Title : Analyzing Sales Data from Multiple File Formats Tasks to Perform: Obtain sales data files in various formats, such as CSV, Excel, and JSON.

1. Load the sales data from each file format into the appropriate data structures or dataframes.
2. Explore the structure and content of the loaded data, identifying any inconsistencies, missing values, or data quality issues.
3. Perform data cleaning operations, such as handling missing values, removing duplicates, or correcting inconsistencies.
4. Convert the data into a unified format, such as a common dataframe or data structure, to enable seamless analysis.
5. Perform data transformation tasks, such as merging multiple datasets, splitting columns, or deriving new variables.
6. Analyze the sales data by performing descriptive statistics, aggregating data by specific variables, or calculating metrics such as total sales, average order value, or product category distribution.
7. Create visualizations, such as bar plots, pie charts, or box plots, to represent the sales data and gain insights into sales trends, customer behavior, or product performance.

In [1]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import json
import warnings
warnings.filterwarnings('ignore')
```

In [2]:

```
# 1. Load the sales data from each file format into the appropriate data structures
# dataframes.
csv = pd.read_csv('sales_data_sample.csv', encoding="cp1252")
csv.head()
```

Out[2]:

	ORDERNUMBER	QUANTITYORDERED	PRICEEACH	ORDERLINENUMBER	SALES	ORDEF
0	10107	30	95.70	2	2871.00	2/24
1	10121	34	81.35	5	2765.90	5/7
2	10134	41	94.74	2	3884.34	7/1
3	10145	45	83.26	6	3746.70	8/25
4	10159	49	100.00	14	5205.27	10/1C

5 rows × 25 columns

In [3]:

```
excel = pd.read_excel('Sample-Sales-Data.xlsx')
excel.head()
```

Out[3]:

	Postcode	Sales_Rep_ID	Sales_Rep_Name	Year	Value
0	2121	456	Jane	2011	84219.497311
1	2092	789	Ashish	2012	28322.192268
2	2128	456	Jane	2013	81878.997241
3	2073	123	John	2011	44491.142121
4	2134	789	Ashish	2012	71837.720959

In [4]:

```
json = pd.read_json('customers.json')
json.head()
```

Out[4]:

	id	email	first	last	company	created_at	countr
0	1	isidro_von@hotmail.com	Torrey	Veum	Hilll, Mayert and Wolf	2014-12-25 04:06:27.981000+00:00	Switzerlar
1	2	frederique19@gmail.com	Micah	Sanford	Stokes-Reichel	2014-07-03 16:08:17.044000+00:00	Democrat People Republic Kore
2	3	fredy54@gmail.com	Hollis	Swift	Rodriguez, Cartwright and Kuhn	2014-08-18 06:15:16.731000+00:00	Tunis
3	4	braxton29@hotmail.com	Perry	Leffler	Sipes, Feeney and Hansen	2014-07-10 11:31:40.235000+00:00	Cha
4	5	turner59@gmail.com	Janelle	Hagenes	Lesch and Daughters	2014-04-21 15:05:43.229000+00:00	Swazilar

In [5]:

```
# 2. Explore the structure and content of the loaded data, identifying any inconsis
csv.columns
```

Out[5]:

```
Index(['ORDERNUMBER', 'QUANTITYORDERED', 'PRICEEACH', 'ORDERLINENUMBER',
       'SALES', 'ORDERDATE', 'STATUS', 'QTR_ID', 'MONTH_ID', 'YEAR_ID',
       'PRODUCTLINE', 'MSRP', 'PRODUCTCODE', 'CUSTOMERNAME', 'PHONE',
       'ADDRESSLINE1', 'ADDRESSLINE2', 'CITY', 'STATE', 'POSTALCODE',
       'COUNTRY', 'TERRITORY', 'CONTACTLASTNAME', 'CONTACTFIRSTNAME',
       'DEALSIZE'],
      dtype='object')
```

In [6]:

```
excel.columns
```

Out[6]:

```
Index(['Postcode', 'Sales_Rep_ID', 'Sales_Rep_Name', 'Year', 'Value'], dtype='obje
ct')
```

In [7]:

```
json.columns
```

Out[7]:

```
Index(['id', 'email', 'first', 'last', 'company', 'created_at', 'country'], dtype
='object')
```

In [8]:

```
# 3. Perform data cleaning operations, such as handling missing values, removing du
```

Data Cleaning For CSV

In [9]:

