_product_counts = df.groupby(['Occupation', 'Product_Category']).
  ↪size().reset_index(name='Count')
plt.figure(figsize=(14, 8))
sns.barplot(x='Occupation', y='Count', hue='Product_Category',␣
  ↪data=occupation_product_counts)
plt.title('Occupation vs Product Category Purchase Counts')
plt.xticks(rotation=45)
plt.show()
```



20 5. What is the correlation between age and spending amount, and does this differ by gender?

[44]:
```
plt.figure(figsize=(10, 6))
sns.scatterplot(x='Age', y='Amount', hue='Gender', data=df)
plt.title('Correlation between Age and Amount Spent by Gender')
plt.show()
```


Correlation between Age and Amount Spent by Gender
Gender
F
M
Amount
Age
25000
20000
15000
10000
5000
0
10
20
30
40
50
60
70
80
90