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1 Task 1: Exploratory Data Analysis (EDA) and Business Insights

1.0.1 1. Perform EDA on the provided dataset.

1.0.2 2. Derive at least 5 business insights from the EDA.

Write these insights in short point-wise sentences (maximum 100 words per insight).

[2]:

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

[3]:

```
# Load the datasets
customers = pd.read_csv('Customers.csv')
products = pd.read_csv('Products.csv')
transactions = pd.read_csv('Transactions.csv')
```

[4]:

```
# Merge datasets for comprehensive analysis
df = pd.merge(transactions, customers, on='CustomerID')
df = pd.merge(df, products, on='ProductID')
```

[5]:

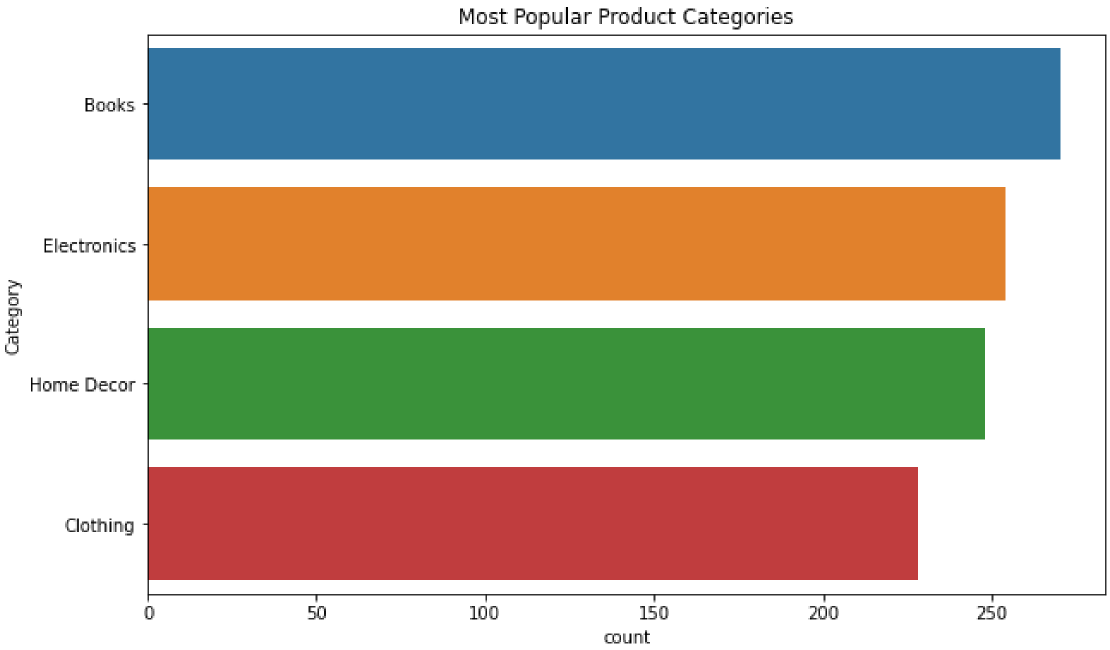
```
# Basic EDA
print(df.info())
print(df.describe())
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 1000 entries, 0 to 999
Data columns (total 13 columns):
 #   Column           Non-Null Count  Dtype
---  ------           --------------  -----
 0   TransactionID    1000 non-null   object
 1   CustomerID       1000 non-null   object
 2   ProductID        1000 non-null   object
 3   TransactionDate  1000 non-null   object
 4   Quantity         1000 non-null   int64
 5   TotalValue       1000 non-null   float64
 6   Price_x          1000 non-null   float64
 7   CustomerName     1000 non-null   object
 8   Region           1000 non-null   object
 9   SignupDate       1000 non-null   object
 10  ProductName      1000 non-null   object
 11  Category         1000 non-null   object
 12  Price_y          1000 non-null   float64
dtypes: float64(3), int64(1), object(9)
memory usage: 109.4+ KB
None
          Quantity   TotalValue     Price_x     Price_y
count  1000.000000  1000.000000  1000.00000  1000.00000
mean      2.537000   689.995560   272.55407   272.55407
std       1.117981   493.144478   140.73639   140.73639
min       1.000000    16.080000    16.08000    16.08000
25%       2.000000   295.295000   147.95000   147.95000
50%       3.000000   588.880000   299.93000   299.93000
75%       4.000000  1011.660000   404.40000   404.40000
max       4.000000  1991.040000   497.76000   497.76000
```