```
csv.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2823 entries, 0 to 2822
Data columns (total 25 columns):
 #   Column            Non-Null Count  Dtype  
---  ------            --------------  -----  
 0   ORDERNUMBER       2823 non-null   int64  
 1   QUANTITYORDERED   2823 non-null   int64  
 2   PRICEEACH         2823 non-null   float64
 3   ORDERLINENUMBER   2823 non-null   int64  
 4   SALES             2823 non-null   float64
 5   ORDERDATE         2823 non-null   object 
 6   STATUS            2823 non-null   object 
 7   QTR_ID            2823 non-null   int64  
 8   MONTH_ID          2823 non-null   int64  
 9   YEAR_ID           2823 non-null   int64  
 10  PRODUCTLINE       2823 non-null   object 
 11  MSRP              2823 non-null   int64  
 12  PRODUCTCODE       2823 non-null   object 
 13  CUSTOMERNAME      2823 non-null   object 
 14  PHONE             2823 non-null   object 
 15  ADDRESSLINE1      2823 non-null   object 
 16  ADDRESSLINE2      302 non-null    object 
 17  CITY              2823 non-null   object 
 18  STATE             1337 non-null   object 
 19  POSTALCODE        2747 non-null   object 
 20  COUNTRY           2823 non-null   object 
 21  TERRITORY         1749 non-null   object 
 22  CONTACTLASTNAME   2823 non-null   object 
 23  CONTACTFIRSTNAME  2823 non-null   object 
 24  DEALSIZE          2823 non-null   object 
dtypes: float64(2), int64(7), object(16)
memory usage: 551.5+ KB
```

In [10]:

```
csv.isnull().sum()
```

Out[10]:

```
ORDERNUMBER            0
QUANTITYORDERED        0
PRICEEACH              0
ORDERLINENUMBER        0
SALES                  0
ORDERDATE              0
STATUS                 0
QTR_ID                 0
MONTH_ID               0
YEAR_ID                0
PRODUCTLINE            0
MSRP                   0
PRODUCTCODE            0
CUSTOMERNAME           0
PHONE                  0
ADDRESSLINE1           0
ADDRESSLINE2        2521
CITY                   0
STATE               1486
POSTALCODE            76
COUNTRY                0
TERRITORY           1074
CONTACTLASTNAME        0
CONTACTFIRSTNAME       0
DEALSIZE               0
dtype: int64
```

In [11]:

```
csv['ADDRESSLINE2'] = csv['ADDRESSLINE2'].fillna('Not Available')
csv = csv.drop(columns=['STATE'])
csv['TERRITORY'] = csv['TERRITORY'].fillna('Unknown')
csv = csv.drop(columns=['POSTALCODE'])
csv.isnull().sum()
```

```
Out[11]: ORDERNUMBER         0
         QUANTITYORDERED     0
         PRICEEACH           0
         ORDERLINENUMBER     0
         SALES               0
         ORDERDATE           0
         STATUS              0
         QTR_ID              0
         MONTH_ID            0
         YEAR_ID             0
         PRODUCTLINE         0
         MSRP                0
         PRODUCTCODE         0
         CUSTOMERNAME        0
         PHONE               0
         ADDRESSLINE1        0
         ADDRESSLINE2        0
         CITY                0
         COUNTRY             0
         TERRITORY           0
         CONTACTLASTNAME     0
         CONTACTFIRSTNAME    0
         DEALSIZE            0
         dtype: int64
```

```
In [12]: csv.duplicated().sum()
```

```
Out[12]: 0
```

```
In [13]: csv.describe()
```

Out[13]:

	ORDERNUMBER	QUANTITYORDERED	PRICEEACH	ORDERLINENUMBER	SAL
count	2823.000000	2823.000000	2823.000000	2823.000000	2823.0000
mean	10258.725115	35.092809	83.658544	6.466171	3553.8890
std	92.085478	9.741443	20.174277	4.225841	1841.8651
min	10100.000000	6.000000	26.880000	1.000000	482.1300
25%	10180.000000	27.000000	68.860000	3.000000	2203.4300
50%	10262.000000	35.000000	95.700000	6.000000	3184.8000
75%	10333.500000	43.000000	100.000000	9.000000	4508.0000
max	10425.000000	97.000000	100.000000	18.000000	14082.8000

Data Cleaning For excel

