Financial Analytics Project by Prachi Khartade

```
#Problem Statement:
#The objective is to identify key metrics and factors that influence a company's market position,
#as well as to uncover meaningful relationships between market capitalization and sales.
```

Data cleaning process

```
import pandas as pd
import numpy as np
```

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

```
import warnings
warnings.filterwarnings('ignore')
```

```
#uploadind dataset and reading it

data=pd.read_csv("Financial Analytics data.csv")
data
```

	S.No.	Name	Mar Cap - Crore	Sales Qtr - Crore	Unnamed: 4
0	1	Reliance Inds.	583436.72	99810.00	NaN
1	2	TCS	563709.84	30904.00	NaN
2	3	HDFC Bank	482953.59	20581.27	NaN
3	4	ITC	320985.27	9772.02	NaN
4	5	H D F C	289497.37	16840.51	NaN
...	...	...	...	...	...
483	496	Lak. Vilas Bank	3029.57	790.17	NaN
484	497	NOCIL	3026.26	249.27	NaN
485	498	Orient Cement	3024.32	511.53	NaN
486	499	Natl.Fertilizer	3017.07	2840.75	NaN
487	500	L T Foods	NaN	NaN	NaN

488 rows × 5 columns

```
data.shape
```

```
(488, 5)
```

```
#Dataset has 488-->rows , 5-->columns
```

```
#All columns

columns=list(data)
columns
```

```
['S.No.', 'Name', 'Mar Cap - Crore', 'Sales Qtr - Crore', 'Unnamed: 4']
```

```
## Displays the first 10 rows

data.head(10)
```

	S.No.	Name	Mar Cap - Crore	Sales Qtr - Crore	Unnamed: 4
0	1	Reliance Inds.	583436.72	99810.00	NaN
1	2	TCS	563709.84	30904.00	NaN
2	3	HDFC Bank	482953.59	20581.27	NaN
3	4	ITC	320985.27	9772.02	NaN
4	5	H D F C	289497.37	16840.51	NaN
5	6	Hind. Unilever	288265.26	8590.00	NaN
6	7	Maruti Suzuki	263493.81	19283.20	NaN
7	8	Infosys	248320.35	17794.00	NaN
8	9	O N G C	239981.50	22995.88	NaN
9	10	St Bk of India	232763.33	57014.08	NaN

```
#summary of data

data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 488 entries, 0 to 487
Data columns (total 5 columns):
 #   Column             Non-Null Count  Dtype  
---  ------             --------------  -----  
 0   S.No.              488 non-null    int64  
 1   Name               488 non-null    object 
 2   Mar Cap - Crore    479 non-null    float64
 3   Sales Qtr - Crore  365 non-null    float64
 4   Unnamed: 4         94 non-null     float64
dtypes: float64(3), int64(1), object(1)
memory usage: 19.2+ KB
```

```
#calculating basic statistics

data.describe()
```

	S.No.	Mar Cap - Crore	Sales Qtr - Crore	Unnamed: 4
count	488.000000	479.000000	365.000000	94.000000
mean	251.508197	28043.857119	4395.976849	1523.870106
std	145.884078	59464.615831	11092.206185	1800.008836
min	1.000000	3017.070000	47.240000	0.000000
25%	122.750000	4843.575000	593.740000	407.167500
50%	252.500000	9885.050000	1278.300000	702.325000
75%	378.250000	23549.900000	2840.750000	2234.815000
max	500.000000	583436.720000	110666.930000	7757.060000

```
#checking null values/missing values

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

```
S.No.                  0
Name                   0
Mar Cap - Crore        9
Sales Qtr - Crore    123
Unnamed: 4           394
dtype: int64
```

```
#conclusion from above methods-
#1. S.no ---> 488 non-null , 0 null/missing values
#2.Name------> 488 non-null, 0 null/missing values
#3.Mar cap-croce--->365 non-null, 9 null/missing values
#4.Unamed 4---->94 non-null, 394 null/missing values

#Need to deal with null vales in Mar cap-crore column.
#Unamed 4 column is irrelevant and needs to drop
#S.no is not neceesaary hence need to drop
```

```
#Dropping Unamed4 column as it is irrelevant and not necessary

data=data.drop(columns=['S.No.', 'Unnamed: 4'])
```

```
data
```

	Name	Mar Cap - Crore	Sales Qtr - Crore
0	Reliance Inds.	583436.72	99810.00
1	TCS	563709.84	30904.00
2	HDFC Bank	482953.59	20581.27
3	ITC	320985.27	9772.02
4	H D F C	289497.37	16840.51
...	...	...	...
483	Lak. Vilas Bank	3029.57	790.17
484	NOCIL	3026.26	249.27
485	Orient Cement	3024.32	511.53
486	Natl.Fertilizer	3017.07	2840.75
487	L T Foods	NaN	NaN

488 rows × 3 columns

