```python
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import plotly.express as px
import plotly.graph_objects as go

file_path = '/content/consumer_electronics_sales_data.csv'
data = pd.read_csv(file_path)
print(data.head(10))
```

```
   ProductID ProductCategory  ProductBrand  ProductPrice  CustomerAge
\
0       5874     Smartphones  Other Brands    312.949668           18

1       5875   Smart Watches       Samsung    980.389404           35

2       5876         Tablets       Samsung   2606.718293           63

3       5877     Smartphones       Samsung    870.395450           63

4       5878         Tablets          Sony   1798.955875           57

5       5879     Smartphones       Samsung    373.148325           37

6       5880     Smartphones       Samsung   2330.036775           26

7       5881     Smartphones            HP    780.101494           35

8       5882         Laptops  Other Brands   2264.561583           19

9       5883         Laptops            HP   1001.624006           66


   CustomerGender  PurchaseFrequency  CustomerSatisfaction
PurchaseIntent
0               0                  2                     1
0
1               1                  7                     2
1
2               0                  1                     5
1
3               1                 10                     3
1
4               0                 17                     3
0
5               1                  8                     1
1
6               1                  5                     5
1
7               0                 12                     5
```

```
1
8               1                   3                     4
1
9               1                   8                     4
1
```

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 9000 entries, 0 to 8999
Data columns (total 9 columns):
 #   Column                Non-Null Count  Dtype
---  ------                --------------  -----
 0   ProductID             9000 non-null   int64
 1   ProductCategory       9000 non-null   object
 2   ProductBrand          9000 non-null   object
 3   ProductPrice          9000 non-null   float64
 4   CustomerAge           9000 non-null   int64
 5   CustomerGender        9000 non-null   int64
 6   PurchaseFrequency     9000 non-null   int64
 7   CustomerSatisfaction  9000 non-null   int64
 8   PurchaseIntent        9000 non-null   int64
dtypes: float64(1), int64(6), object(2)
memory usage: 632.9+ KB
```

```
data.describe()
```


```
{"summary":"{\n  \"name\": \"data\",\n  \"rows\": 8,\n  \"fields\": [\n    {\n      \"column\": \"ProductID\",\n      \"properties\": {\n\"dtype\": \"number\",\n        \"std\": 3826.462424261394,\n\"min\": 2598.220544911459,\n        \"max\": 14873.0,\n\"num_unique_values\": 7,\n        \"samples\": [\n          9000.0,\n10373.5,\n          12623.25\n        ],\n        \"semantic_type\": \"\",\n        \"description\": \"\"\n      }\n    },\n    {\n\"column\": \"ProductPrice\",\n      \"properties\": {\n\"dtype\": \"number\",\n        \"std\": 2822.6761796613414,\n\"min\": 100.3763582884275,\n        \"max\": 9000.0,\n\"num_unique_values\": 8,\n        \"samples\": [\n1527.4291946773735,\n          1513.0245774706223,\n          9000.0\n],\n        \"semantic_type\": \"\",\n        \"description\": \"\"\n}\n    },\n    {\n      \"column\": \"CustomerAge\",\n\"properties\": {\n        \"dtype\": \"number\",\n        \"std\": 3168.173400424824,\n        \"min\": 15.055083949552753,\n\"max\": 9000.0,\n        \"num_unique_values\": 8,\n\"samples\": [\n          43.347,\n          43.0,\n          9000.0\n],\n        \"semantic_type\": \"\",\n        \"description\": \"\"\n}\n    },\n    {\n      \"column\": \"CustomerGender\",\n\"properties\": {\n        \"dtype\": \"number\",\n        \"std\": 3181.7780656950235,\n        \"min\": 0.0,\n        \"max\": 9000.0,\n\"num_unique_values\": 5,\n        \"samples\": [\n
```

0.5088888888888888,\n   1.0,\n   0.499948757112903\n
],\n   \"semantic_type\": \"\",\n   \"description\": \"\"\n
}\n   },\n   {\n   \"column\": \"PurchaseFrequency\",\n
\"properties\": {\n   \"dtype\": \"number\",\n   \"std\":
3178.6766202140425,\n   \"min\": 1.0,\n   \"max\": 9000.0,\n
\"num_unique_values\": 8,\n   \"samples\": [\n
10.054666666666666,\n   10.0,\n   9000.0\n   ],\n
\"semantic_type\": \"\",\n   \"description\": \"\"\n   }\
n   },\n   {\n   \"column\": \"CustomerSatisfaction\",\n
\"properties\": {\n   \"dtype\": \"number\",\n   \"std\":
3181.0008751283435,\n   \"min\": 1.0,\n   \"max\": 9000.0,\n
\"num_unique_values\": 8,\n   \"samples\": [\n   2.996,\n
3.0,\n   9000.0\n   ],\n   \"semantic_type\": \"\",\n
\"description\": \"\"\n   }\n   },\n   {\n   \"column\":
\"PurchaseIntent\",\n   \"properties\": {\n   \"dtype\":
\"number\",\n   \"std\": 3181.775378614299,\n   \"min\":
0.0,\n   \"max\": 9000.0,\n   \"num_unique_values\": 5,\n
\"samples\": [\n   0.5664444444444444,\n   1.0,\n
0.49559300446236393\n   ],\n   \"semantic_type\": \"\",\n
\"description\": \"\"\n   }\n   }\n]\n}","type":"dataframe"}

```
data.isnull().sum()
```

```
ProductID               0
ProductCategory         0
ProductBrand            0
ProductPrice            0
CustomerAge             0
CustomerGender          0
PurchaseFrequency       0
CustomerSatisfaction    0
PurchaseIntent          0
dtype: int64
```

```
product_category = data['ProductCategory'].value_counts()
print(product_category)
```

```
ProductCategory
Laptops          1842
Smartphones      1841
Smart Watches    1810
Tablets          1769
Headphones       1738
Name: count, dtype: int64
```

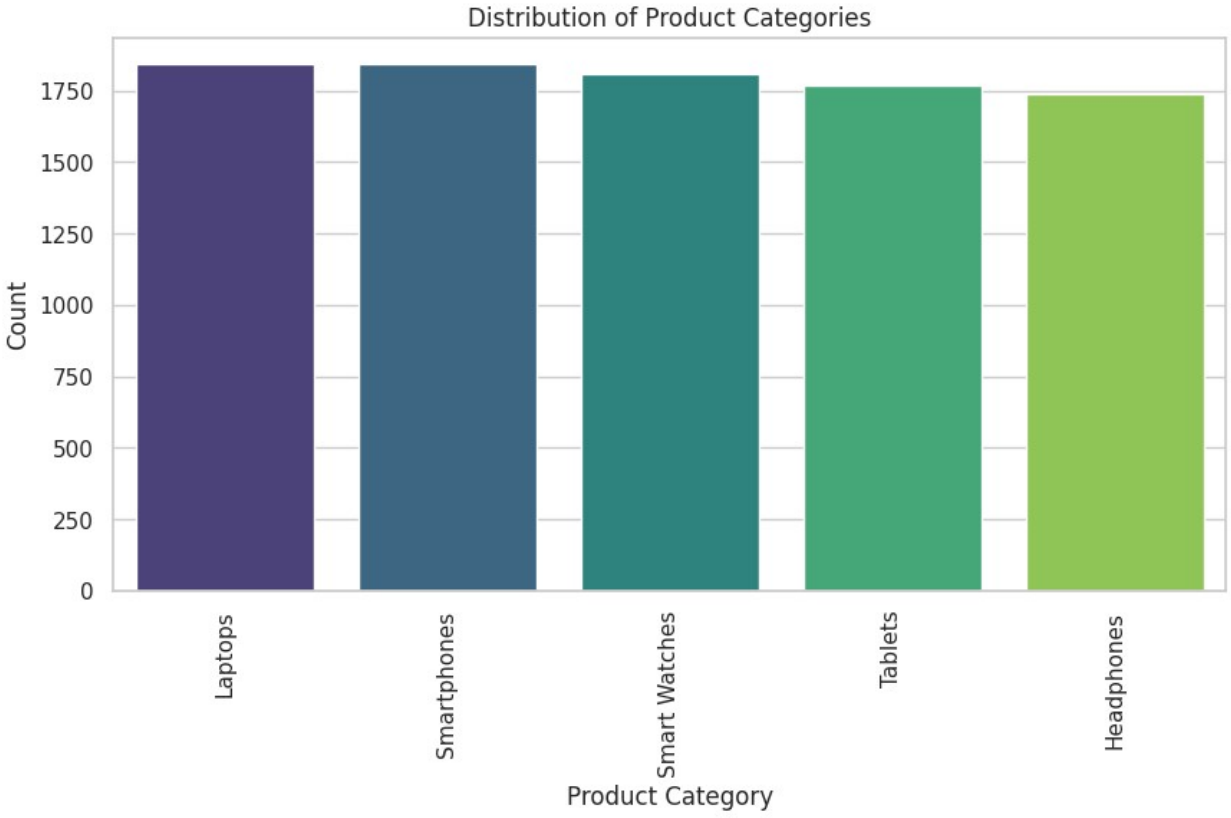
```
sns.set(style="whitegrid")
plt.figure(figsize=(10, 5))
sns.countplot(data=data, x='ProductCategory',
order=data['ProductCategory'].value_counts().index, palette="viridis")
plt.title('Distribution of Product Categories')
```

```
plt.xlabel('Product Category')
plt.ylabel('Count')
plt.xticks(rotation=90)
plt.show()
```

```
<ipython-input-8-1baf84e99fc2>: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.countplot(data=data, x='ProductCategory', order=data['ProductCategory'].value_counts().index, palette="viridis")
```

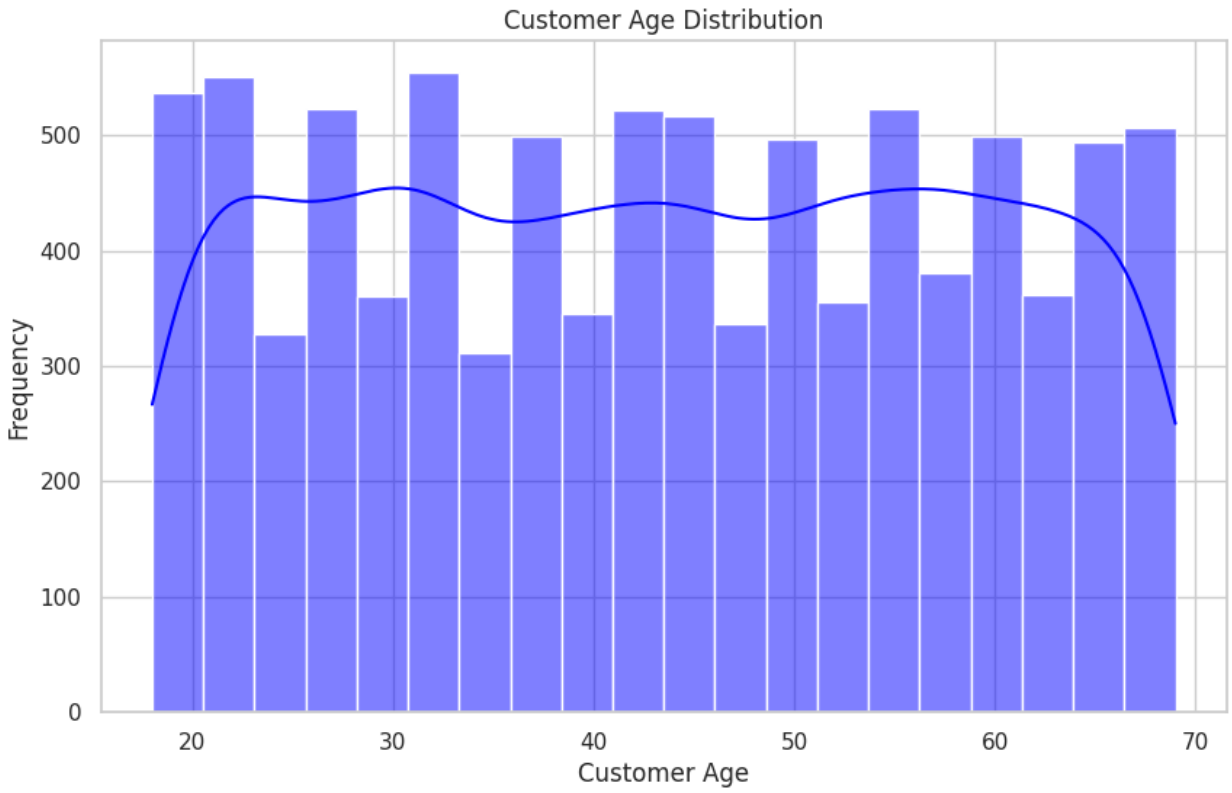



```
df = data['CustomerAge']
print(df.head(10))
```

```
0    18
1    35
2    63
3    63
4    57
5    37
6    26
```

```
7    35
8    19
9    66
Name: CustomerAge, dtype: int64
```

```
plt.figure(figsize=(10, 6))
sns.histplot(df, bins=20, kde=True, color='blue')
plt.title('Customer Age Distribution')
plt.xlabel('Customer Age')
plt.ylabel('Frequency')
plt.show()
```




```
x = data['PurchaseFrequency']
y = data['CustomerSatisfaction']

fig = px.scatter(data, x='PurchaseFrequency',
y='CustomerSatisfaction', color='CustomerGender',
                 title='Purchase Frequency vs. Customer Satisfaction')
fig.update_layout(
    xaxis_title="Purchase Frequency",
    yaxis_title="Customer Satisfaction",
    legend_title="Customer Gender"
)
fig.show()
```

```
fig = px.histogram(data, x='CustomerGender', color='PurchaseIntent',
barmode='group',
                        title='Gender-wise Purchase Intent')
fig.update_layout(
        xaxis_title="Customer Gender",
        yaxis_title="Count",
        legend_title="Purchase Intent")
fig.show()
```