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

df=pd.read_csv("Diwali Sales Data.csv",encoding='unicode_escape')

df.head()

   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  

df.shape

(11251, 15)

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

```
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
```

```
# to check null values showing True
df.isnull()
```

```
       User_ID  Cust_name  Product_ID  Gender  Age Group    Age  \
0        False      False       False   False      False  False
```

```
1        False      False       False   False      False  False
2        False      False       False   False      False  False
3        False      False       False   False      False  False
4        False      False       False   False      False  False
...        ...        ...         ...     ...        ...    ...
11246    False      False       False   False      False  False
11247    False      False       False   False      False  False
11248    False      False       False   False      False  False
11249    False      False       False   False      False  False
11250    False      False       False   False      False  False

       Marital_Status  State   Zone  Occupation  Product_Category
Orders  \
0               False  False  False       False             False
False
1               False  False  False       False             False
False
2               False  False  False       False             False
False
3               False  False  False       False             False
False
4               False  False  False       False             False
False
...               ...    ...    ...         ...               ...
...
11246           False  False  False       False             False
False
11247           False  False  False       False             False
False
11248           False  False  False       False             False
False
11249           False  False  False       False             False
False
11250           False  False  False       False             False
False

       Amount
0       False
1       False
2       False
3       False
4       False
...       ...
11246   False
11247   False
11248   False
11249   False
11250   False

[11251 rows x 13 columns]
```

```
# sum of null values
df.isnull().sum()
```

```
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
```

```
df.shape
```

```
(11251, 13)
```

```
# drop rows of null values
df.dropna(inplace=True)
```

```
df.shape
```

```
(11239, 13)
```

```
# change data type
df['Amount']=df['Amount'].astype('int')
```

```
df['Amount'].dtypes
```

```
dtype('int32')
```

```
df.columns
```

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

```
# rename a column
df.rename(columns={'Marital_Status':'Shadi'})
```

```
       User_ID    Cust_name Product_ID Gender Age Group  Age  Shadi  \
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
0       23952
1       23934
2       23924
3       23912
4       23877
...       ...
11246     370
11247     367
11248     213
11249     206
11250     188

[11239 rows x 13 columns]
```

```
df.describe()
```

```
            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
```

```
# describe() for specific columns
df[['Age','Orders','Amount']].describe()
```

```
                Age        Orders        Amount
count  11239.000000  11239.000000  11239.000000
mean      35.410357      2.489634   9453.610553
std       12.753866      1.114967   5222.355168
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
```