```
In [14]: excel.isnull().sum()
```

```
Out[14]: Postcode          0
         Sales_Rep_ID      0
         Sales_Rep_Name    0
         Year              0
         Value             0
         dtype: int64
```

```
In [15]: excel.duplicated().sum()
```

```
Out[15]: 0
```

```
In [16]: excel.describe()
```

Out[16]:

	Postcode	Sales_Rep_ID	Year	Value
count	390.000000	390.000000	390.000000	390.000000
mean	2098.430769	456.000000	2012.000000	49229.388305
std	58.652206	272.242614	0.817545	28251.271309
min	2000.000000	123.000000	2011.000000	106.360599
25%	2044.000000	123.000000	2011.000000	26101.507357
50%	2097.500000	456.000000	2012.000000	47447.363750
75%	2142.000000	789.000000	2013.000000	72277.800608
max	2206.000000	789.000000	2013.000000	99878.489209

Data Cleaning For JSON

In [17]:

```
json.isnull().sum()
```

Out[17]:

```
id            0
email         0
first         0
last          0
company       0
created_at    0
country       0
dtype: int64
```

In [18]:

```
json.duplicated().sum()
```

Out[18]:

```
0
```

In [19]:

```
json.describe()
```

Out[19]:

	id
count	9999.000000
mean	5000.000000
std	2886.607005
min	1.000000
25%	2500.500000
50%	5000.000000
75%	7499.500000
max	9999.000000

In [20]:

```
# 4. Convert the data into a unified format, such as a common dataframe or data str
unified_data = pd.concat([csv, excel,json], ignore_index=True)
unified_data.head()
```

Out[20]:

	ORDERNUMBER	QUANTITYORDERED	PRICEEACH	ORDERLINENUMBER	SALES	ORDEF
0	10107.0	30.0	95.70	2.0	2871.00	2/24
1	10121.0	34.0	81.35	5.0	2765.90	5/7
2	10134.0	41.0	94.74	2.0	3884.34	7/1
3	10145.0	45.0	83.26	6.0	3746.70	8/25
4	10159.0	49.0	100.00	14.0	5205.27	10/1

5 rows × 35 columns

In [21]:

```
unified_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 13212 entries, 0 to 13211
Data columns (total 35 columns):
 #   Column            Non-Null Count  Dtype
---  ------            --------------  -----
 0   ORDERNUMBER       2823 non-null   float64
 1   QUANTITYORDERED   2823 non-null   float64
 2   PRICEEACH         2823 non-null   float64
 3   ORDERLINENUMBER   2823 non-null   float64
 4   SALES             2823 non-null   float64
 5   ORDERDATE         2823 non-null   object
 6   STATUS            2823 non-null   object
 7   QTR_ID            2823 non-null   float64
 8   MONTH_ID          2823 non-null   float64
 9   YEAR_ID           2823 non-null   float64
 10  PRODUCTLINE       2823 non-null   object
 11  MSRP              2823 non-null   float64
 12  PRODUCTCODE       2823 non-null   object
 13  CUSTOMERNAME      2823 non-null   object
 14  PHONE             2823 non-null   object
 15  ADDRESSLINE1      2823 non-null   object
 16  ADDRESSLINE2      2823 non-null   object
 17  CITY              2823 non-null   object
 18  COUNTRY           2823 non-null   object
 19  TERRITORY         2823 non-null   object
 20  CONTACTLASTNAME   2823 non-null   object
 21  CONTACTFIRSTNAME  2823 non-null   object
 22  DEALSIZE          2823 non-null   object
 23  Postcode          390 non-null    float64
 24  Sales_Rep_ID      390 non-null    float64
 25  Sales_Rep_Name    390 non-null    object
 26  Year              390 non-null    float64
 27  Value             390 non-null    float64
 28  id                9999 non-null   float64
 29  email             9999 non-null   object
 30  first             9999 non-null   object
 31  last              9999 non-null   object
 32  company           9999 non-null   object
 33  created_at        9999 non-null   datetime64[ns, UTC]
 34  country           9999 non-null   object
dtypes: datetime64[ns, UTC](1), float64(14), object(20)
memory usage: 3.5+ MB
```

In [22]:

```
# 5. Perform data transformation tasks, such as merging multiple datasets, splittin
```

In [23]:

```
total_sales = unified_data['SALES'].sum()
print("Total Sales:", total_sales)
```

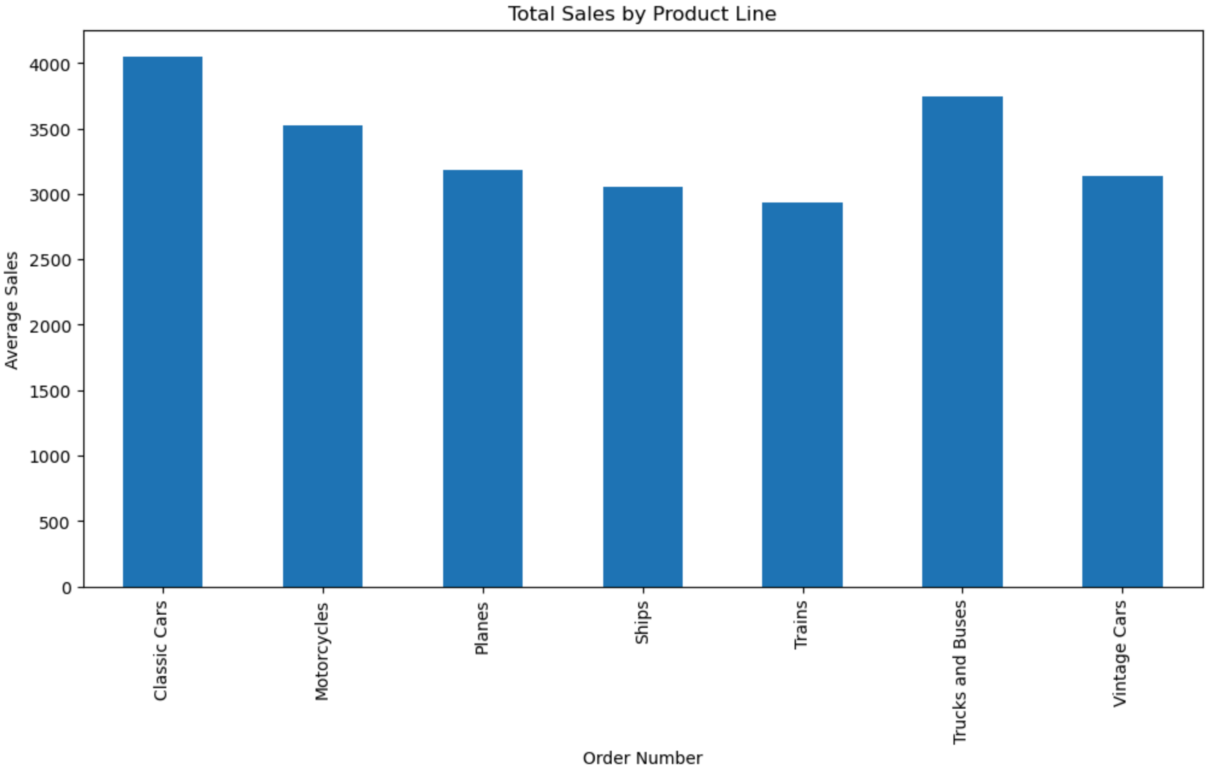
```
Total Sales: 10032628.850000001
```

In [24]:

```python
category_sales = unified_data.groupby('PRODUCTLINE')['SALES'].mean()
```

In [25]:

```python
# Plot mean sales per order
category_sales.plot(kind='bar', figsize=(12,6))

plt.title("Total Sales by Product Line")
plt.xlabel("Order Number")
plt.ylabel("Average Sales")
plt.show()
```



In [26]:

```python
# 6. Analyze the sales data by performing descriptive statistics, aggregating data
# 7. Create visualizations, such as bar plots, pie charts, or box plots, to represe
```

In [27]:

```python
unified_data.columns
```

Out[27]:

```
Index(['ORDERNUMBER', 'QUANTITYORDERED', 'PRICEEACH', 'ORDERLINENUMBER',
       'SALES', 'ORDERDATE', 'STATUS', 'QTR_ID', 'MONTH_ID', 'YEAR_ID',
       'PRODUCTLINE', 'MSRP', 'PRODUCTCODE', 'CUSTOMERNAME', 'PHONE',
       'ADDRESSLINE1', 'ADDRESSLINE2', 'CITY', 'COUNTRY', 'TERRITORY',
       'CONTACTLASTNAME', 'CONTACTFIRSTNAME', 'DEALSIZE', 'Postcode',
       'Sales_Rep_ID', 'Sales_Rep_Name', 'Year', 'Value', 'id', 'email',
       'first', 'last', 'company', 'created_at', 'country'],
      dtype='object')
```

In [28]:

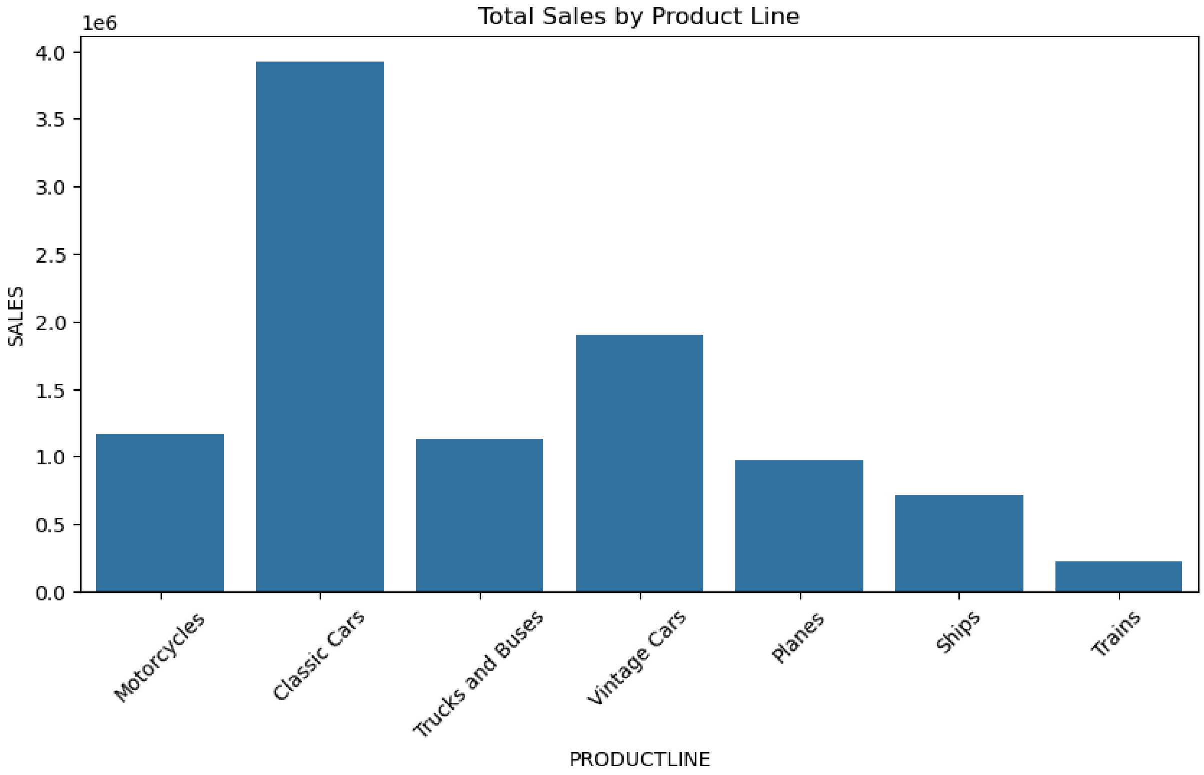
```python
unified_data.duplicated().sum()
```

Out[28]:

```
0
```

In [29]:

```python
plt.figure(figsize=(10,5))
sns.barplot(x="PRODUCTLINE", y="SALES", data=unified_data, estimator=sum, ci=None)
plt.title("Total Sales by Product Line")
plt.xticks(rotation=45)
plt.show()


"""
This means: for each PRODUCTLINE, sum up all the SALES values and display that as t

Default value of estimator is mean, so if you don’t specify, it will show the avera
"""
```

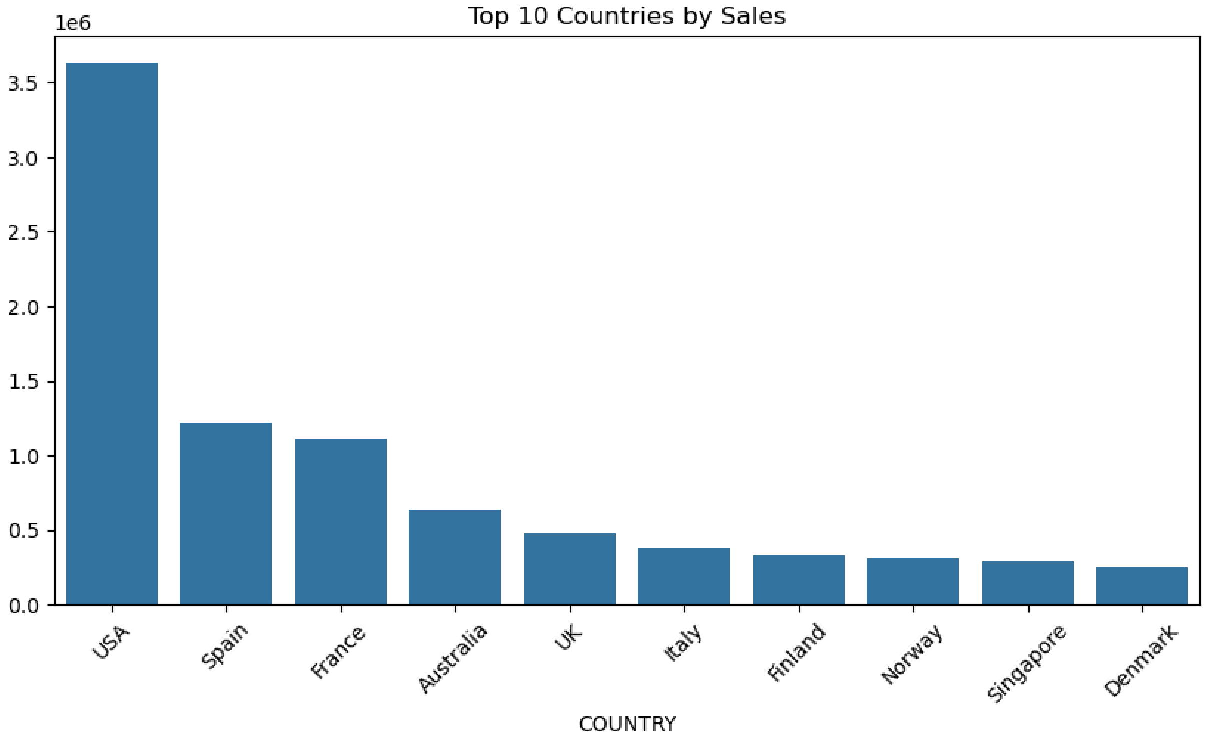


Out[29]:

```
'\nThis means: for each PRODUCTLINE, sum up all the SALES values and display that
as the bar height.\n\nDefault value of estimator is mean, so if you don’t specify,
it will show the average sales per product line instead.\n'
```

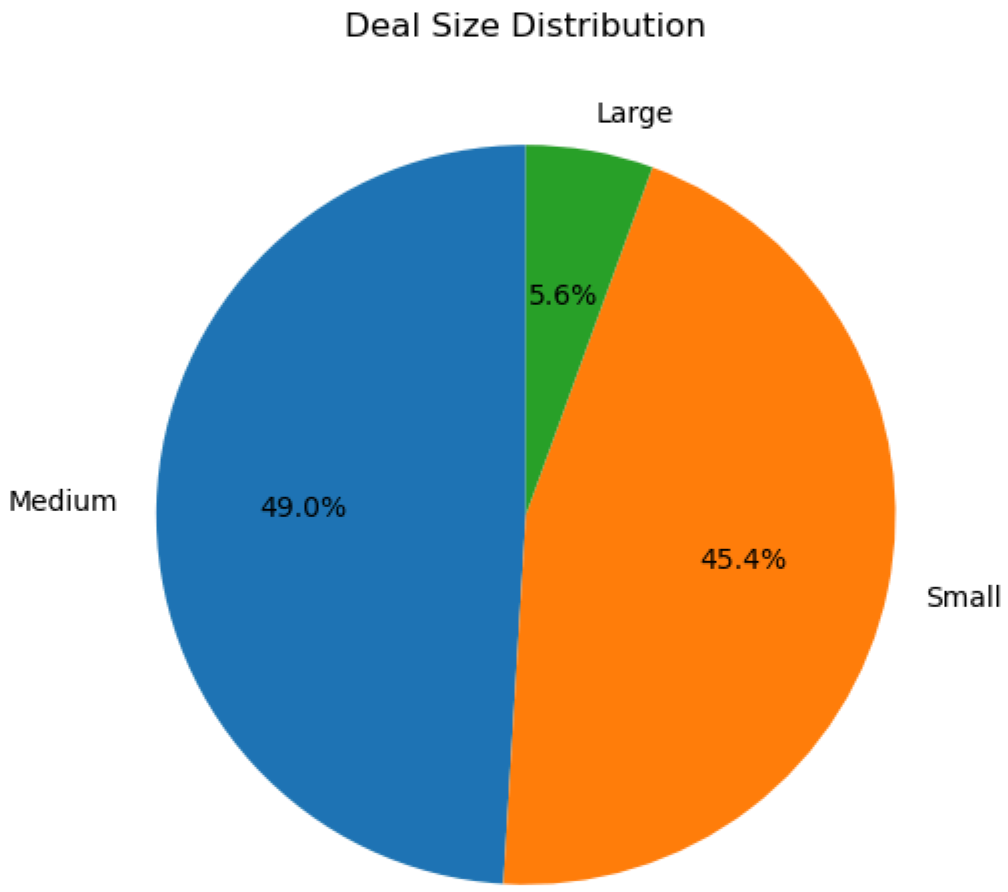
In [30]:

```
# Sales Distribution by Country (Top 10 countries) - Bar Plot

top_countries = unified_data.groupby("COUNTRY")["SALES"].sum().nlargest(10)
plt.figure(figsize=(10,5))
sns.barplot(x=top_countries.index, y=top_countries.values)
plt.title("Top 10 Countries by Sales")
plt.xticks(rotation=45)
plt.show()
```



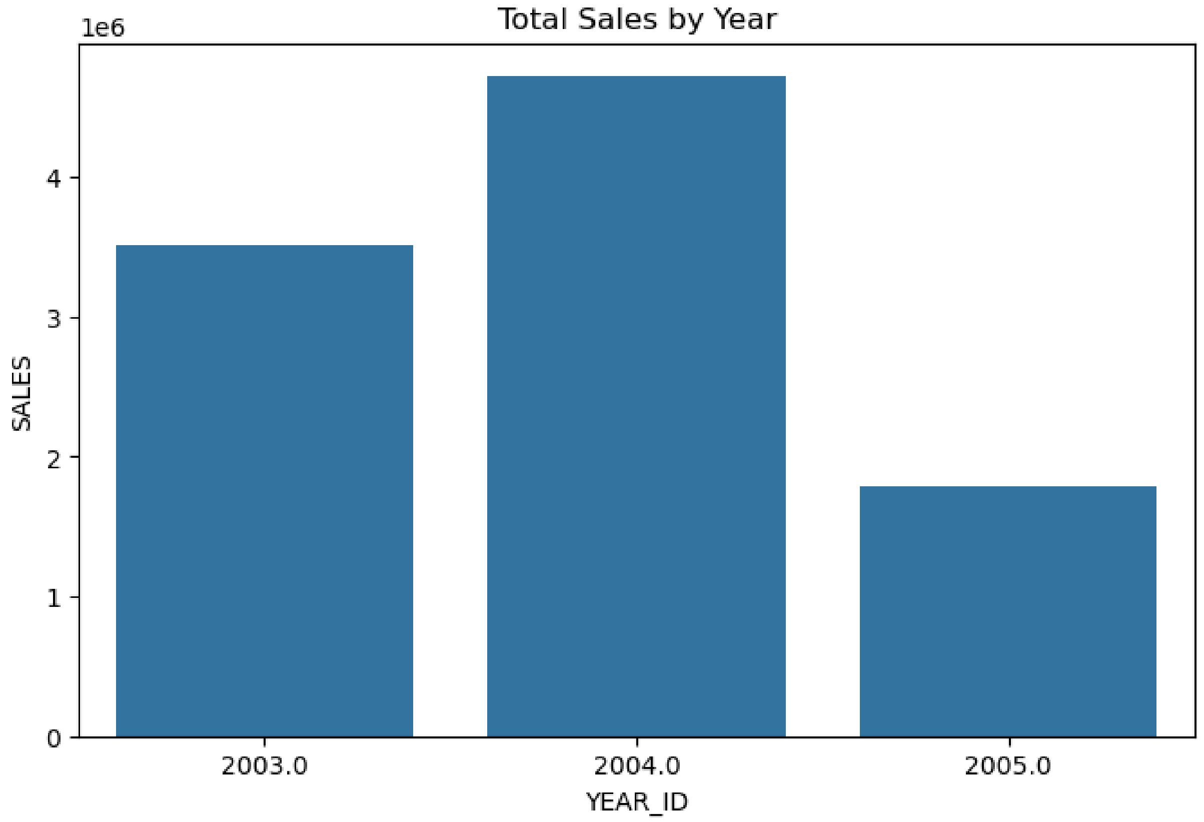
In [31]:

```
# Deal Size Distribution (Pie Chart)

plt.figure(figsize=(6,6))
unified_data["DEALSIZE"].value_counts().plot.pie(autopct='%1.1f%%', startangle=90)
plt.title("Deal Size Distribution")
plt.ylabel("")  # remove y-label
plt.show()
```



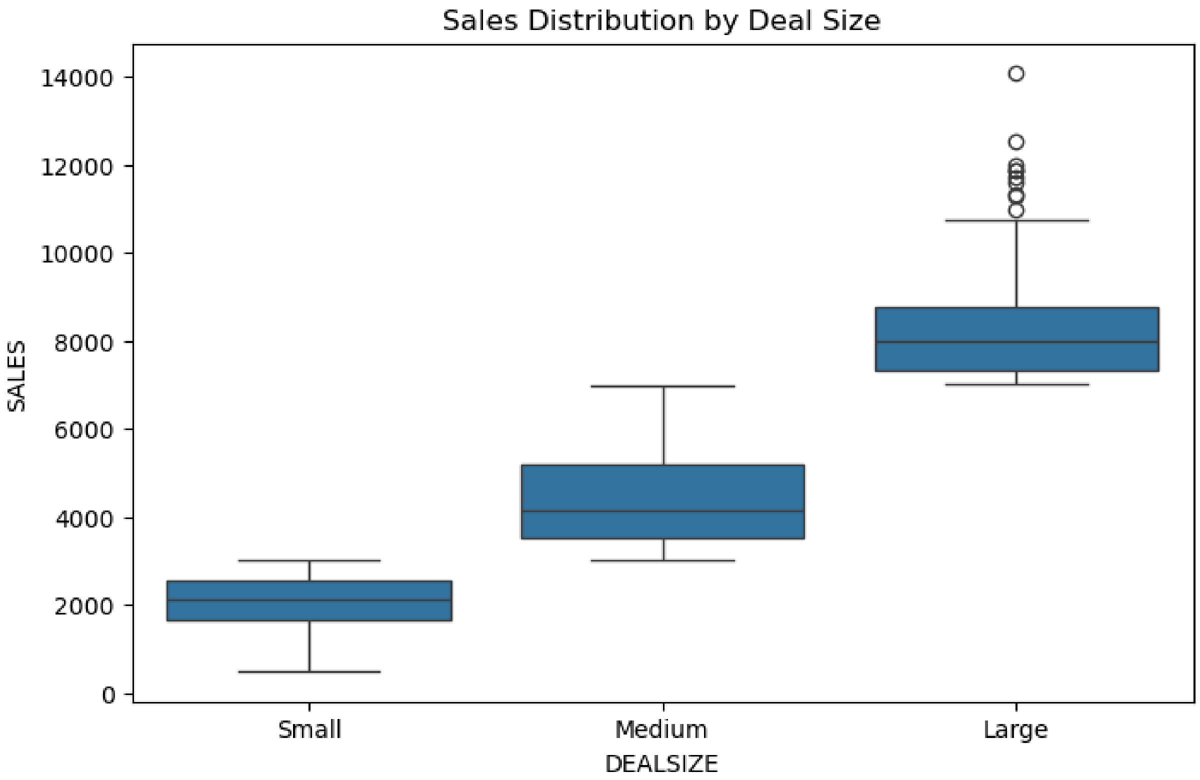
In [32]:

```
#  Sales by Year (Bar Plot)

plt.figure(figsize=(8,5))
sns.barplot(x="YEAR_ID", y="SALES", data=unified_data, estimator=sum, ci=None)
plt.title("Total Sales by Year")
plt.show()
```



In [33]:

```
# Sales Distribution (Box Plot)
plt.figure(figsize=(8,5))
sns.boxplot(x="DEALSIZE", y="SALES", data=unified_data)
plt.title("Sales Distribution by Deal Size")
plt.show()
```


Sales Distribution by Deal Size
SALES
14000
12000
10000
8000
6000
4000
2000
0
Small
Medium
Large
DEALSIZE