```
#Handling missing/null values

# Drop the unnecessary columns
#data_cleaned = data.drop(columns=['S.No.', 'Unnamed: 4'])

# Handle missing values: Drop rows with missing values in 'Mar Cap - Crore' and 'Sales Qtr - Crore'
#data_cleaned = data_cleaned.dropna()

# Display the cleaned data information
#data_cleaned_info = data_cleaned.info()
#data_cleaned_head = data_cleaned.head()

#data_cleaned_info, data_cleaned_head
```

```
#when to use---use drop statement when uh have more than 45% data as empty data or null values.
#Hence dropna() would be appropriate and we need to handle very little missing values and dropping them would not affect much

data=data.dropna()
```

```
data
```

	Name	Mar Cap - Crore	Sales Qtr - Crore
0	Reliance Inds.	583436.72	99810.00
1	TCS	563709.84	30904.00
2	HDFC Bank	482953.59	20581.27
3	ITC	320985.27	9772.02
4	H D F C	289497.37	16840.51
...	...	...	...
482	Prime Focus	3031.50	609.61
483	Lak. Vilas Bank	3029.57	790.17
484	NOCIL	3026.26	249.27
485	Orient Cement	3024.32	511.53
486	Natl.Fertilizer	3017.07	2840.75

365 rows × 3 columns

```
#display clean data information

data_info=data.info()
data_head=data.head(10)
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 365 entries, 0 to 486
Data columns (total 3 columns):
 #   Column            Non-Null Count  Dtype  
---  ------            --------------  -----  
 0   Name              365 non-null    object 
 1   Mar Cap - Crore   365 non-null    float64
 2   Sales Qtr - Crore  365 non-null    float64
dtypes: float64(2), object(1)
memory usage: 11.4+ KB
```

```
data_info,data_head
```

```
(None,
              Name  Mar Cap - Crore  Sales Qtr - Crore
 0  Reliance Inds.        583436.72           99810.00
 1             TCS        563709.84           30904.00
 2       HDFC Bank        482953.59           20581.27
 3             ITC        320985.27            9772.02
 4         H D F C        289497.37           16840.51
 5  Hind. Unilever        288265.26            8590.00
 6   Maruti Suzuki        263493.81           19283.20
 7         Infosys        248320.35           17794.00
 8         O N G C        239981.50           22995.88
 9  St Bk of India        232763.33           57014.08)
```

```
#checking null values/missing values

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

```
Name                 0
Mar Cap - Crore      0
Sales Qtr - Crore    0
dtype: int64
```

```
# Check for duplicate entries
duplicate_entries = data.duplicated().sum()

duplicate_entries
```

```
0
```

```
data
```

	Name	Mar Cap - Crore	Sales Qtr - Crore	Mar Cap to Sales Ratio	Cap Category
0	Reliance Inds.	583436.72	99810.00	5.845474	Large Cap
1	TCS	563709.84	30904.00	18.240676	Large Cap
2	HDFC Bank	482953.59	20581.27	23.465685	Large Cap
3	ITC	320985.27	9772.02	32.847382	Large Cap
4	H D F C	289497.37	16840.51	17.190535	Large Cap
...	...	...	...	...	...
482	Prime Focus	3031.50	609.61	4.972851	Small Cap
483	Lak. Vilas Bank	3029.57	790.17	3.834074	Small Cap
484	NOCIL	3026.26	249.27	12.140490	Small Cap
485	Orient Cement	3024.32	511.53	5.912302	Small Cap
486	Natl.Fertilizer	3017.07	2840.75	1.062068	Small Cap

365 rows × 5 columns

Data is cleaned and now we will proceed with further process

```
#converting clean data file into csv .
```

```
data.to_csv('cleaned_data.csv',index=False)
```

```
data_info1 = data.info()
data_head1 = data.head()

data_info1, data_head1
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 365 entries, 0 to 486
Data columns (total 3 columns):
 #   Column             Non-Null Count  Dtype  
---  ------             --------------  -----  
 0   Name               365 non-null    object 
 1   Mar Cap - Crore    365 non-null    float64
 2   Sales Qtr - Crore  365 non-null    float64
dtypes: float64(2), object(1)
memory usage: 11.4+ KB
(None,
              Name  Mar Cap - Crore  Sales Qtr - Crore
 0  Reliance Inds.        583436.72           99810.00
 1             TCS        563709.84           30904.00
 2       HDFC Bank        482953.59           20581.27
 3             ITC        320985.27            9772.02
 4         H D F C        289497.37           16840.51)
```