Exploratory Data Analysis

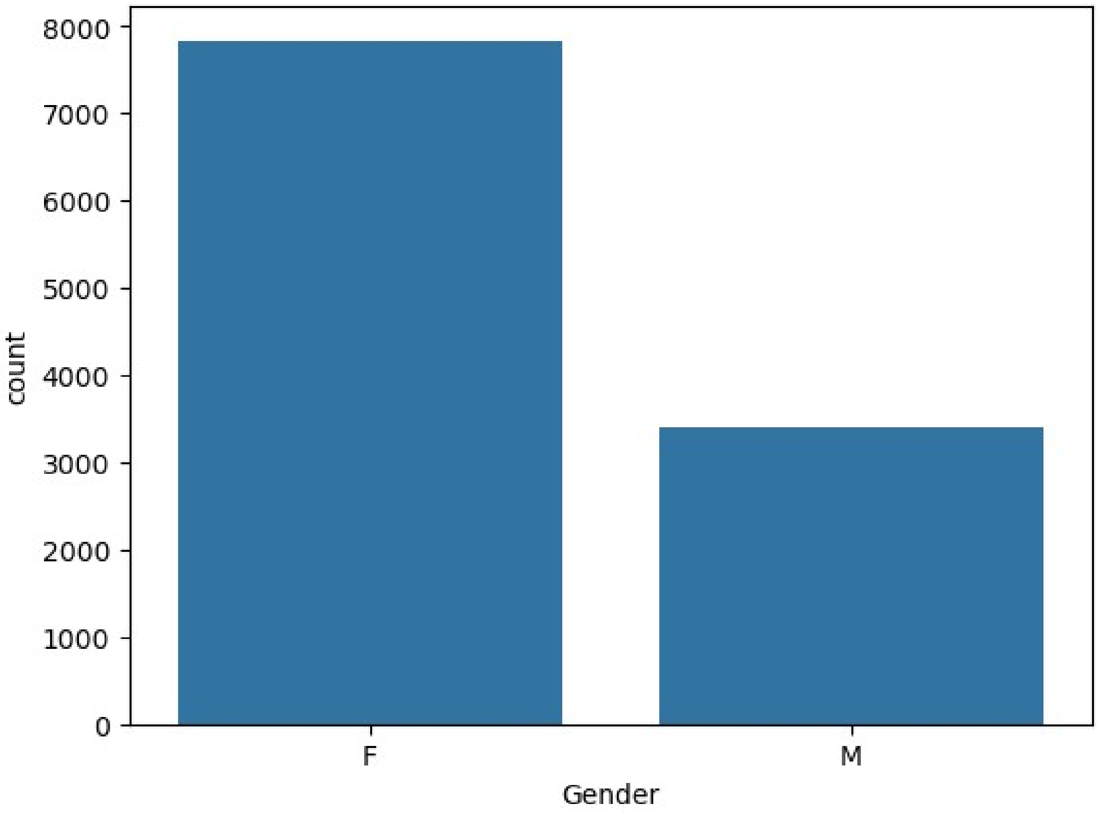
Gender

```
df.columns
```

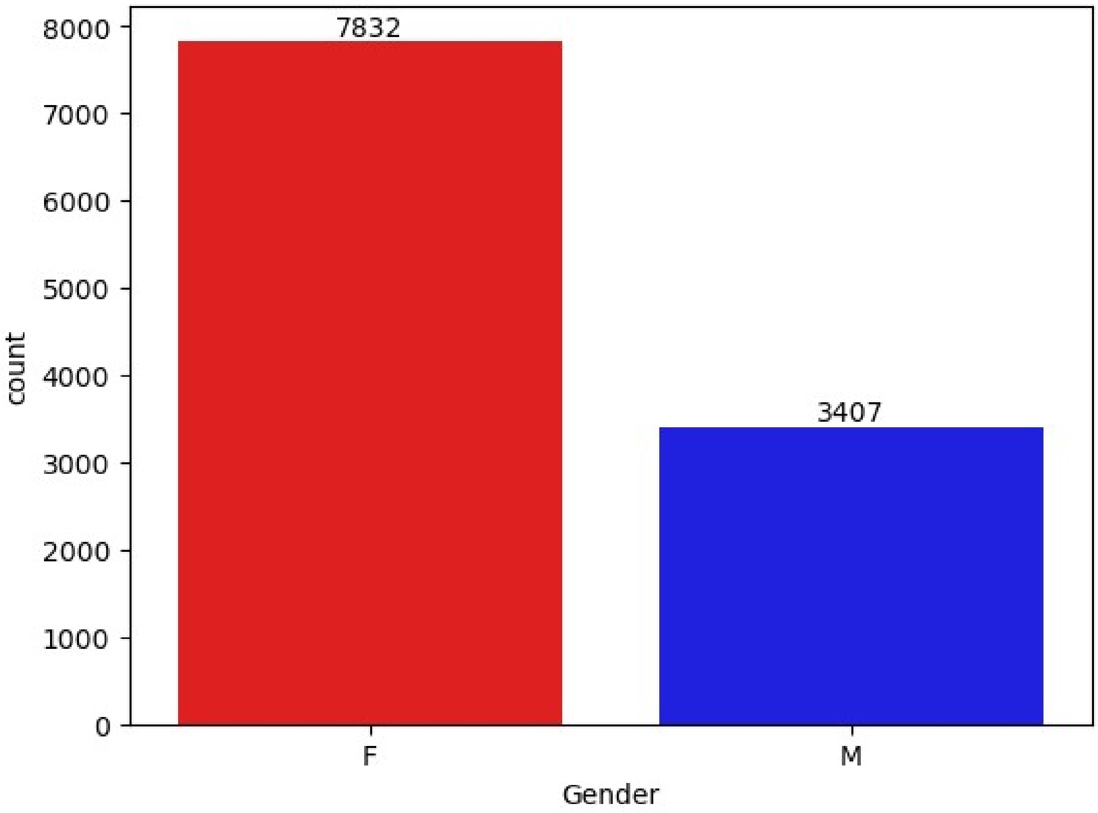
```
Index(['User_ID', 'Cust_name', 'Product_ID', 'Gender', 'Age Group',
'Age',
       'Marital_Status', 'State', 'Zone', 'Occupation',
'Product_Category',
       'Orders', 'Amount'],
      dtype='object')
```

```
sns.countplot(x="Gender", data=df)
```

```
<Axes: xlabel='Gender', ylabel='count'>
```



```
ax=sns.countplot(x="Gender",hue='Gender',
data=df,palette=['red','blue'])
for bars in ax.containers:
    ax.bar_label(bars)
```

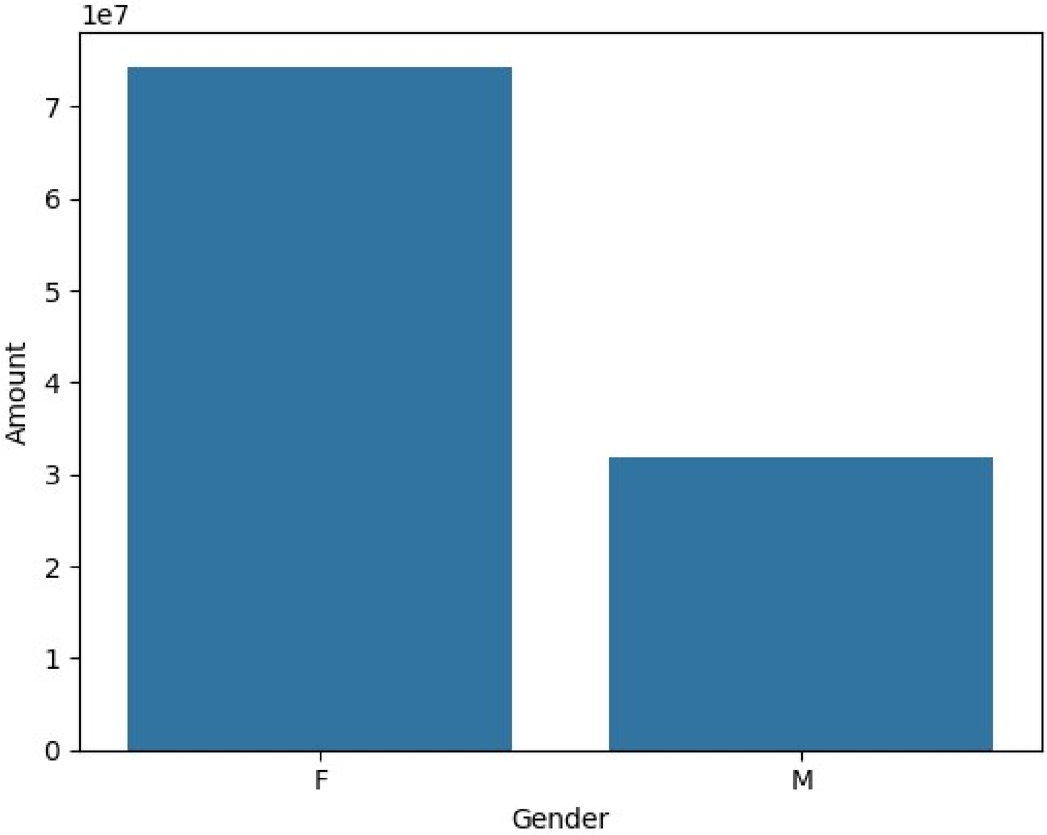


```
df.groupby(['Gender'],as_index=False)
['Amount'].sum().sort_values(by='Amount',ascending=False)
```

```
  Gender    Amount
0      F  74335853
1      M  31913276
```

```
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)
```

```
<Axes: xlabel='Gender', ylabel='Amount'>
```

