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

In [2]:
```python
df = pd.read_csv('Diwali Sales Data.csv')
df.shape
```

Out[2]: (11251, 15)

In [3]:
```python
df.head(10)
```

Out[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	23952.00	NaN	NaN
1	1000732	Kartik	P00110942	F	26-35	35	1	Andhra Pradesh	Southern	Govt	Auto	3	23934.00	NaN	NaN
2	1001990	Bindu	P00118542	F	26-35	35	1	Uttar Pradesh	Central	Automobile	Auto	3	23924.00	NaN	NaN
3	1001425	Sudevi	P00237842	M	0-17	16	0	Karnataka	Southern	Construction	Auto	2	23912.00	NaN	NaN
4	1000588	Joni	P00057942	M	26-35	28	1	Gujarat	Western	Food Processing	Auto	2	23877.00	NaN	NaN
5	1000588	Joni	P00057942	M	26-35	28	1	Himachal Pradesh	Northern	Food Processing	Auto	1	23877.00	NaN	NaN
6	1001132	Balk	P00018042	F	18-25	25	1	Uttar Pradesh	Central	Lawyer	Auto	4	23841.00	NaN	NaN
7	1002092	Shivangi	P00273442	F	55+	61	0	Maharashtra	Western	IT Sector	Auto	1	NaN	NaN	NaN
8	1003224	Kushal	P00205642	M	26-35	35	0	Uttar Pradesh	Central	Govt	Auto	2	23809.00	NaN	NaN
9	1003650	Ginny	P00031142	F	26-35	26	1	Andhra Pradesh	Southern	Media	Auto	4	23799.99	NaN	NaN

In [4]:
```python
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
```

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

In [6]:
```python
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
```

In [7]:
```python
pd.isnull(df).sum()
```

Out[7]:
```
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
```

In [8]:
```python
df.dropna(inplace=True)
```

In [9]:
```python
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 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
```

In [10]:
```python
df['Amount'] = df['Amount'].astype(int)
```

In [11]:
```python
df['Amount'].dtypes
```

Out[11]: dtype('int64')

In [12]:
```python
df.columns
```

Out[12]:
```
Index(['User_ID', 'Cust_name', 'Product_ID', 'Gender', 'Age Group', 'Age',
       'Marital_Status', 'State', 'Zone', 'Occupation', 'Product_Category',
       'Orders', 'Amount'],
      dtype='object')
```

In [13]:
```python
df.describe()
```

Out[13]:

	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

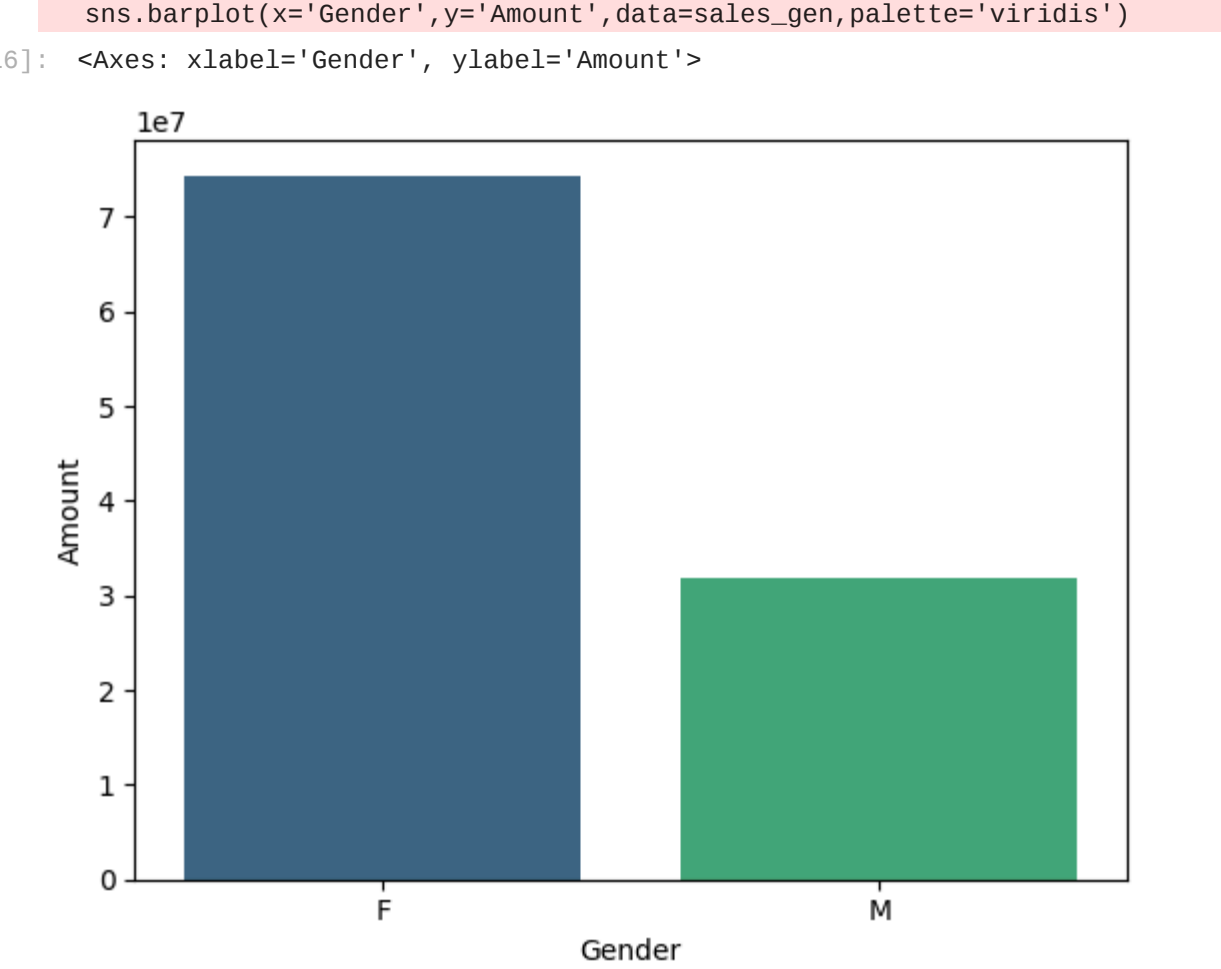
EDA

In [14]:
```python
df.columns
```

Out[14]:
```
Index(['User_ID', 'Cust_name', 'Product_ID', 'Gender', 'Age Group', 'Age',
       'Marital_Status', 'State', 'Zone', 'Occupation', 'Product_Category',
       'Orders', 'Amount'],
      dtype='object')
```