Outliers

```
#Let's analyze the outliers in both the "Mar Cap - Crore" and "Sales Qtr - Crore" columns to see if any of them require special attentic

#I'll identify the companies with the highest and lowest values to better understand the distribution. Then, I'll proceed with data trar


# Identify companies with the highest and lowest market cap and sales
highest_market_cap = data.nlargest(5, 'Mar Cap - Crore')
lowest_market_cap = data.nsmallest(5, 'Mar Cap - Crore')

highest_sales = data.nlargest(5, 'Sales Qtr - Crore')
lowest_sales = data.nsmallest(5, 'Sales Qtr - Crore')

highest_market_cap, lowest_market_cap, highest_sales, lowest_sales
```

```
(             Name  Mar Cap - Crore  Sales Qtr - Crore
 0  Reliance Inds.        583436.72           99810.00
 1             TCS        563709.84           30904.00
 2       HDFC Bank        482953.59           20581.27
 3             ITC        320985.27            9772.02
 4         H D F C        289497.37           16840.51,
                  Name  Mar Cap - Crore  Sales Qtr - Crore
 486  Natl.Fertilizer          3017.07            2840.75
 485    Orient Cement          3024.32             511.53
 484            NOCIL          3026.26             249.27
 483  Lak. Vilas Bank          3029.57             790.17
 482      Prime Focus          3031.50             609.61,
                Name  Mar Cap - Crore  Sales Qtr - Crore
 14         I O C L        178017.48          110666.93
 0   Reliance Inds.        583436.72           99810.00
 23     Tata Motors        117071.87           74156.07
 27         B P C L         98278.00           60616.36
 54         H P C L         58034.78           57474.25,
                   Name  Mar Cap - Crore  Sales Qtr - Crore
 467  Central Dep. Ser          3316.31              47.24
 455       La Opala RG          3510.93              69.77
 478   Kaveri Seed Co.          3125.83              70.64
 463   Thyrocare Tech.          3374.38              77.84
 445           I T D C          3619.04             102.14)
```

Data transformation

```
#create market cap to sales ratio

#data['Mar Cap to Sales Ratio']=data['Mar Cap - Crore'] / data['Sales Qtr - Crore']

data.loc[:, 'Mar Cap to Sales Ratio'] = data['Mar Cap - Crore'] / data['Sales Qtr - Crore']
```

```
#summary statistics
summary_stats=data.describe

summary_stats
```

```
<bound method NDFrame.describe of                  Name  Mar Cap - Crore  Sales Qtr - Crore  \
0     Reliance Inds.        583436.72           99810.00   
1                TCS        563709.84           30904.00   
2          HDFC Bank        482953.59           20581.27   
3                ITC        320985.27            9772.02   
4            H D F C        289497.37           16840.51   
```

```
..                ...             ...                ...
482      Prime Focus          3031.50             609.61
483  Lak. Vilas Bank          3029.57             790.17
484            NOCIL          3026.26             249.27
485    Orient Cement          3024.32             511.53
486  Natl.Fertilizer          3017.07            2840.75

     Mar Cap to Sales Ratio Cap Category
0                  5.845474    Large Cap
1                 18.240676    Large Cap
2                 23.465685    Large Cap
3                 32.847382    Large Cap
4                 17.190535    Large Cap
..                      ...          ...
482                4.972851    Small Cap
483                3.834074    Small Cap
484               12.140490    Small Cap
485                5.912302    Small Cap
486                1.062068    Small Cap

[365 rows x 5 columns]>
```

```
#categorixe companies based on market cap

#defining thresholds for categorization
#taking vales of thresholds iamginnary
large_ct=50000
mid_ct=10000

def categorize_company(market_cap):
    if market_cap > large_ct:
        return 'Large Cap'
    elif market_cap > mid_ct:
        return 'Mid Cap'
    else :
        return 'Small Cap'


#this line applies the categorize_company function to each value in the 'Mar Cap - Crore' column of the data DataFrame
#and creates a new column 'Cap Category' to store the results.
#data['Cap Category']=data['Mar Cap - Crore'].apply(categorize_company)
data.loc[:, 'Cap Category'] = data['Mar Cap - Crore'].apply(categorize_company)
```

```
data.head
```