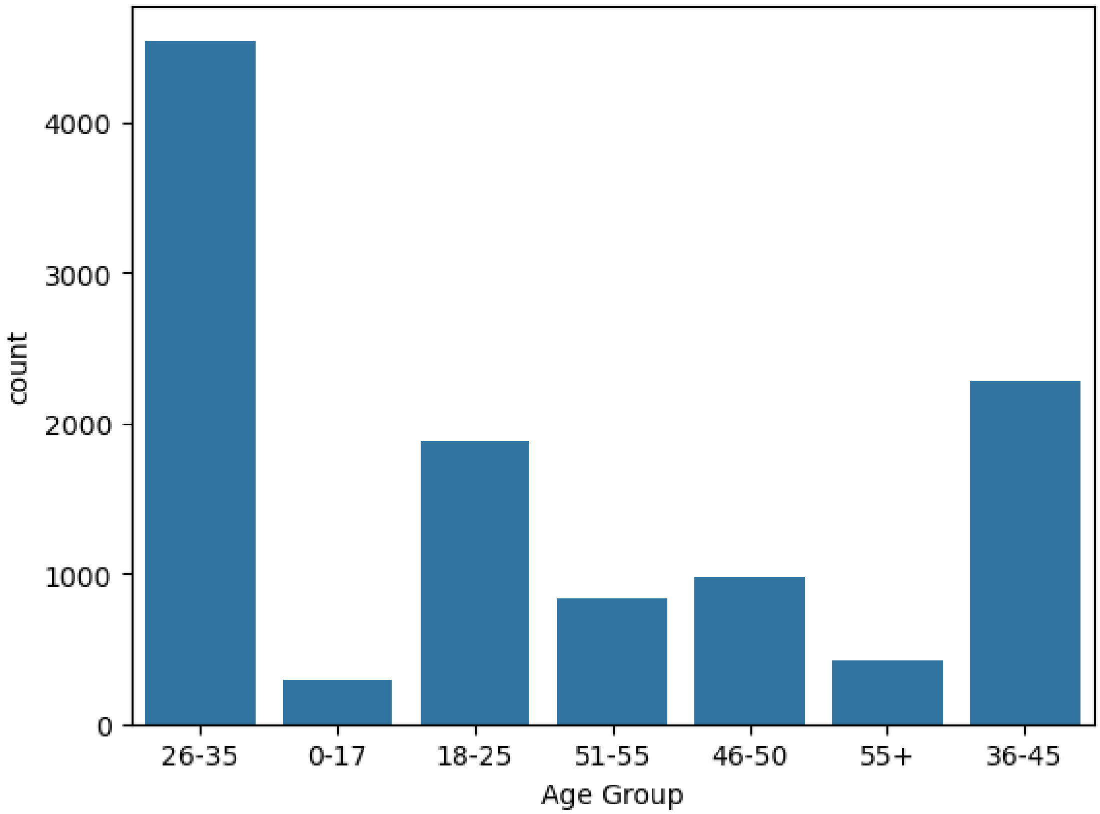


from the above graph we can see that most of the buyers are females and even the purchasing power of females are greater than men

Age

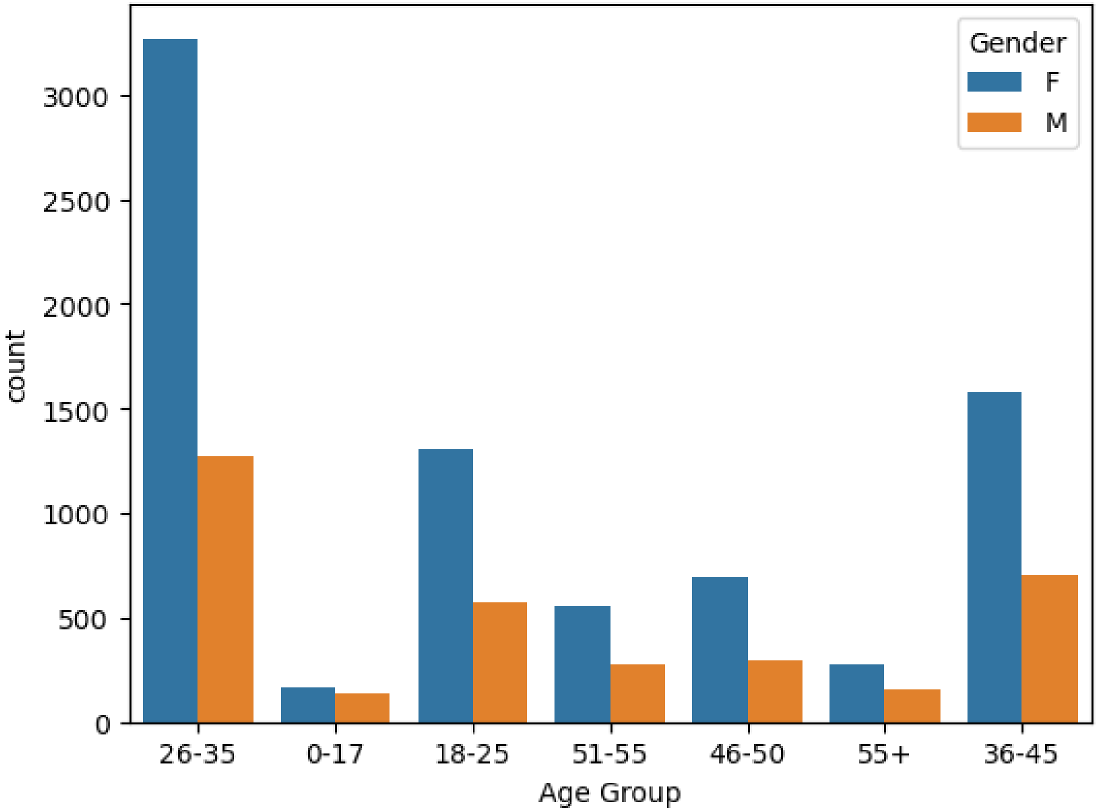
```
sns.countplot(data=df, x='Age Group')
```

```
<Axes: xlabel='Age Group', ylabel='count'>
```