In [15]:
```python
ax = sns.countplot(x='Gender',data=df,palette='viridis')
for bars in ax.containers:
    ax.bar_label(bars)
```

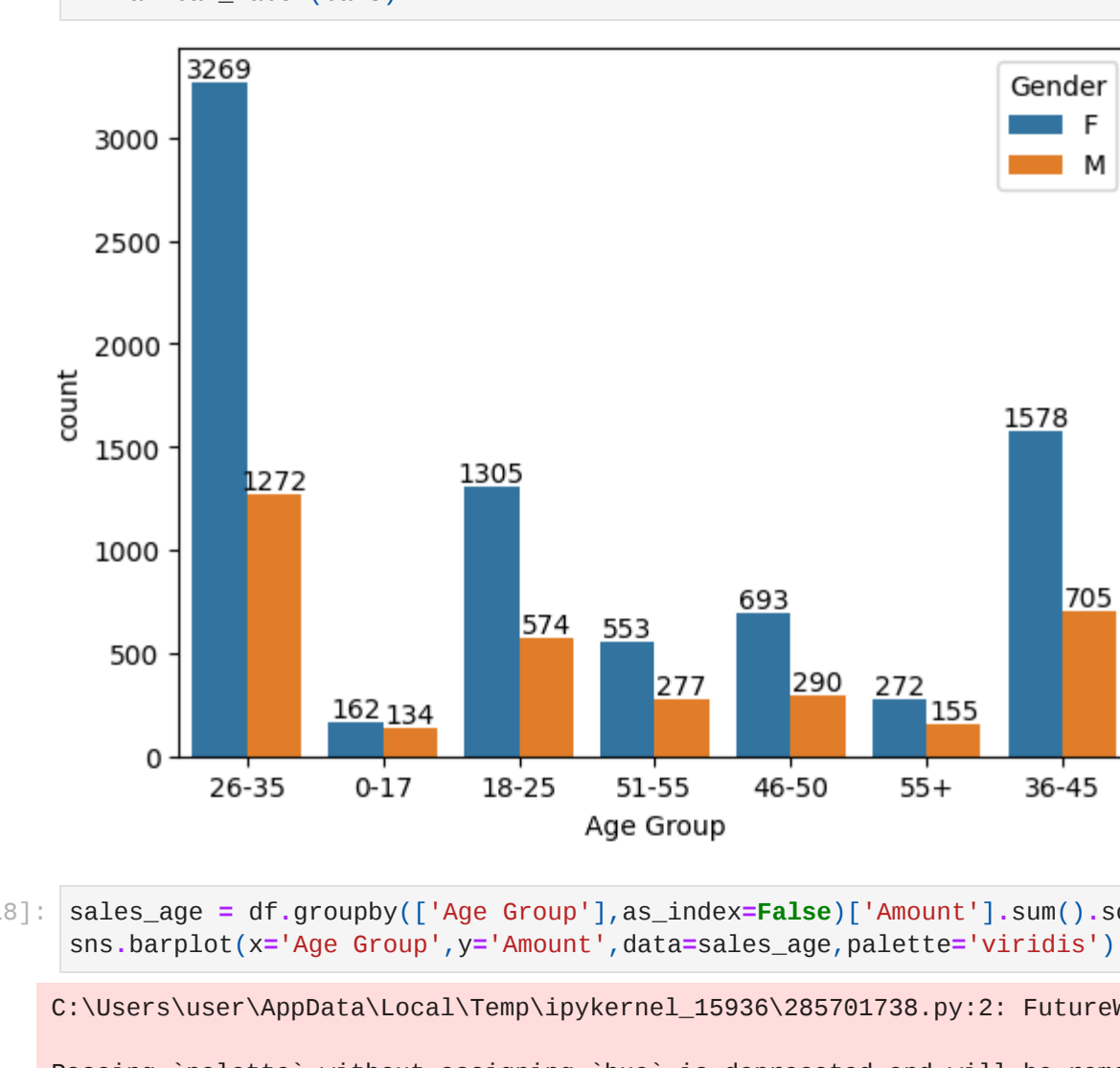
```
C:\Users\user\AppData\Local\Temp\ipykernel_15936\1792030332.py:1: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

  ax = sns.countplot(x='Gender',data=df,palette='viridis')
```



In [16]:
```python
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,palette='viridis')
```