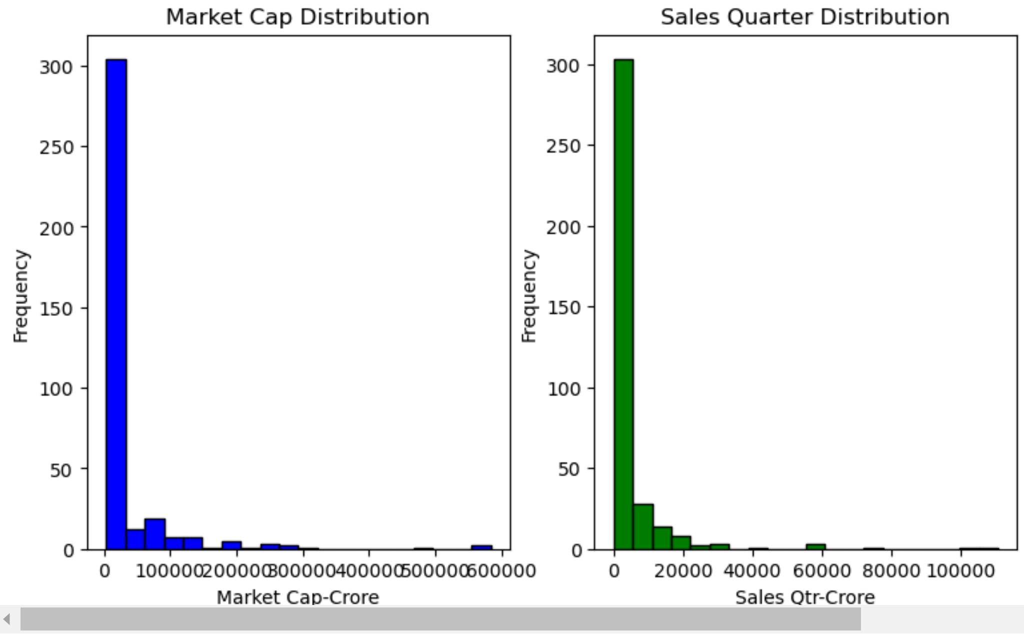
```
<bound method NDFrame.head of                  Name  Mar Cap - Crore  Sales Qtr - Crore  \
0     Reliance Inds.        583436.72           99810.00
1                TCS        563709.84           30904.00
2          HDFC Bank        482953.59           20581.27
3                ITC        320985.27            9772.02
4            H D F C        289497.37           16840.51
..                ...             ...                ...
482      Prime Focus          3031.50             609.61
483  Lak. Vilas Bank          3029.57             790.17
484            NOCIL          3026.26             249.27
485    Orient Cement          3024.32             511.53
486  Natl.Fertilizer          3017.07            2840.75

     Mar Cap to Sales Ratio Cap Category
0                  5.845474    Large Cap
1                 18.240676    Large Cap
2                 23.465685    Large Cap
3                 32.847382    Large Cap
4                 17.190535    Large Cap
..                      ...          ...
482                4.972851    Small Cap
483                3.834074    Small Cap
484               12.140490    Small Cap
485                5.912302    Small Cap
486                1.062068    Small Cap

[365 rows x 5 columns]>
```

```
#Correlation matrix

# Select only numerical columns
numerical_data = data.select_dtypes(include=['float64', 'int64'])

# Calculate the correlation matrix
correlation_matrix = numerical_data.corr()

# Display the correlation matrix
correlation_matrix
```

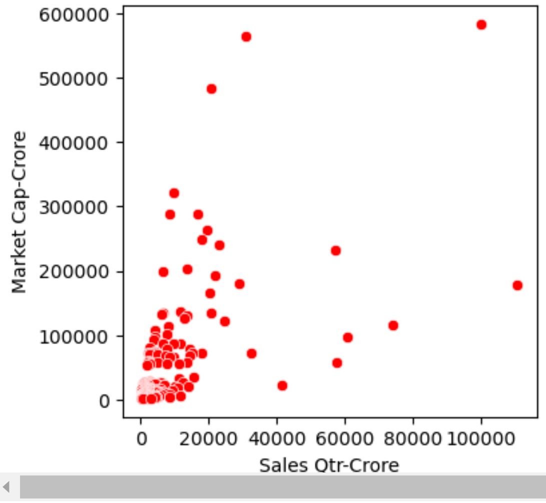
	Mar Cap - Crore	Sales Qtr - Crore	Mar Cap to Sales Ratio
Mar Cap - Crore	1.000000	0.620702	0.097460
Sales Qtr - Crore	0.620702	1.000000	-0.190282
Mar Cap to Sales Ratio	0.097460	-0.190282	1.000000