2 Business Insights

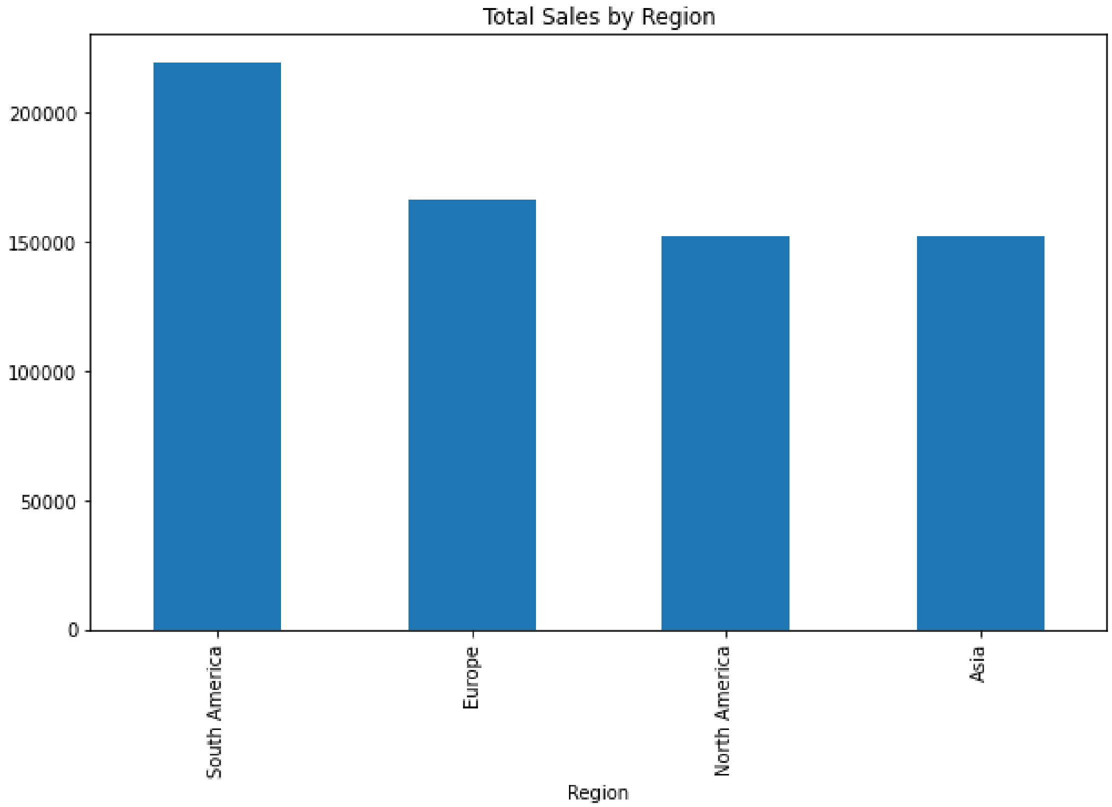
[6]:

```python
# Insight 1: Most popular product categories
plt.figure(figsize=(10, 6))
sns.countplot(y='Category', data=df, order=df['Category'].value_counts().index)
plt.title('Most Popular Product Categories')
plt.show()
```