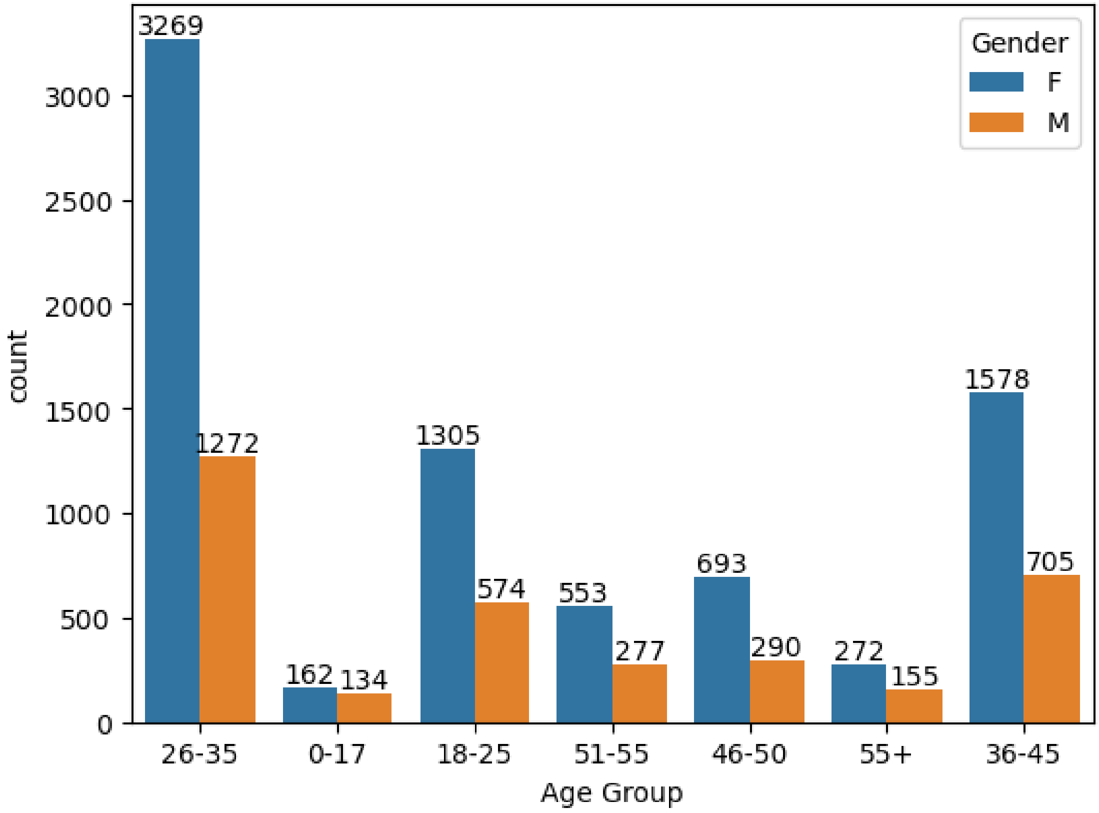


```
sns.countplot(data=df, x='Age Group',hue='Gender')
```

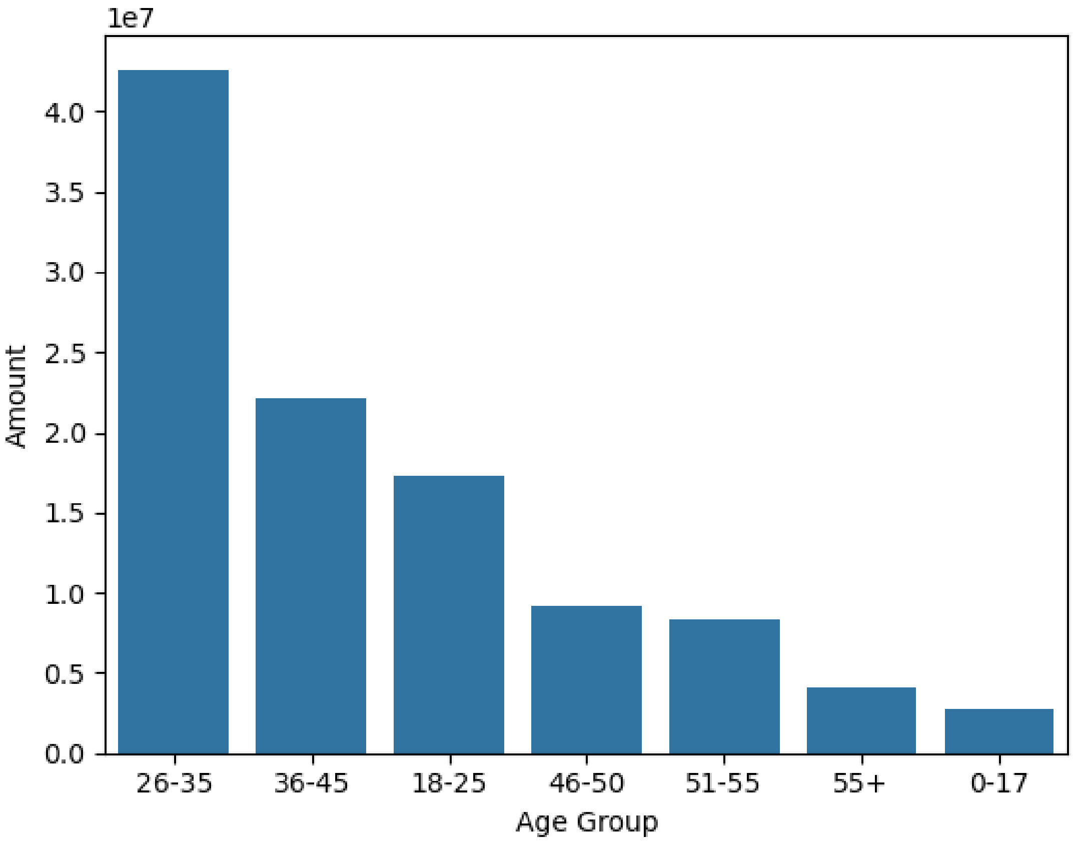
```
<Axes: xlabel='Age Group', ylabel='count'>
```



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



```
# total sales vs Age group
sales_age=df.groupby(['Age Group'],as_index=False)
['Amount'].sum().sort_values(by='Amount',ascending=False)
sales_age

  Age Group    Amount
2     26-35  42613442
3     36-45  22144994
1     18-25  17240732
4     46-50   9207844
5     51-55   8261477
6       55+   4080987
0      0-17   2699653

sns.barplot(x='Age Group', y='Amount',data=sales_age)

<Axes: xlabel='Age Group', ylabel='Amount'>
```