Data analysis and visualization

```
#Histogram of numeric columns
plt.figure(figsize=(9,5))

plt.subplot(1,2,1)


plt.hist(data['Mar Cap - Crore'],bins=20,color='blue',edgecolor='black')
plt.title('Market Cap Distribution')
plt.xlabel('Market Cap-Crore')
plt.ylabel("Frequency")

plt.subplot(1,2,2)
plt.hist(data['Sales Qtr - Crore'],bins=20,color='green',edgecolor='black')
plt.title('Sales Quarter Distribution')
plt.xlabel('Sales Qtr-Crore')
plt.ylabel('Frequency')

plt.tight_layout
plt.show()
```



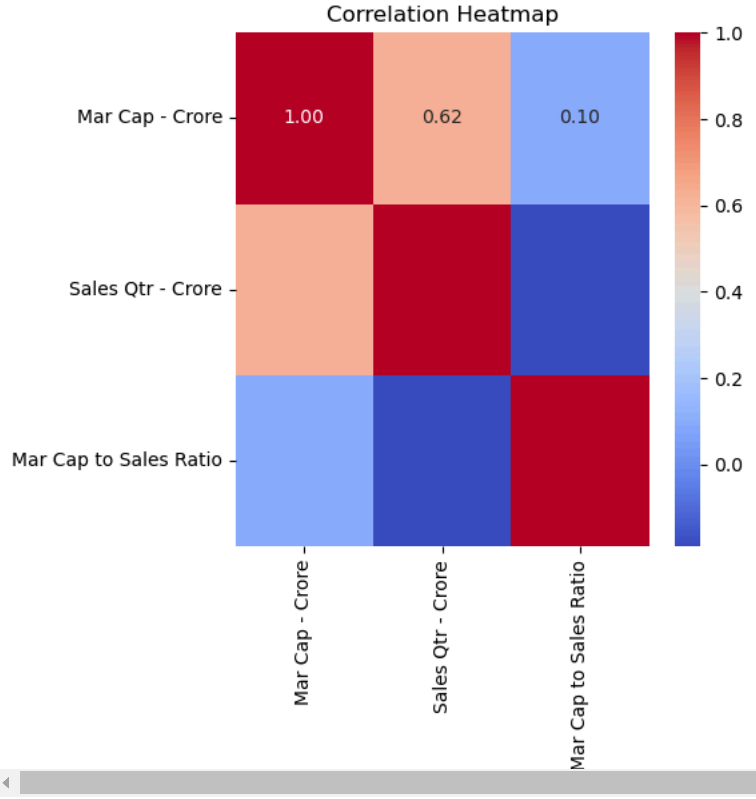
```
#Scatter plot to see the realationship between market cap and sales

plt.figure(figsize=(4,4))
sns.scatterplot(x='Sales Qtr - Crore',y='Mar Cap - Crore',data=data,color='red')
plt.xlabel('Sales Qtr-Crore')
plt.ylabel('Market Cap-Crore')
plt.show()
```



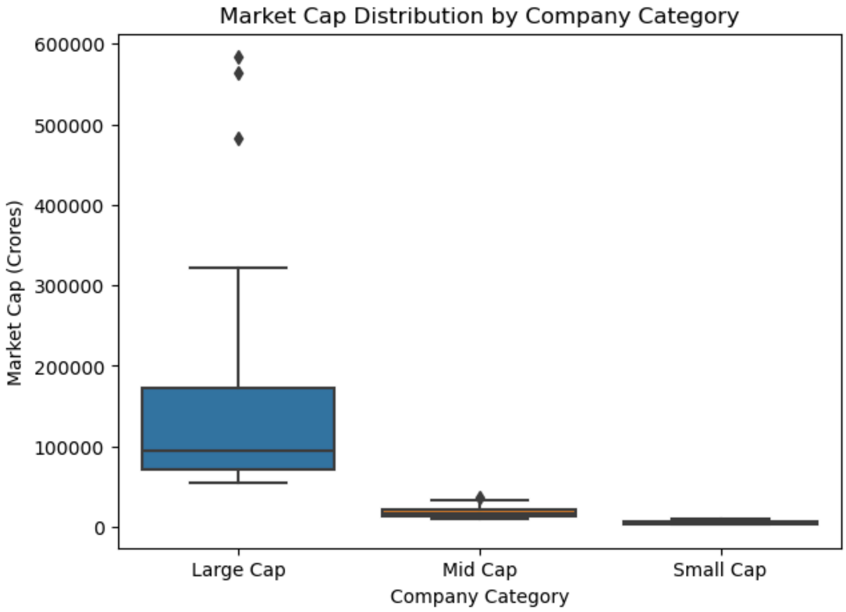
```
#Correlation matrix

# Select only numerical columns
numerical_data = data.select_dtypes(include=['float64', 'int64'])

# Calculate the correlation matrix
correlation_matrix = numerical_data.corr()

# Display the correlation matrix
correlation_matrix
```