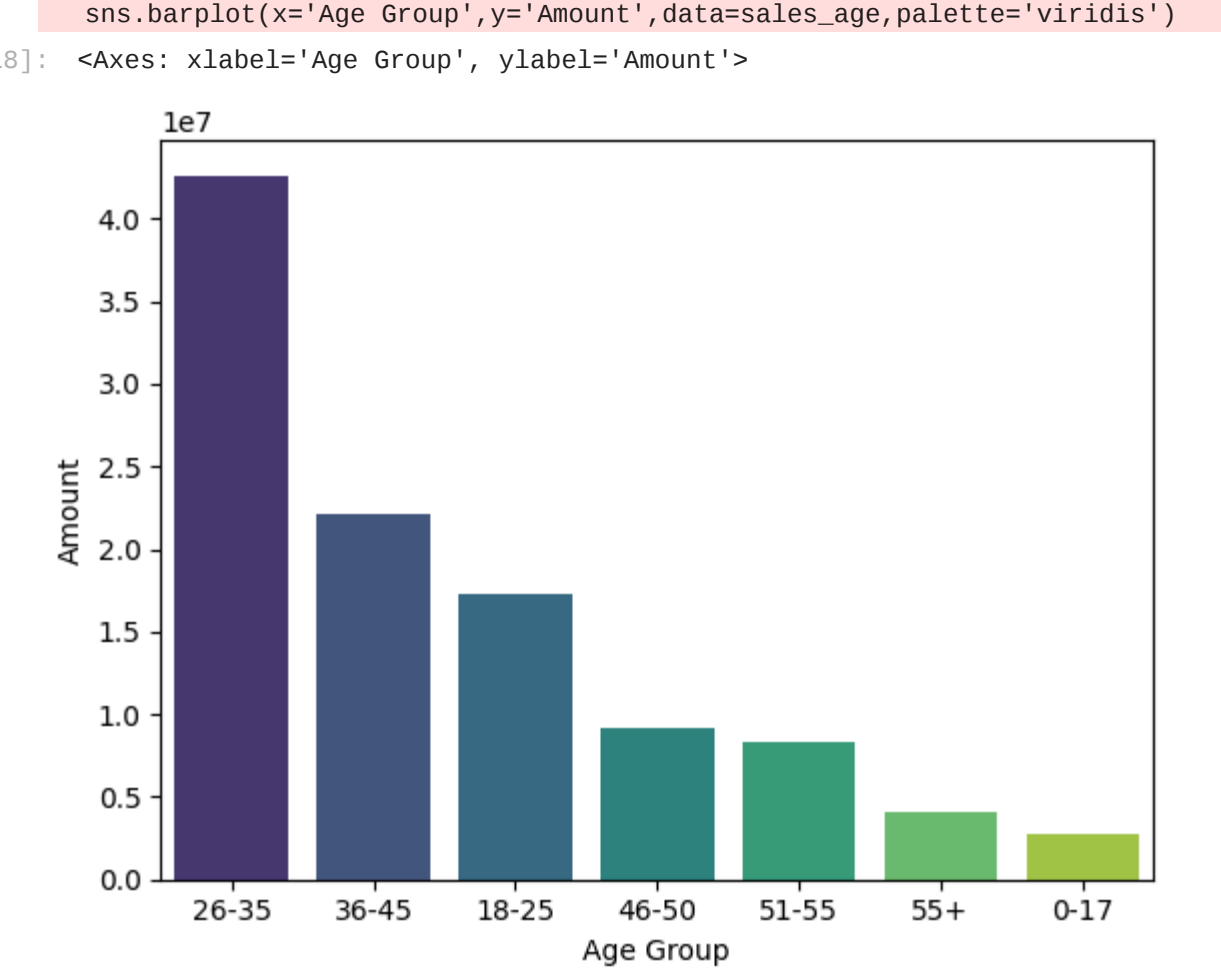
```
C:\Users\user\AppData\Local\Temp\ipykernel_15936\1756672361.py:2: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

  sns.barplot(x='Gender',y='Amount',data=sales_gen,palette='viridis')
```

Out[16]: <Axes: xlabel='Gender', ylabel='Amount'>



From above graphs we can see that most of the buyers are females and even the puchasing power of females are greater than men.

In [17]:
```python
ax = sns.countplot(data = df,x='Age Group',hue='Gender')
for bars in ax.containers:
    ax.bar_label(bars)
```



In [18]:
```python
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,palette='viridis')
```

```
C:\Users\user\AppData\Local\Temp\ipykernel_15936\285701738.py:2: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

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

Out[18]: <Axes: xlabel='Age Group', ylabel='Amount'>

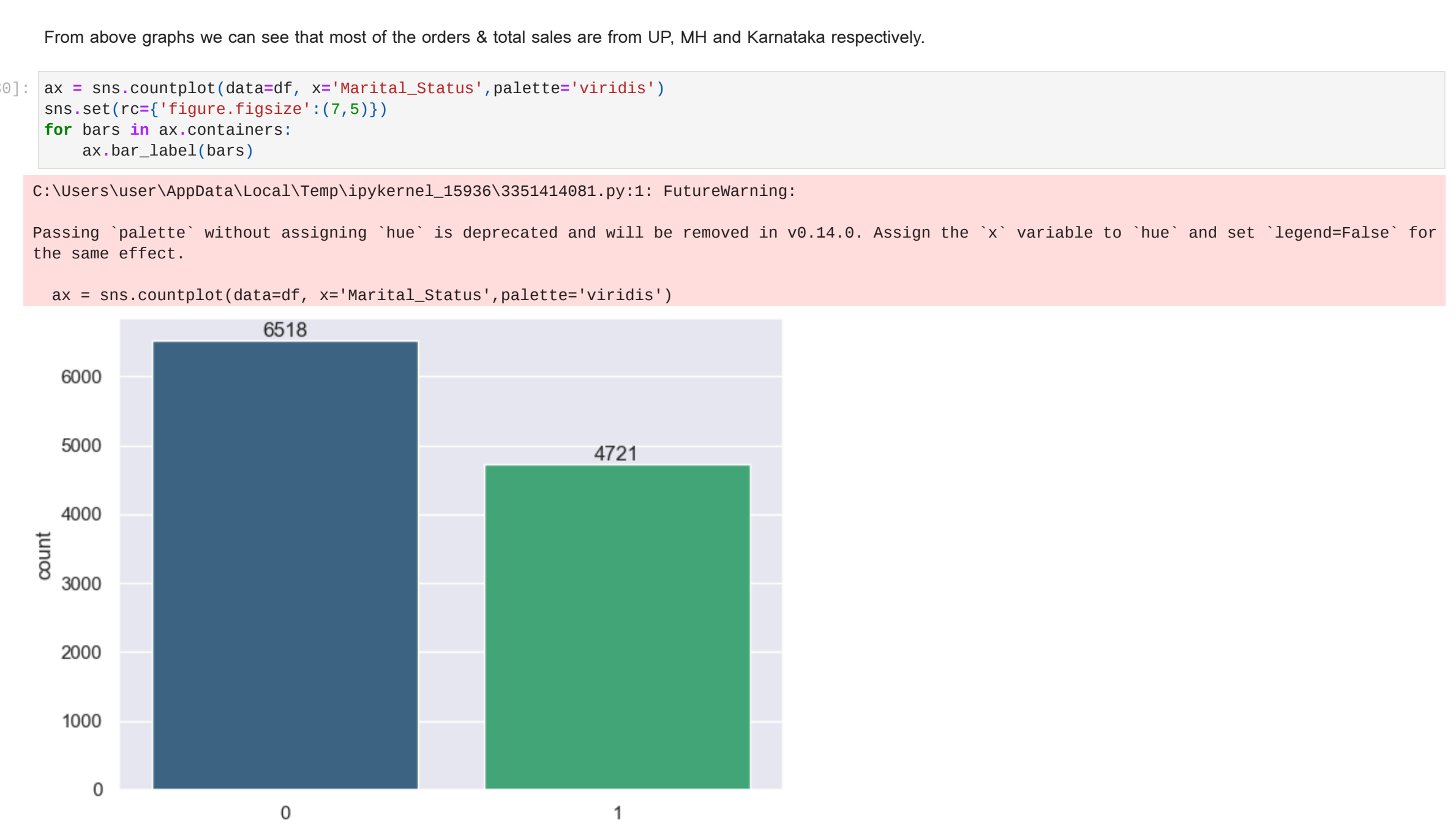
From above graphs we can see that most of the buyers are of age group between 26-35 years and mostly are females.

In [19]:
```python
sales_state = df.groupby(['State'],as_index=False)['Orders'].sum().sort_values(by='Orders',ascending=False).head(10)
sns.set(rc={'figure.figsize':(20,10)})
sns.barplot(data=sales_state,x='State',y='Orders',palette='viridis')
plt.show()
```