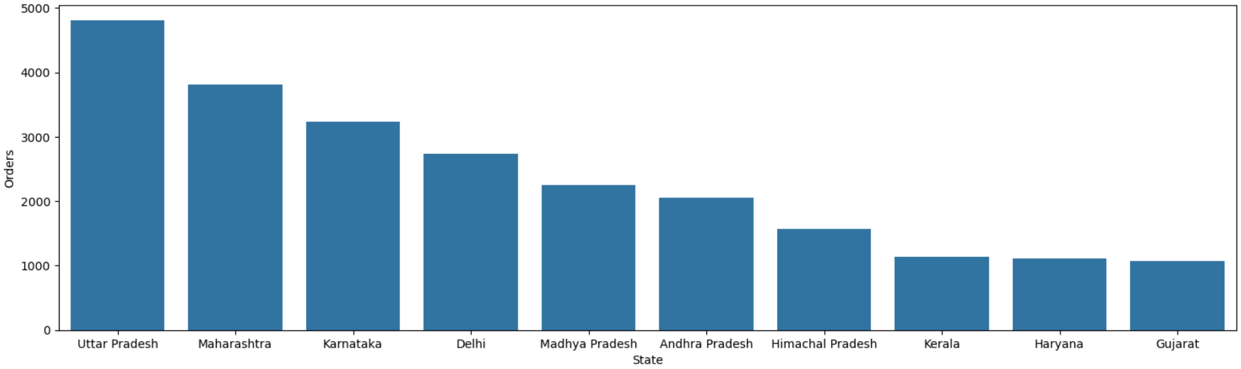
from the above graph we can see that most of the buyers are of age group between 26-35 years female

state

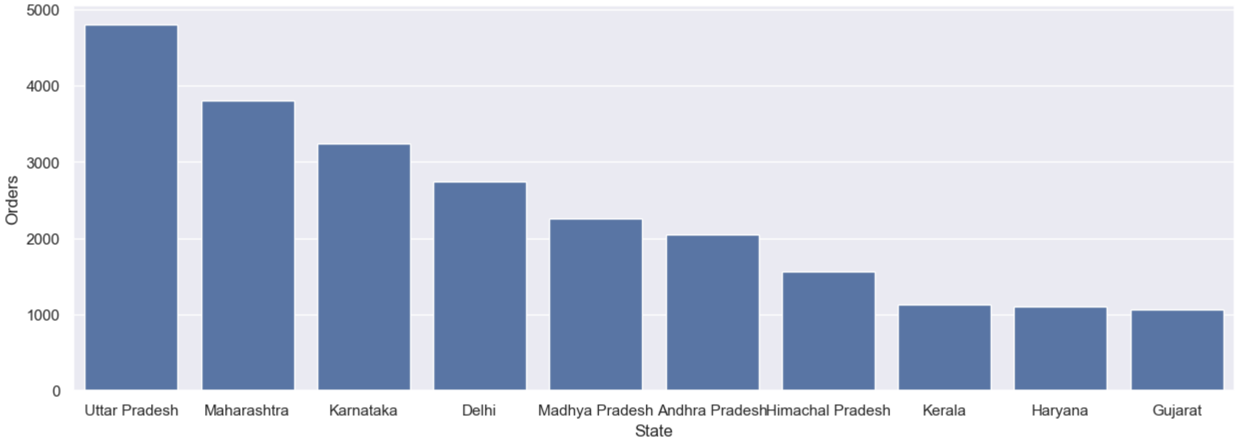
```
# total no. of orders from top 10 states
sales_state=df.groupby(['State'],as_index=False)
['Orders'].sum().sort_values(by='Orders',ascending=False).head(10)
sales_state
```

```
               State  Orders
14     Uttar Pradesh    4807
10       Maharashtra    3810
7          Karnataka    3240
2              Delhi    2740
9     Madhya Pradesh    2252
0     Andhra Pradesh    2051
5   Himachal Pradesh    1568
8             Kerala    1137
4            Haryana    1109
3            Gujarat    1066
```

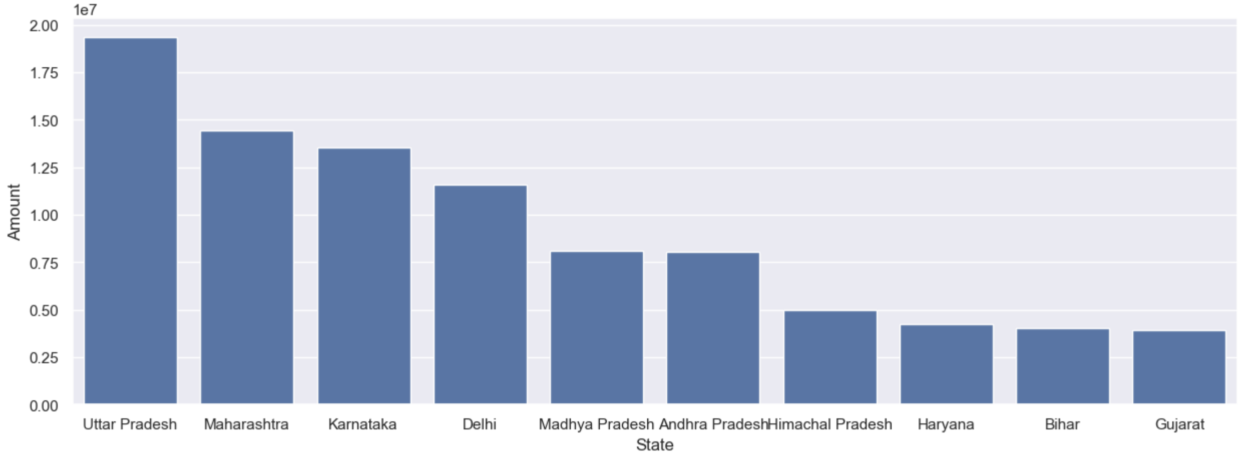
```
plt.figure(figsize=(18,5))
sns.barplot(data=sales_state,x='State',y='Orders')

<Axes: xlabel='State', ylabel='Orders'>
```



```
sns.set(rc={'figure.figsize':(15,5)})
sns.barplot(data=sales_state,x='State',y='Orders')

<Axes: xlabel='State', ylabel='Orders'>
```