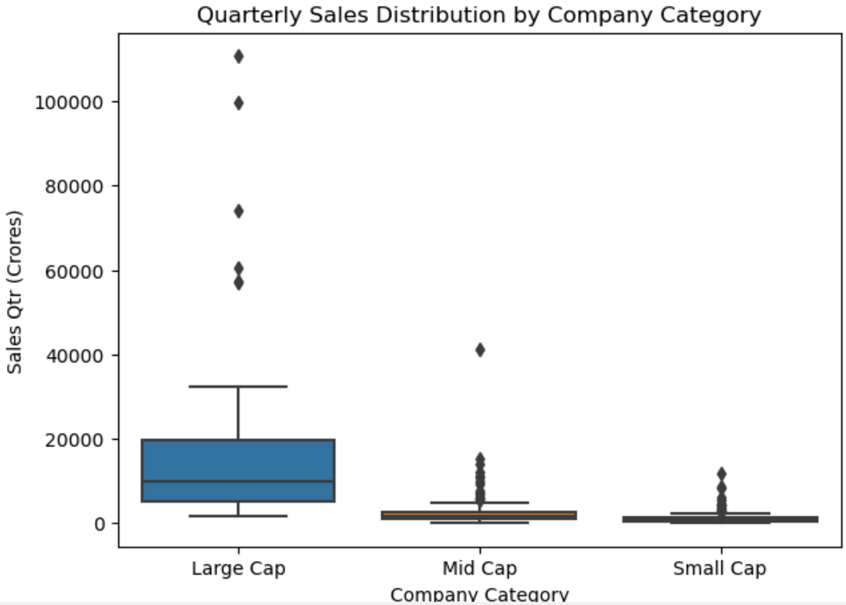
	Mar Cap - Crore	Sales Qtr - Crore
Mar Cap - Crore	1.000000	0.620702
Sales Qtr - Crore	0.620702	1.000000

```
#Correlation heatmap

#Understanding the correlation between different financial metrics can reveal how they are related.

plt.figure(figsize=(5,5))
sns.heatmap(data[['Mar Cap - Crore' , 'Sales Qtr - Crore' , 'Mar Cap to Sales Ratio']].corr()
           , annot=True , cmap='coolwarm', fmt='.2f')
plt.title('Correlation Heatmap')
plt.show()
```

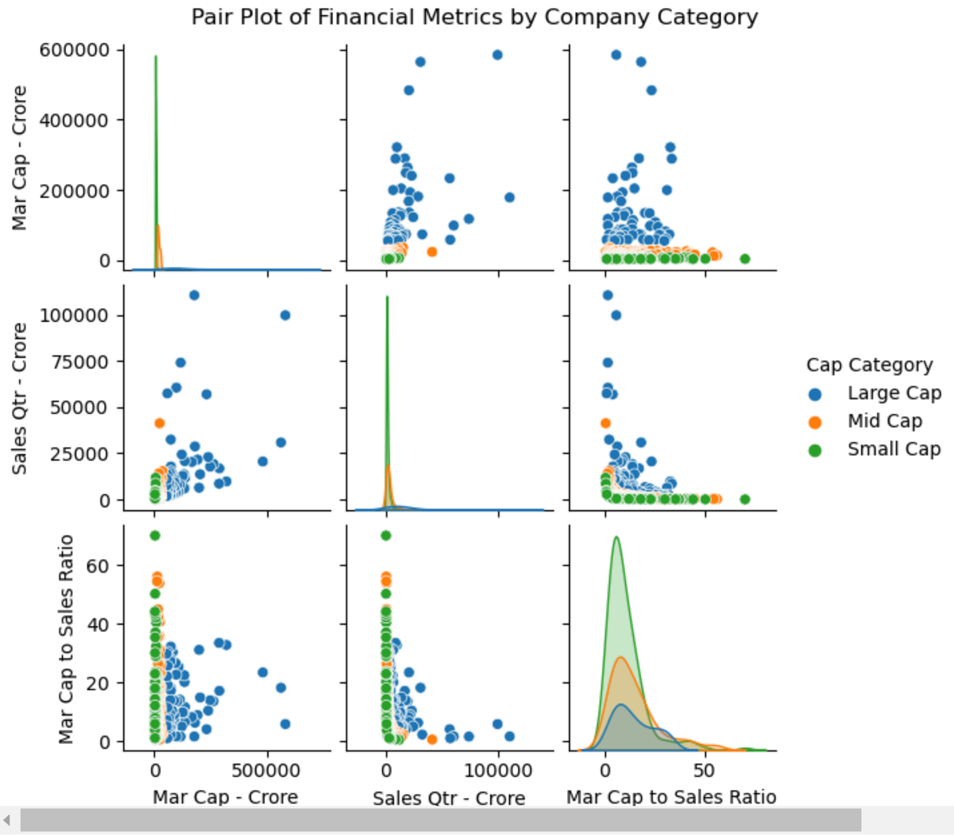


```
#Box plt: Market Cap and sales by Categpory

#A box plot is useful for visualizing the distribution and identifying outliers within categories.

plt.figure(figsize=(7, 5))
sns.boxplot(x='Cap Category', y='Mar Cap - Crore', data=data)
plt.title('Market Cap Distribution by Company Category')
plt.xlabel('Company Category')
plt.ylabel('Market Cap (Crores)')
plt.show()
print()
print()
plt.figure(figsize=(7, 5))
sns.boxplot(x='Cap Category', y='Sales Qtr - Crore', data=data)
plt.title('Quarterly Sales Distribution by Company Category')
plt.xlabel('Company Category')
plt.ylabel('Sales Qtr (Crores)')
plt.show()
```