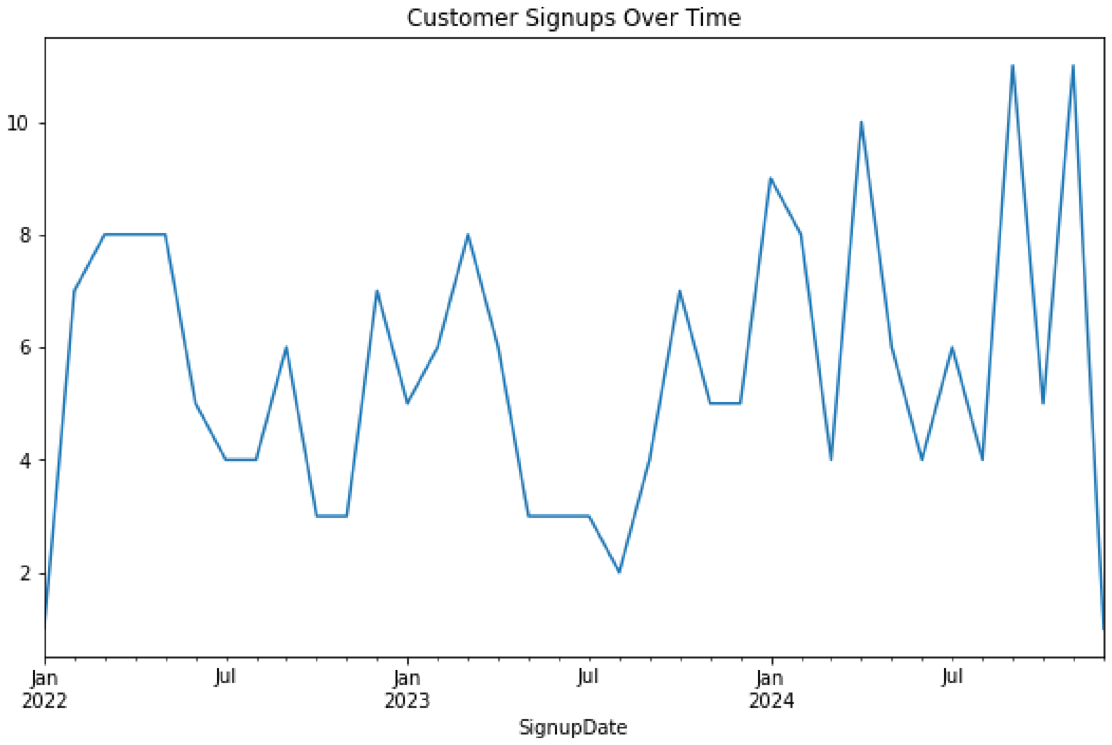
```
[7]: # Insight 2: Total sales by region
     region_sales = df.groupby('Region')['TotalValue'].sum().
      ↪sort_values(ascending=False)
     region_sales.plot(kind='bar', figsize=(10, 6), title='Total Sales by Region')
```

```
[7]: <AxesSubplot:title={'center':'Total Sales by Region'}, xlabel='Region'>
```



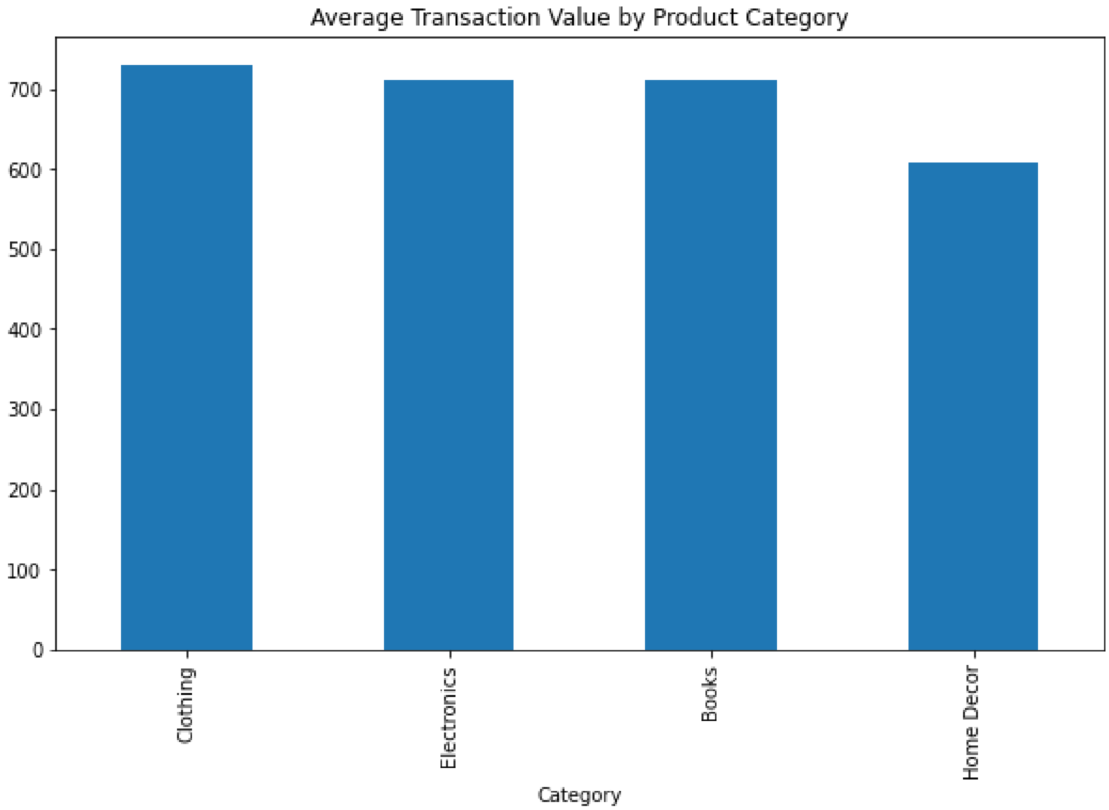
```
[8]: # Insight 3: Customer signups over time
     customers['SignupDate'] = pd.to_datetime(customers['SignupDate'])
     customers.set_index('SignupDate', inplace=True)
     customers.resample('M').size().plot(figsize=(10, 6), title='Customer Signups␣
      ↪Over Time')
```

```
[8]: <AxesSubplot:title={'center':'Customer Signups Over Time'}, xlabel='SignupDate'>
```