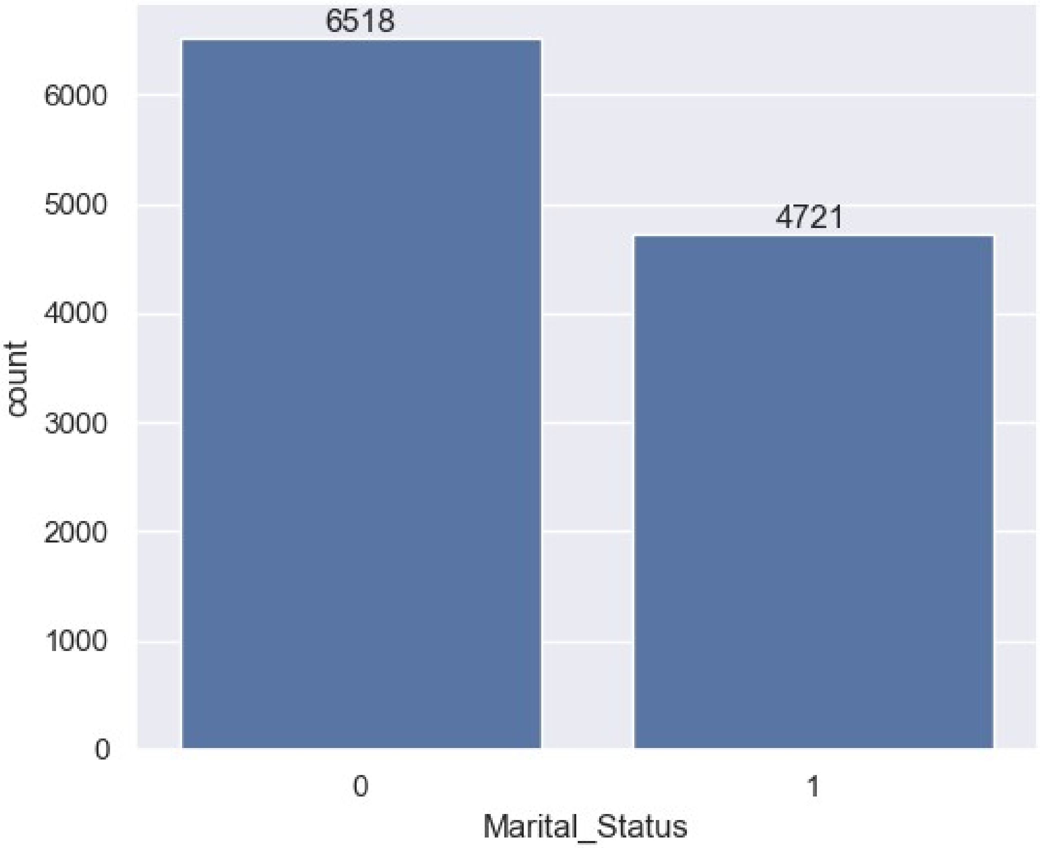
```
sales_state=df.groupby(['State'],as_index=False)
['Amount'].sum().sort_values(by='Amount',ascending=False).head(10)
sns.set(rc={'figure.figsize':(15,5)})
sns.barplot(data=sales_state,x='State',y='Amount')

<Axes: xlabel='State', ylabel='Amount'>
```



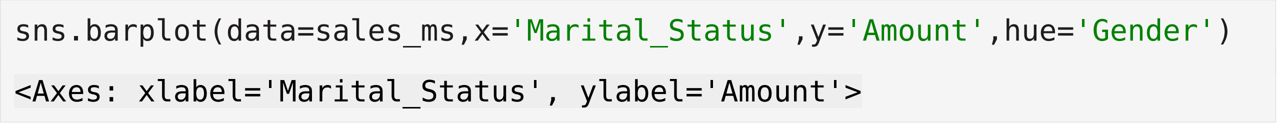
from above graph we can see that most of the orders are from Uttar Pradesh, Maharashtra and Karnataka respectively

Marital Status

```
ax=sns.countplot(x="Marital_Status",data=df)
sns.set(rc={'figure.figsize':(4,5)})
for bars in ax.containers:
    ax.bar_label(bars)
```

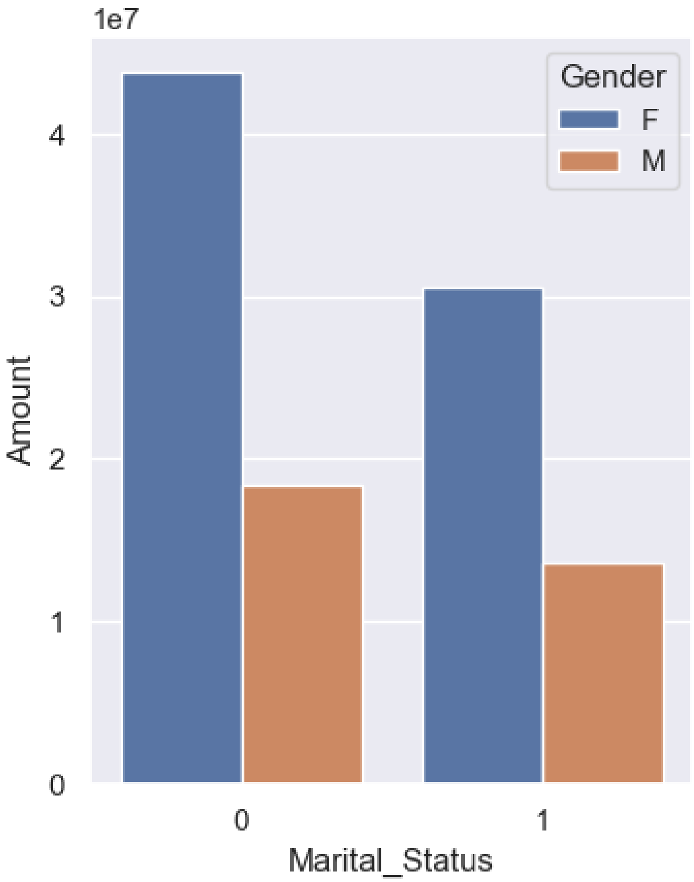


sales_ms=df.groupby(['Marital_Status','Gender'],as_index=False)
['Amount'].sum().sort_values(by='Amount',ascending=False) sales_ms



```
sns.barplot(data=sales_ms,x='Marital_Status',y='Amount',hue='Gender')
```

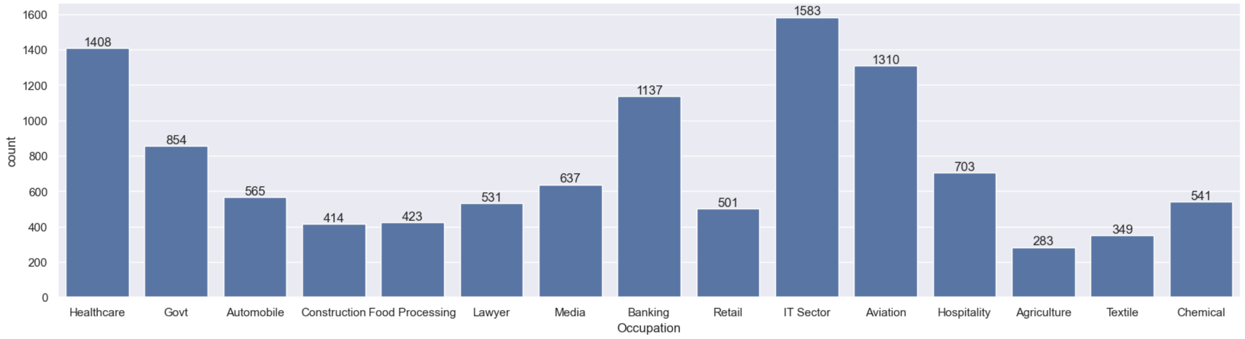
```
<Axes: xlabel='Marital_Status', ylabel='Amount'>
```



from the above graph we can see that most of the buyers are married(females) and they have high purchasing power

Occupation

```
ax=sns.countplot(data=df,x="Occupation")
sns.set(rc={'figure.figsize':(20,5)})
for bars in ax.containers:
    ax.bar_label(bars)
```

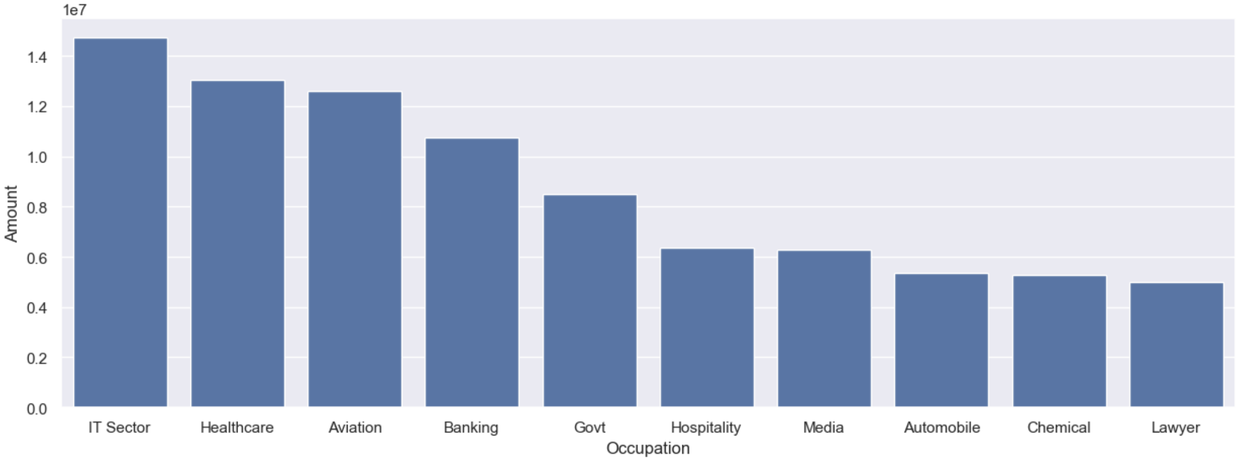


```
sales_occu=df.groupby(['Occupation'],as_index=False)
['Amount'].sum().sort_values(by='Amount',ascending=False).head(10)
sales_occu
```

```
      Occupation    Amount
10     IT Sector  14755079
8     Healthcare  13034586
2       Aviation  12602298
3        Banking  10770610
7           Govt   8517212
9    Hospitality   6376405
12         Media   6295832
1     Automobile   5368596
4       Chemical   5297436
11        Lawyer   4981665
```

```
sns.set(rc={'figure.figsize':(15,5)})
sns.barplot(data=sales_occu,x='Occupation',y='Amount')
```

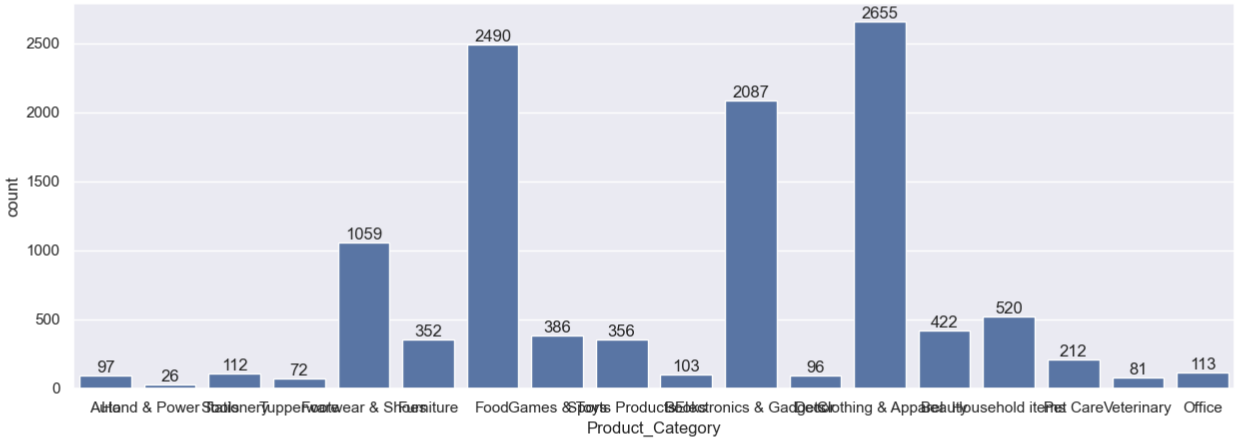
```
<Axes: xlabel='Occupation', ylabel='Amount'>
```



from above graph we can see that most of the buyers are working in IT, Healthcare and Aviation sector

product category

```
ax=sns.countplot(data=df, x='Product_Category')
for bars in ax.containers:
    ax.bar_label(bars)
```