```
C:\Users\user\AppData\Local\Temp\ipykernel_15936\1737927626.py:3: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

  sns.barplot(data=sales_state,x='State',y='Orders',palette='viridis')
C:\Users\user\AppData\Local\Programs\Python\Python312\Lib\site-packages\IPython\core\pylabtools.py:170: UserWarning: Glyph 65533 (\N{REPLACEMENT CHARACTER}) missing from font(s) Arial.
  fig.canvas.print_figure(bytes_io, **kw)
```

In [20]:
```python
sales_state = df.groupby(['State'],as_index=False)['Amount'].sum().sort_values(by='Amount',ascending=False).head(10)
sns.set(rc={'figure.figsize':(20,10)})
sns.barplot(data=sales_state,x='State',y='Amount',palette='viridis')
plt.show()
```

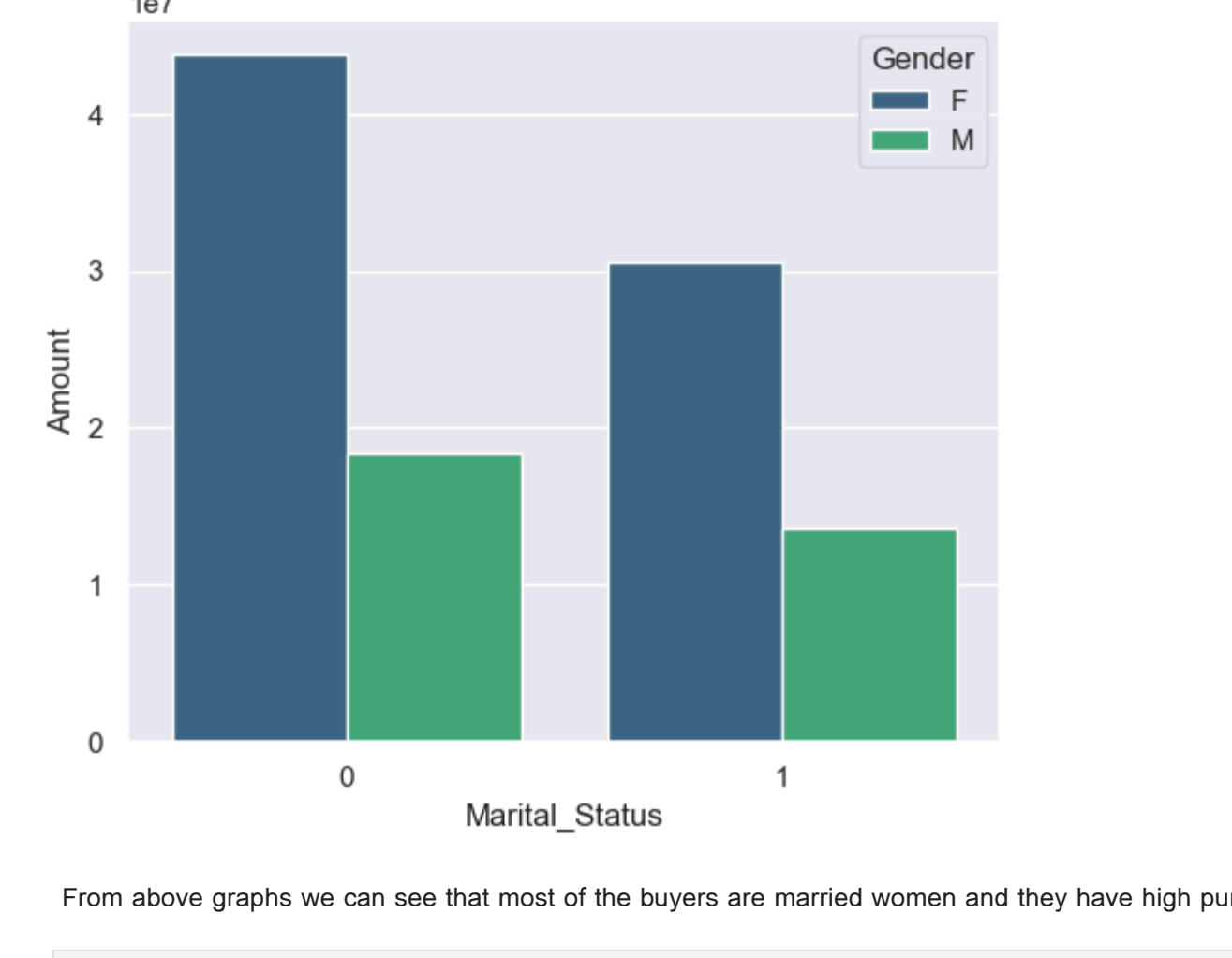
```
C:\Users\user\AppData\Local\Temp\ipykernel_15936\1783320580.py:3: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

  sns.barplot(data=sales_state,x='State',y='Amount',palette='viridis')
C:\Users\user\AppData\Local\Programs\Python\Python312\Lib\site-packages\IPython\core\pylabtools.py:170: UserWarning: Glyph 65533 (\N{REPLACEMENT CHARACTER}) missing from font(s) Arial.
  fig.canvas.print_figure(bytes_io, **kw)
```



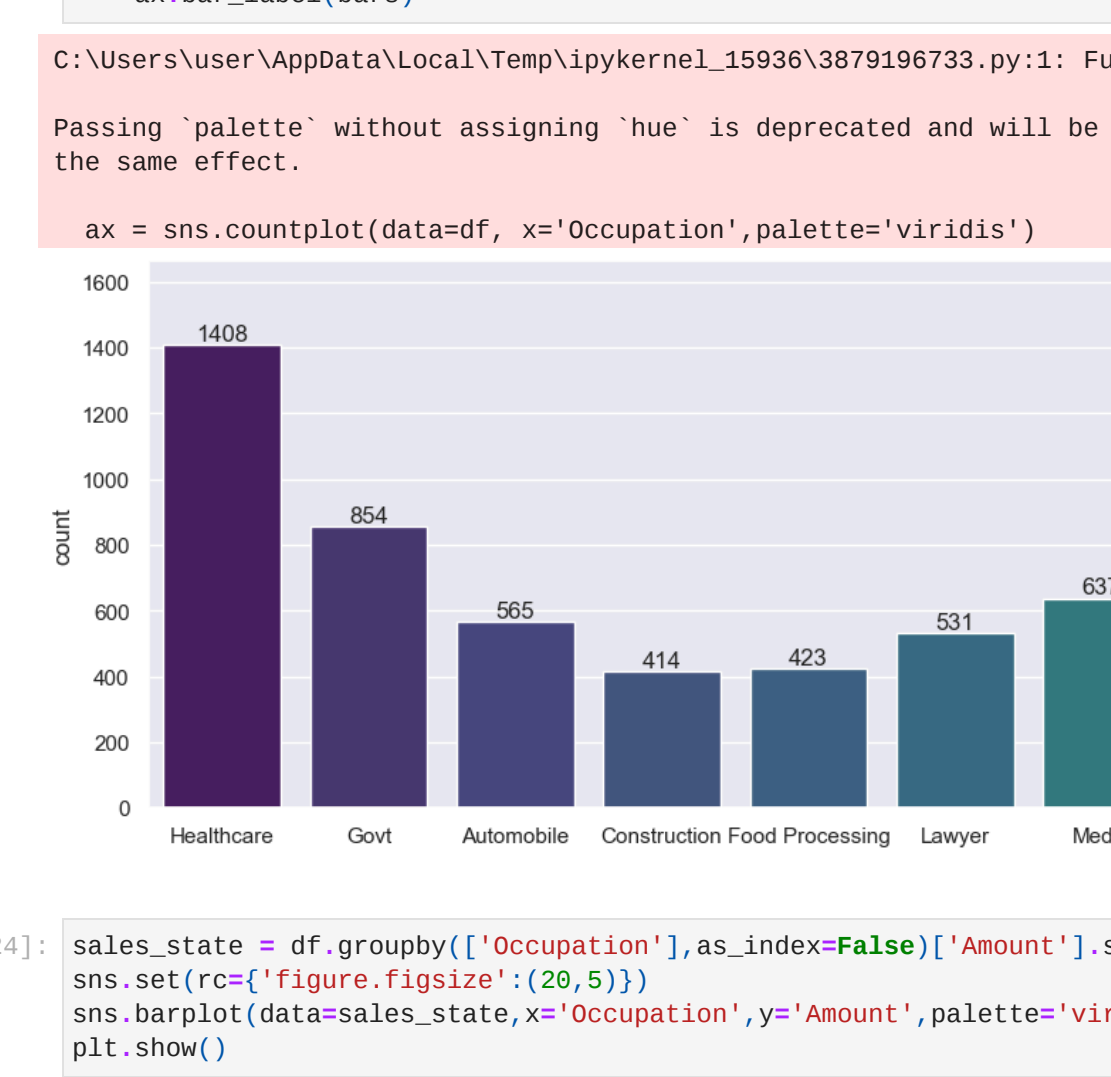
From above graphs we can see that most of the orders & total sales are from UP, MH and Karnataka respectively.

In [30]:
```python
ax = sns.countplot(data=df, x='Marital_Status',palette='viridis')
sns.set(rc={'figure.figsize':(7,5)})
for bars in ax.containers:
    ax.bar_label(bars)
```

```
C:\Users\user\AppData\Local\Temp\ipykernel_15936\3351414081.py:1: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

  ax = sns.countplot(data=df, x='Marital_Status',palette='viridis')
```



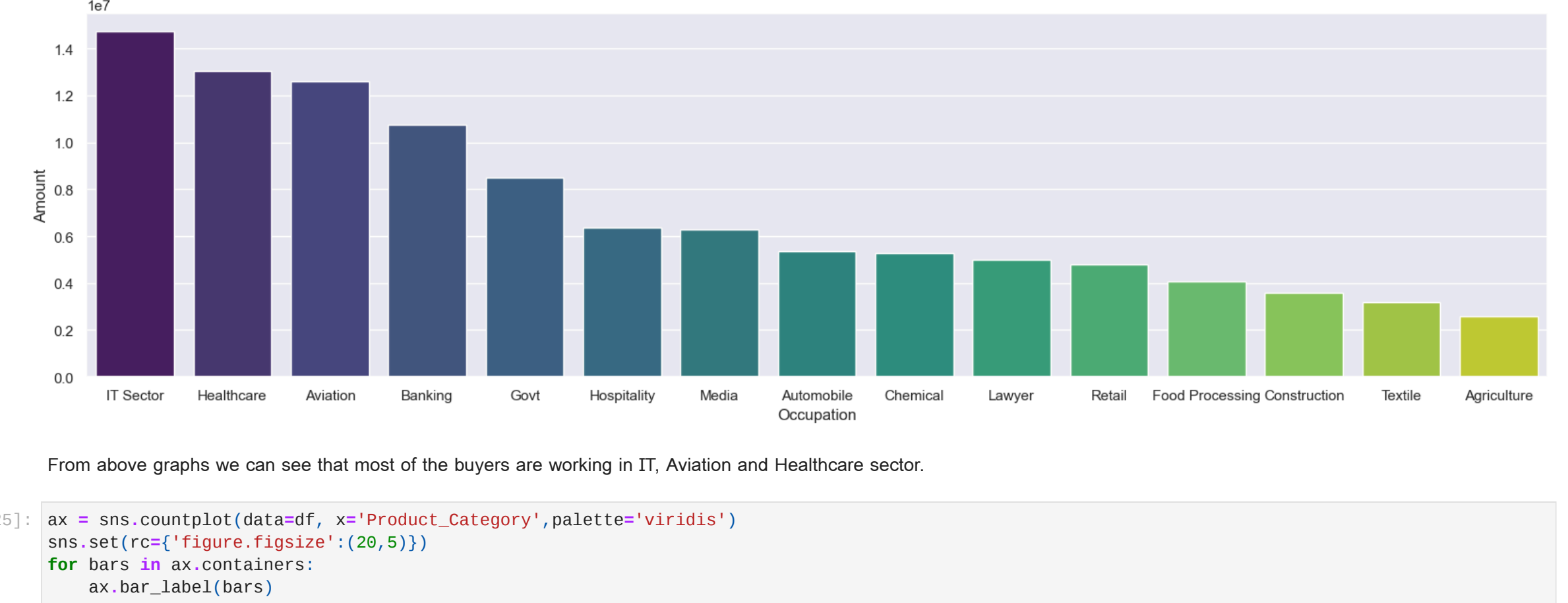
In [22]:
```python
sales_state = df.groupby(['Marital_Status','Gender'],as_index=False)['Amount'].sum().sort_values(by='Amount',ascending=False).head(10)
sns.set(rc={'figure.figsize':(6,5)})
sns.barplot(data=sales_state,x='Marital_Status',y='Amount',palette='viridis',hue='Gender')
plt.show()
```



From above graphs we can see that most of the buyers are married women and they have high purchasing power.

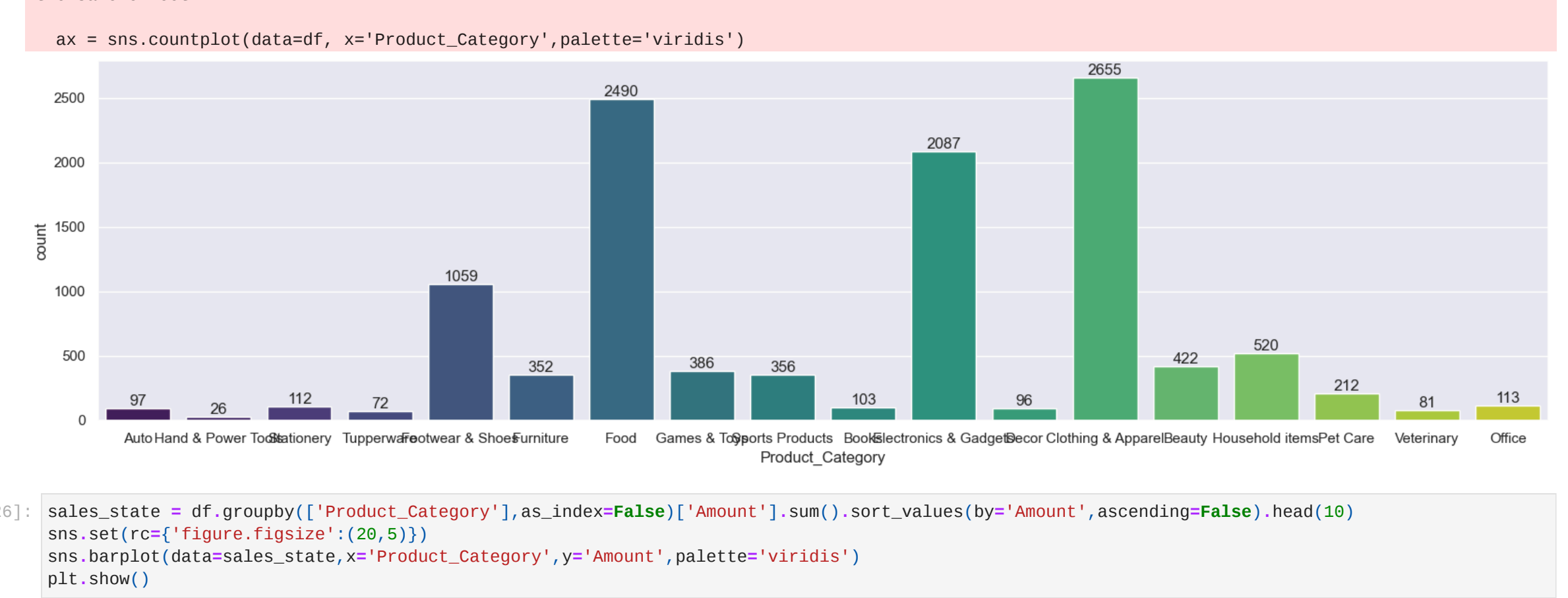
In [32]:
```python
ax = sns.countplot(data=df, x='Occupation',palette='viridis')
sns.set(rc={'figure.figsize':(20,5)})
for bars in ax.containers:
    ax.bar_label(bars)
```

```
C:\Users\user\AppData\Local\Temp\ipykernel_15936\3879196733.py:1: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

  ax = sns.countplot(data=df, x='Occupation',palette='viridis')
```



In [24]:
```python
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',palette='viridis')
plt.show()
```

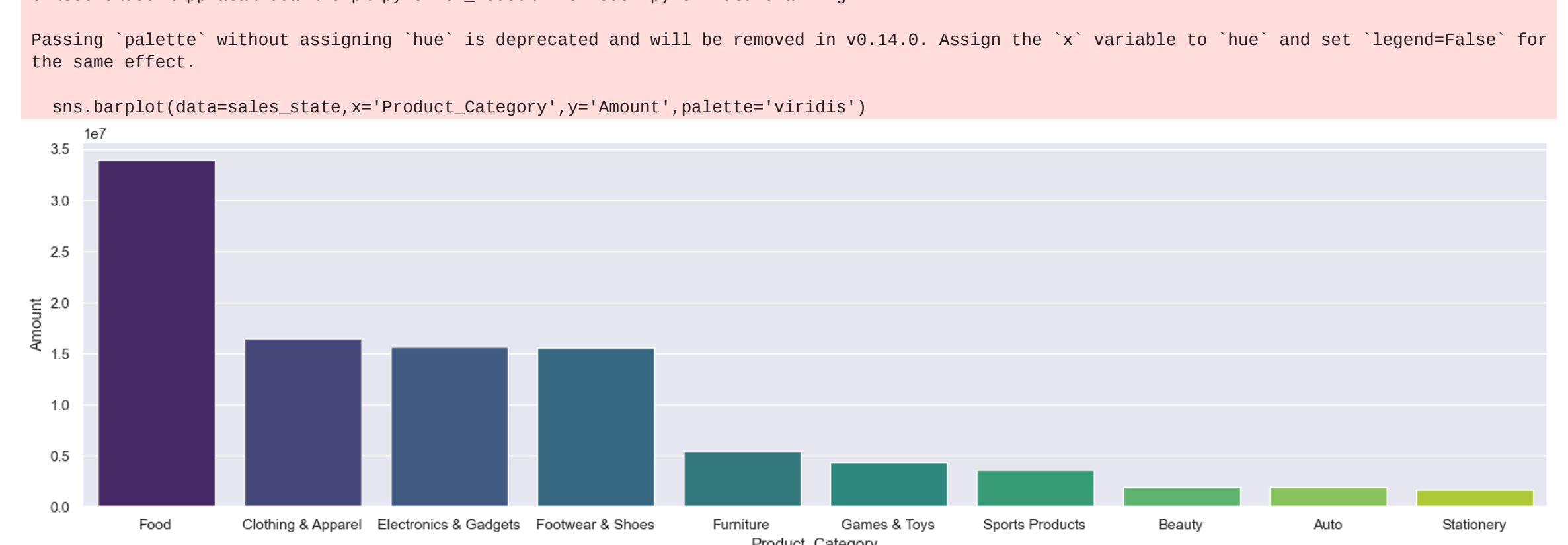
```
C:\Users\user\AppData\Local\Temp\ipykernel_15936\4168351614.py:3: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

  sns.barplot(data=sales_state,x='Occupation',y='Amount',palette='viridis')
```



From above graphs we can see that most of the buyers are working in IT, Aviation and Healthcare sector.

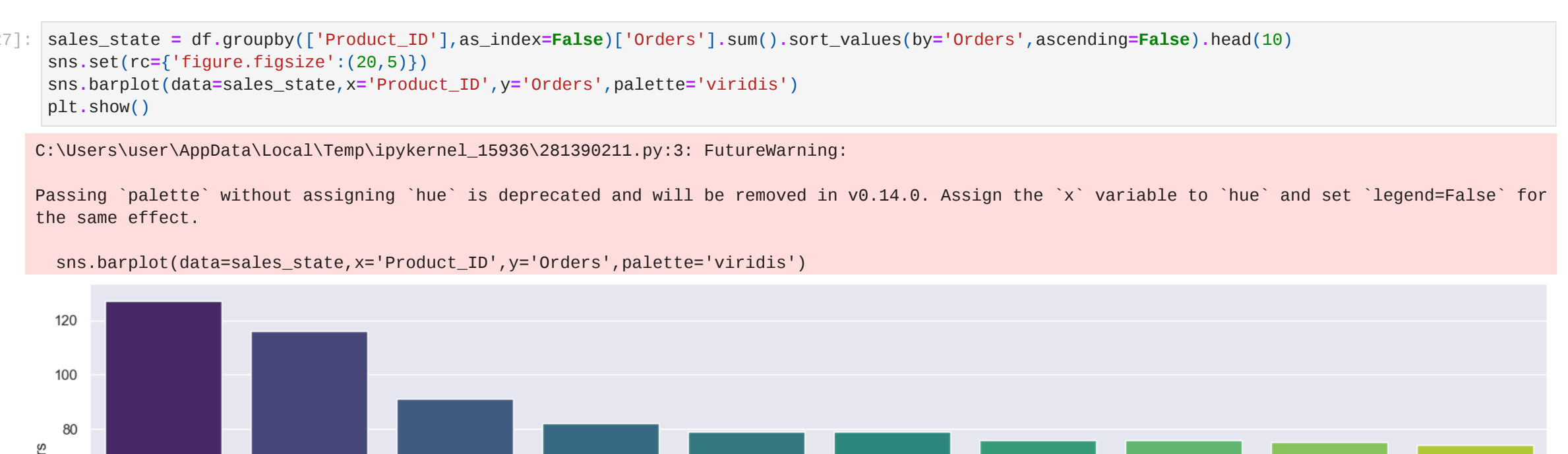
In [25]:
```python
ax = sns.countplot(data=df, x='Product_Category',palette='viridis')
sns.set(rc={'figure.figsize':(20,5)})
for bars in ax.containers:
    ax.bar_label(bars)
```