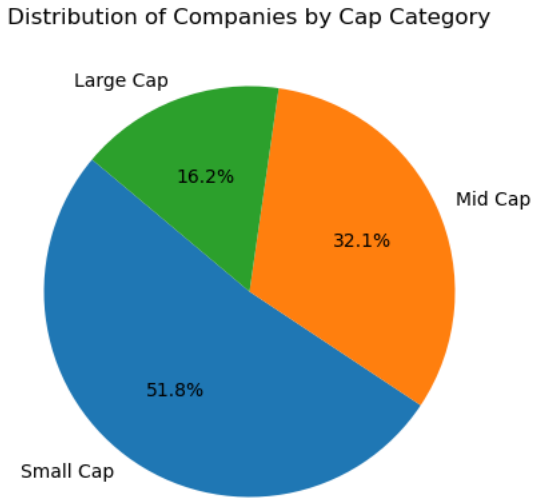




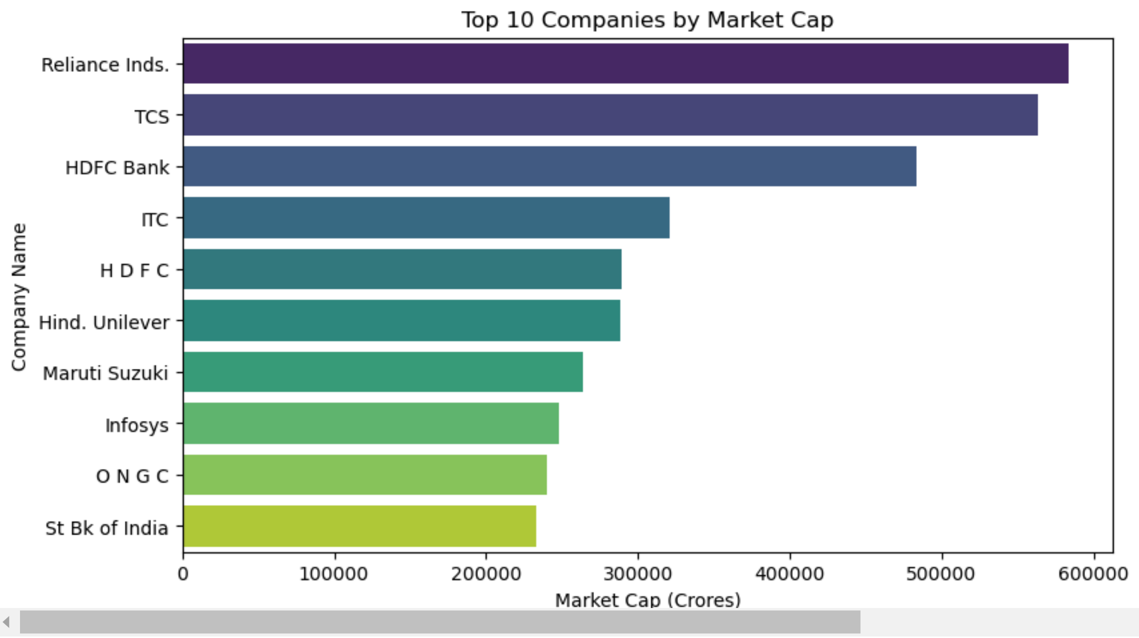
```
#Pair plot

#A pair plot allows you to see the relationships and distributions for multiple numerical variables in one view.

sns.pairplot(data, vars=['Mar Cap - Crore', 'Sales Qtr - Crore', 'Mar Cap to Sales Ratio'], hue='Cap Category',height=2)
plt.suptitle('Pair Plot of Financial Metrics by Company Category', y=1.02)
plt.show()
```



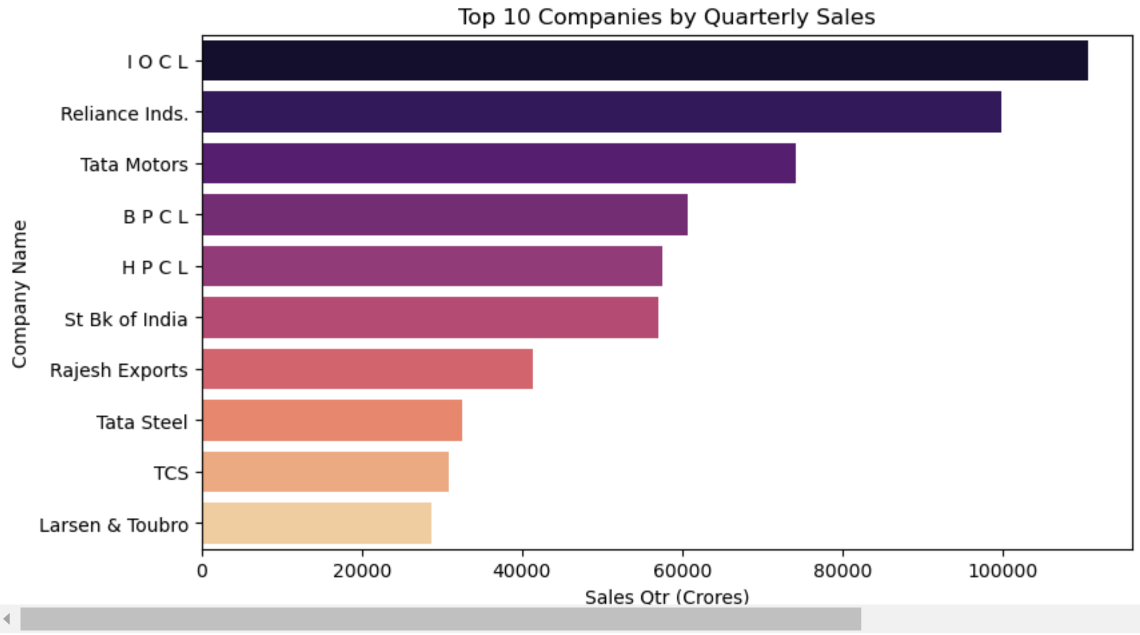
```
import matplotlib.pyplot as plt

# Count the number of companies in each category
category_counts = data['Cap Category'].value_counts()

# Plot a pie chart
plt.figure(figsize=(5, 5))
plt.pie(category_counts, labels=category_counts.index, autopct='%1.1f%%', startangle=140)
plt.title('Distribution of Companies by Cap Category')
plt.show()
```



```
#Bar Plot: Top 10 Companies by Market Cap
#Identify the top 10 companies by market capitalization and visualize them.

top_10_market_cap = data.nlargest(10, 'Mar Cap - Crore')

plt.figure(figsize=(9, 5))
sns.barplot(x='Mar Cap - Crore', y='Name', data=top_10_market_cap, palette='viridis')
plt.title('Top 10 Companies by Market Cap')
plt.xlabel('Market Cap (Crores)')
plt.ylabel('Company Name')
plt.show()
```



```
#Bar Plot: Top 10 Companies by Sales
#Similar to the market cap, you can analyze the top 10 companies by quarterly sales

top_10_sales = data.nlargest(10, 'Sales Qtr - Crore')

plt.figure(figsize=(9, 5))
sns.barplot(x='Sales Qtr - Crore', y='Name', data=top_10_sales, palette='magma')
plt.title('Top 10 Companies by Quarterly Sales')
plt.xlabel('Sales Qtr (Crores)')
plt.ylabel('Company Name')
plt.show()
```



```
# Market Cap to Sales Ratio Analysis
#Visualize how different companies perform based on the Market Cap to Sales Ratio.

plt.figure(figsize=(9, 5))
sns.scatterplot(x='Mar Cap - Crore', y='Mar Cap to Sales Ratio', hue='Cap Category', data=data)
plt.title('Market Cap vs. Market Cap to Sales Ratio')
plt.xlabel('Market Cap (Crores)')
plt.ylabel('Market Cap to Sales Ratio')
plt.show()
```