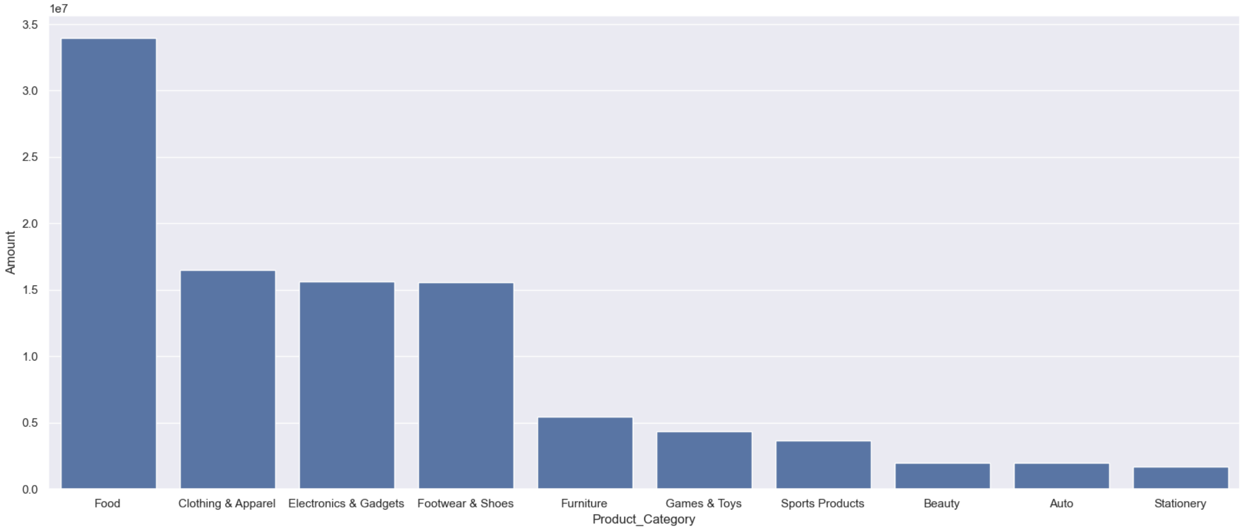


```
sales_pc=df.groupby(['Product_Category'],as_index=False)
['Amount'].sum().sort_values(by='Amount',ascending=False).head(10)
sales_pc
```

```
         Product_Category    Amount
6                    Food  33933883
3      Clothing & Apparel  16495019
5    Electronics & Gadgets  15643846
7        Footwear & Shoes  15575209
8               Furniture   5440051
9             Games & Toys   4331694
14         Sports Products   3635933
1                  Beauty   1959484
0                    Auto   1958609
15             Stationery   1676051
```

```
sns.set(rc={'figure.figsize':(20,8)})
sns.barplot(data=sales_pc,x='Product_Category',y='Amount')
```

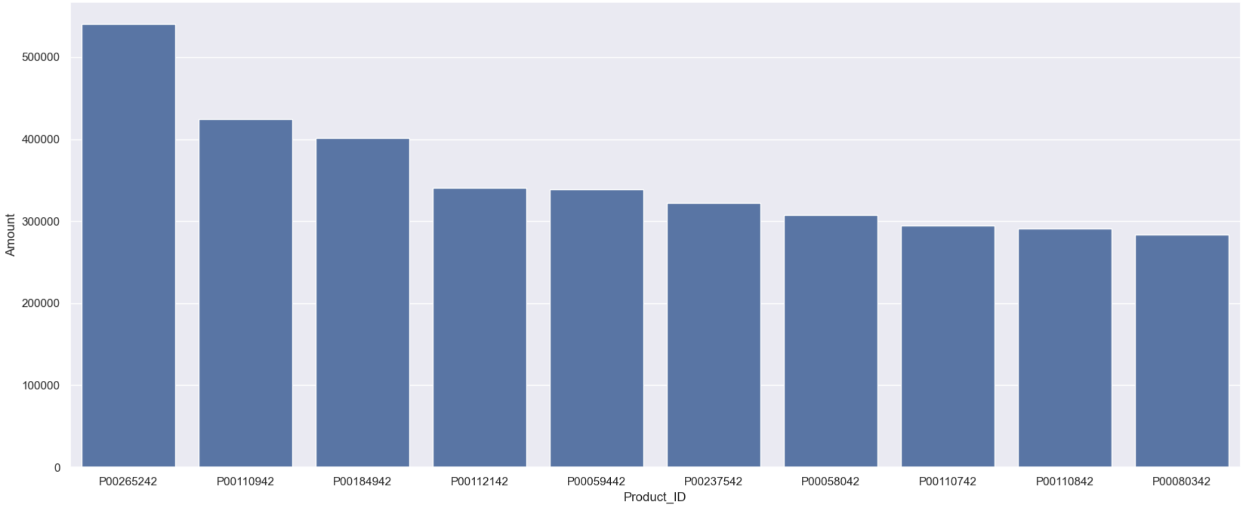
```
<Axes: xlabel='Product_Category', ylabel='Amount'>
```



from above graph we can see that most of the sold products are from Food, Clothing and Electronic category

```
sales_pi=df.groupby(['Product_ID'],as_index=False)
['Amount'].sum().sort_values(by='Amount',ascending=False).head(10)
sns.set(rc={'figure.figsize':(20,8)})
sns.barplot(data=sales_pi,x='Product_ID',y='Amount')
```

```
<Axes: xlabel='Product_ID', ylabel='Amount'>
```



conclusion:

Married women age group of 26-35 years from UP, Maharashtra and Karnataka in IT, Healthcarea and Aviation are more likely to buy products from Food, Clothing and Electronics Category