```
C:\Users\user\AppData\Local\Temp\ipykernel_15936\3553110356.py:1: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

  ax = sns.countplot(data=df, x='Product_Category',palette='viridis')
```



In [26]:
```python
sales_state = df.groupby(['Product_Category'],as_index=False)['Amount'].sum().sort_values(by='Amount',ascending=False).head(10)
sns.set(rc={'figure.figsize':(20,5)})
sns.barplot(data=sales_state,x='Product_Category',y='Amount',palette='viridis')
plt.show()
```

```
C:\Users\user\AppData\Local\Temp\ipykernel_15936\1145278952.py:3: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

  sns.barplot(data=sales_state,x='Product_Category',y='Amount',palette='viridis')
```



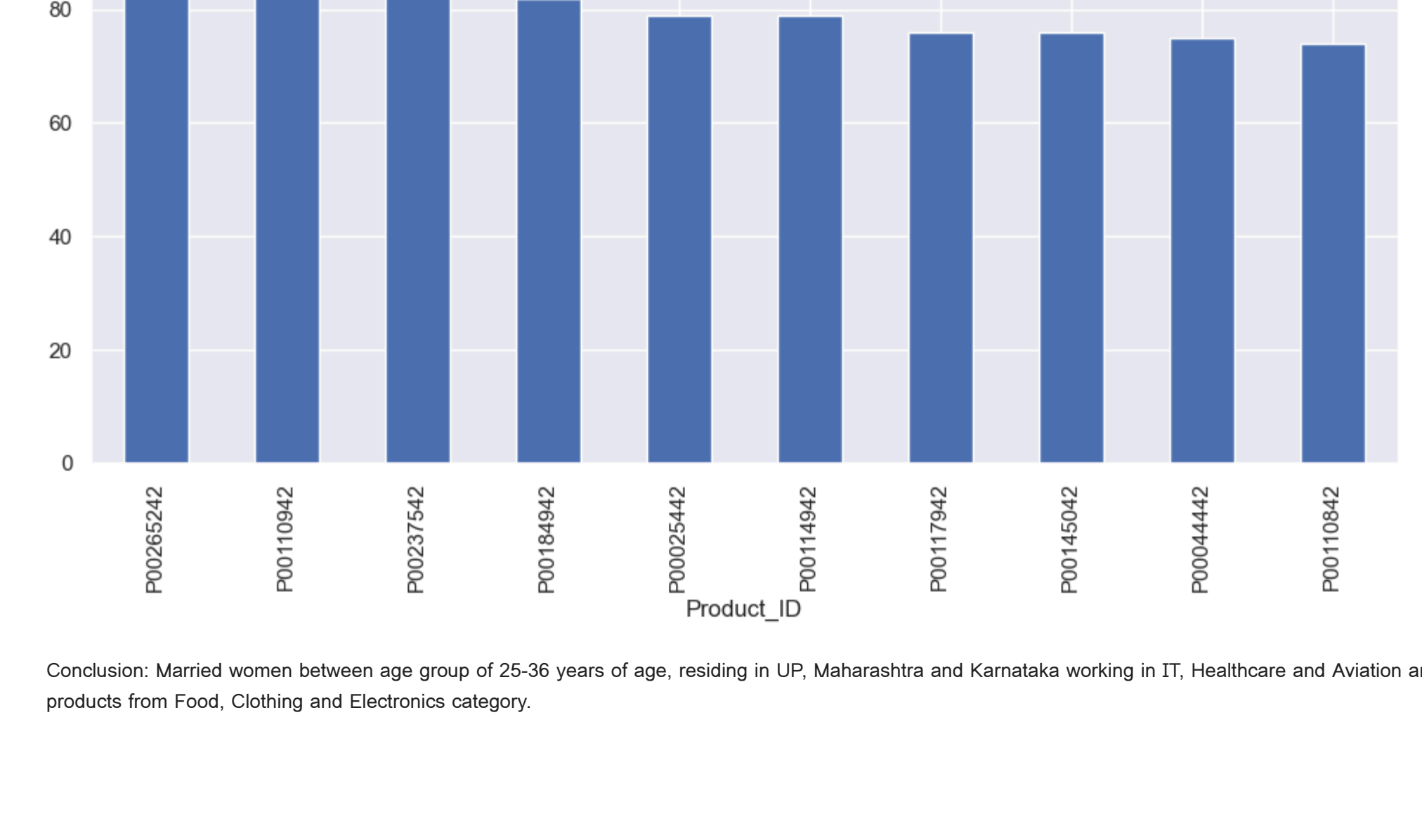
From above graphs we can see that most of the sold products are Food, Clothing and Electronics.

In [27]:
```python
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',palette='viridis')
plt.show()
```

```
C:\Users\user\AppData\Local\Temp\ipykernel_15936\281390211.py:3: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

  sns.barplot(data=sales_state,x='Product_ID',y='Orders',palette='viridis')
```

In [28]:
```python
fig1, ax1 = plt.subplots(figsize=(12,7))
df.groupby('Product_ID')['Orders'].sum().nlargest(10).sort_values(ascending=False).plot(kind='bar')
```

Out[28]: <Axes: xlabel='Product_ID'>



Conclusion: Married women between age group of 25-36 years of age, residing in UP, Maharashtra and Karnataka working in IT, Healthcare and Aviation are more likely to buy products from Food, Clothing and Electronics category.