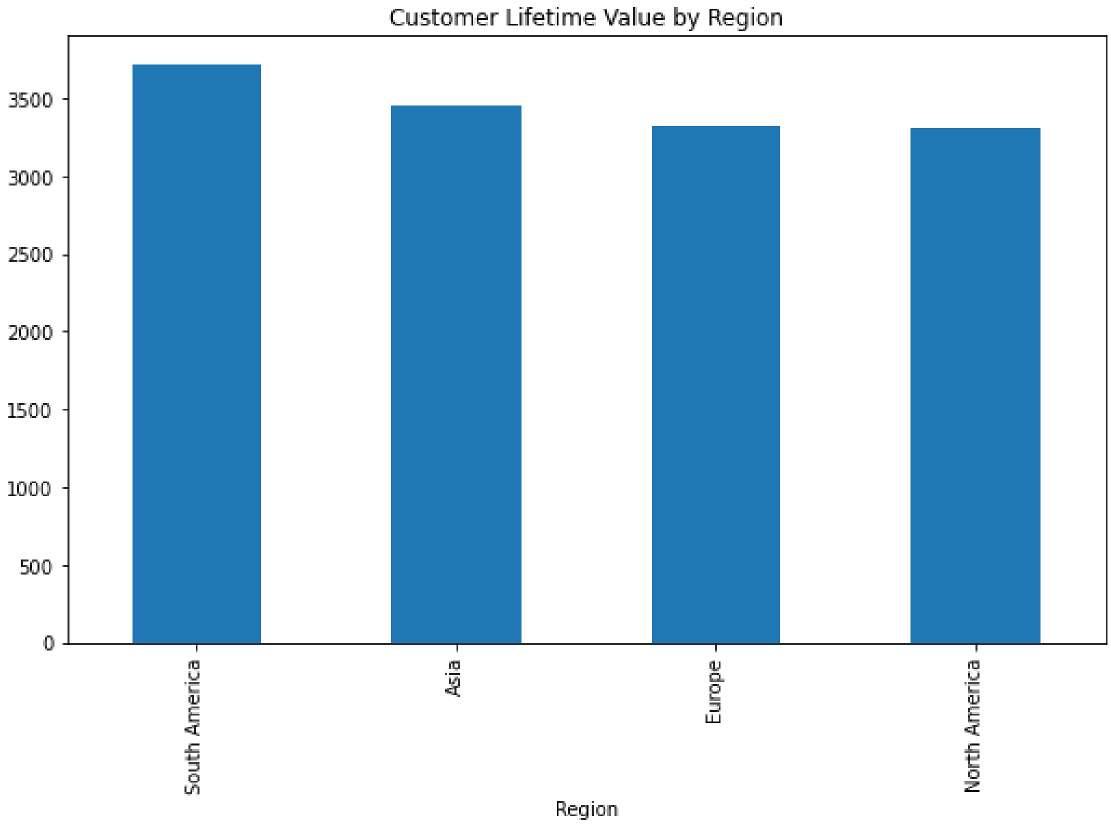
[9]:
```
# Insight 4: Average transaction value by product category
avg_transaction_value = df.groupby('Category')['TotalValue'].mean().
 ↪sort_values(ascending=False)
avg_transaction_value.plot(kind='bar', figsize=(10, 6), title='Average␣
 ↪Transaction Value by Product Category')
```

[9]:
```
<AxesSubplot:title={'center':'Average Transaction Value by Product Category'},
xlabel='Category'>
```



```
[10]: # Insight 5: Customer lifetime value (CLV) by region
      clv = df.groupby('CustomerID')['TotalValue'].sum().reset_index()
      clv = pd.merge(clv, customers.reset_index()[['CustomerID', 'Region']],␣
       ↪on='CustomerID')
      clv.groupby('Region')['TotalValue'].mean().sort_values(ascending=False).
       ↪plot(kind='bar', figsize=(10, 6), title='Customer Lifetime Value by Region')
```

```
[10]: <AxesSubplot:title={'center':'Customer Lifetime Value by Region'},
      xlabel='Region'>
```


Customer Lifetime Value by Region
3500
3000
2500
2000
1500
1000
500
0
South America
Asia
Europe
North America
Region

[ ]: