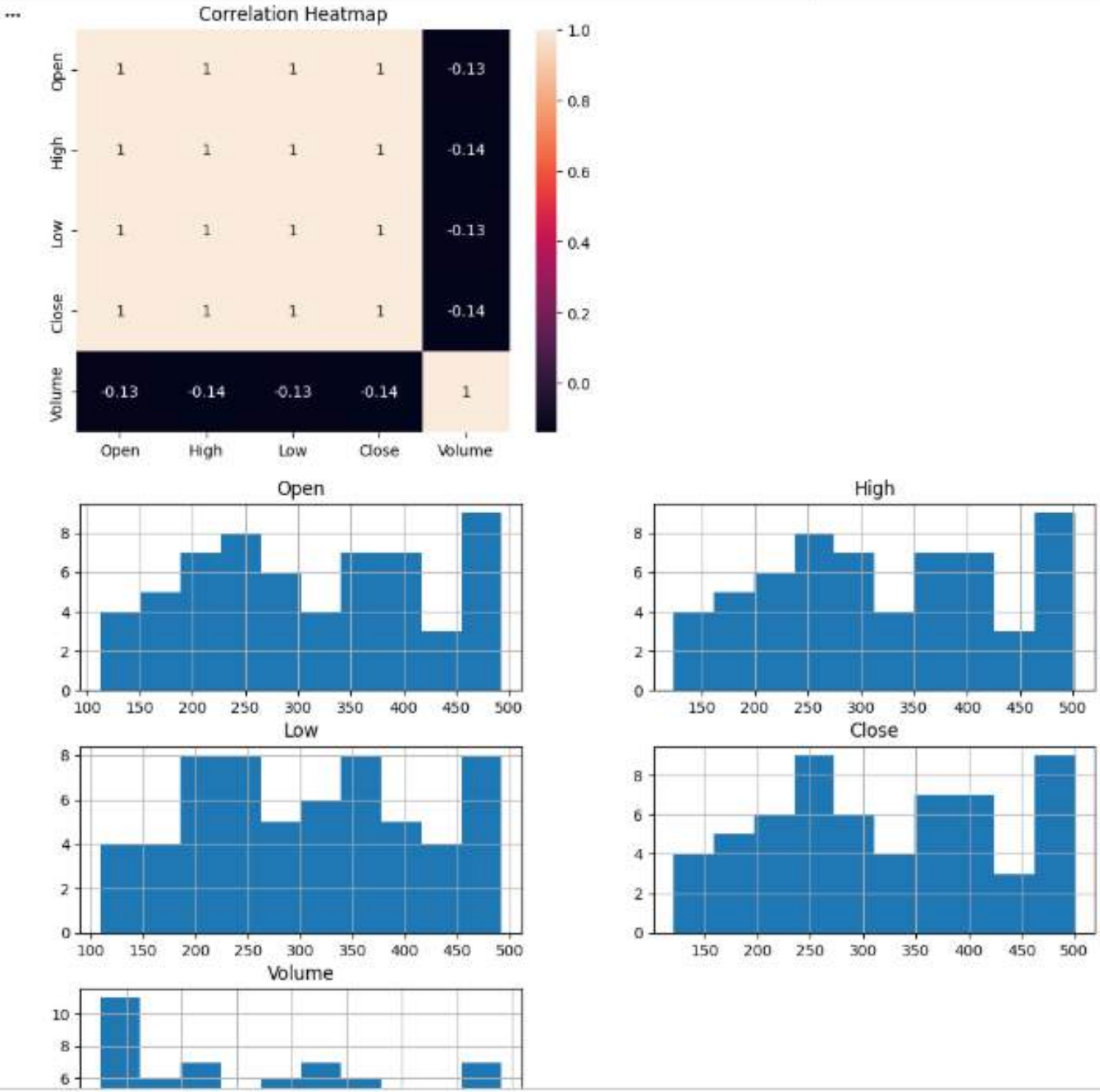
```python
#step 1 : import libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

# step 2 : load dataset
df = pd.read_csv('/content/random_stock_market_dataset.csv')

# step 3 : data overview
print(df.info())
print(df.head())

# step 4 : summary statistics
print(df.describe())

# step 5 : check for missing values
print(df.isnull().sum())

# step 6 : outlier detection (IQR method)
numeric = df.drop('Date', axis=1)
q1 = numeric.quantile(0.25)
q3 = numeric.quantile(0.75)
iqr = q3 - q1
outliers = ((numeric < (q1 - 1.5 * iqr)) | (numeric > (q3 + 1.5 * iqr))).sum()
print('outliers per column:\n', outliers)

# step 6 :  Correlation Heatmap
import seaborn as sns
import matplotlib.pyplot as plt
sns.heatmap(numeric.corr(), annot=True)
plt.title('Correlation Heatmap')
plt.show()

# step 7 :  Basic Visualizations
numeric.hist(figsize=(12, 8))
plt.show()

# step 8 : Save any changes (Optional)
df.to_csv('cleaned_stock_market_data.csv', index=False)
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 60 entries, 0 to 59
Data columns (total 6 columns):
 #   Column  Non-Null Count  Dtype  
---  ------  --------------  -----  
 0   Date    60 non-null     object 
 1   Open    60 non-null     float64
 2   High    60 non-null     float64
 3   Low     60 non-null     float64
 4   Close   60 non-null     float64
 5   Volume  60 non-null     int64  
dtypes: float64(4), int64(1), object(1)
memory usage: 2.9+ KB
None
         Date    Open    High     Low   Close  Volume
0  2024-01-01  296.45  307.31  293.96  303.72   93133
1  2024-01-02  190.11  193.10  187.21  191.40   64993
2  2024-01-03  197.41  208.64  193.37  205.89   70326
3  2024-01-04  253.13  262.67  248.67  258.95   17358
4  2024-01-05  241.35  253.09  238.99  252.20   20847
             Open        High         Low       Close         Volume
count   60.000000   60.000000   60.000000   60.000000      60.000000
mean   310.552000  322.589833  308.056833  320.412667   95405.516667
std    108.859051  109.095813  108.986426  109.157159   54895.342146
min    112.680000  123.780000  109.430000  121.270000   13193.000000
25%    222.957500  238.247500  220.042500  237.242500   48016.500000
50%    303.240000  313.800000  302.385000  309.385000   93850.500000
75%    396.150000  415.915000  392.905000  413.462500  130917.250000
max    492.790000  501.670000  492.300000  500.420000  195189.000000
Date      0
Open      0
High      0
Low       0
Close     0
Volume    0
dtype: int64
outliers per column:
 Open      0
High      0
Low       0
Close     0
Volume    0
dtype: int64
```


Correlation Heatmap
Open
High
Low
Close
Volume
1
-0.13
-0.14
1.0
0.8
0.6
0.4
0.2
0.0
Open
High
Low
Close
Volume
100
150
200
250
300
350
400
450
500

[2]
✓ 0s

```python
import pandas as pd
from sklearn.impute import SimpleImputer
from sklearn.preprocessing import Binarizer, MinMaxScaler, LabelEncoder

# Load the dataset
file_path = '/content/random_stock_market_dataset.csv'
try:
    df = pd.read_csv(file_path)
except FileNotFoundError:
    print(f"Error: File not found at {file_path}")
    # Exit or raise error if file not found
    exit()

# Create a copy to store modifications
df_processed = df.copy()

print("--- Original Data Head ---")
print(df_processed.head())
print("\n")
```

[2]
✓ 0s

```
# --- 1. Statistical Measures (Mean, Median, Mode) ---
print("--- 1. Statistical Measures ---")
# Define which columns are numerical for these stats
numerical_cols = ['Open', 'High', 'Low', 'Close', 'Volume']

# Mean
print("Mean:")
print(df_processed[numerical_cols].mean())
print("\n")

# Median
print("Median:")
print(df_processed[numerical_cols].median())
print("\n")

# Mode
print("Mode:")
# Mode can return multiple values (e.g., if two values appear with
# the same highest frequency). We print just the first row of modes.
print(df_processed[numerical_cols].mode().iloc[0])
print("\n")
```

[2]
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```
# --- 2. Imputation ---
print("--- 2. Imputation (Handling Missing Values) ---")
# First, check if there are any missing values in the whole DataFrame
missing_values_count = df_processed.isnull().sum().sum()
if missing_values_count == 0:
    print("No missing values found in the dataset. Imputation is not necessary.")
else:
    print(f"Found {missing_values_count} total missing values. Applying imputation...")
    # This example imputes with the mean for numerical columns.
    # You could choose 'median' or 'most_frequent' as other strategies.
    num_imputer = SimpleImputer(strategy='mean')

    for col in numerical_cols:
        if df_processed[col].isnull().any():
            print(f"Imputing column: {col}")
            # SimpleImputer expects 2D data, so we use [[col]]
            df_processed[col] = num_imputer.fit_transform(df_processed[[col]])

    print("Imputation applied (if any values were missing).")
print("\n")
```

```python
# --- 3. Binarization ---
print("--- 3. Binarization ---")
# Binarize the 'Volume' column based on its mean
volume_mean = df_processed['Volume'].mean()
print(f"Binarizing 'Volume' column. Threshold (mean) = {volume_mean:.2f}")

# Initialize the Binarizer with the threshold
binarizer = Binarizer(threshold=volume_mean)

# Note: Binarizer (and most sklearn transformers) expects a 2D array.
# .values returns a NumPy array. .reshape(-1, 1) converts it to 2D.
df_processed['Volume_Binarized'] = binarizer.fit_transform(df_processed[['Volume']].values)

print("Binarization complete. New column 'Volume_Binarized' added.")
print(df_processed[['Volume', 'Volume_Binarized']].head())
print("\n")
```

```python
# --- 4. Normalization (Min-Max Scaling) ---
print("--- 4. Normalization (Min-Max Scaling) ---")
# Normalize the 'Close' column to the [0, 1] range
scaler = MinMaxScaler()
df_processed['Close_Normalized'] = scaler.fit_transform(df_processed[['Close']].values)

print("Normalization complete. New column 'Close_Normalized' added.")
print(df_processed[['Close', 'Close_Normalized']].head())
print("\n")

# --- 5. & 6. Label Encoding and One-Hot Encoding ---
print("--- 5. & 6. Label and One-Hot Encoding ---")
# These techniques are for categorical data.
# We will create a categorical column from 'Date' to demonstrate.

# Ensure 'Date' is in datetime format
df_processed['Date'] = pd.to_datetime(df_processed['Date'])

# Create a new categorical column: 'Day_of_Week'
df_processed['Day_of_Week'] = df_processed['Date'].dt.day_name()
print("Created new categorical column 'Day_of_Week':")
print(df_processed[['Date', 'Day_of_Week']].head())
print("\n")
```

[2]
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```
# 5. Label Encoding
print("Applying Label Encoding to 'Day_of_Week'...")
le = LabelEncoder()
df_processed['Day_of_Week_LabelEncoded'] = le.fit_transform(df_processed['Day_of_Week'])
print("Label Encoding complete. New column 'Day_of_Week_LabelEncoded' added.")

# Show the mapping created by the LabelEncoder
print("Label Encoder Mapping:")
for i, class_name in enumerate(le.classes_):
    print(f"{class_name} -> {i}")
print("\n")


# 6. One-Hot Encoding
print("Applying One-Hot Encoding to 'Day_of_Week'...")
# pd.get_dummies is a simple way to get one-hot encoding
one_hot_df = pd.get_dummies(df_processed['Day_of_Week'], prefix='Day')

# Join the new one-hot columns back to the main DataFrame
df_processed = pd.concat([df_processed, one_hot_df], axis=1)
print("One-Hot Encoding complete. New 'Day_*' columns added.")
print("\n")
```

[2]
✓ 0s

```
# --- Final Result ---
print("--- Final Processed Data (Head) ---")
# Print the head of the DataFrame to show all new columns
print(df_processed.head())
print("\n")

# Save the processed DataFrame to a new CSV file
output_file = 'stock_data_processed.csv'
df_processed.to_csv(output_file, index=False)
print(f"All processing complete. The new DataFrame has been saved to '{output_file}'")
```

```
--- Original Data Head ---
         Date    Open    High     Low   Close  Volume
0  2024-01-01  296.45  307.31  293.96  303.72   93133
1  2024-01-02  190.11  193.10  187.21  191.40   64993
2  2024-01-03  197.41  208.64  193.37  205.89   70326
3  2024-01-04  253.13  262.67  248.67  258.95   17358
4  2024-01-05  241.35  253.09  238.99  252.20   20847


--- 1. Statistical Measures ---
Mean:
Open         310.552000
High         322.589833
Low          308.056833
Close        320.412667
Volume     95405.516667
dtype: float64


Median:
Open         303.240
High         313.800
Low          302.385
Close        309.385
Volume     93850.500
dtype: float64
```

```
Mode:
Open         112.68
High         123.78
Low          109.43
Close        121.27
Volume    13193.00
Name: 0, dtype: float64


--- 2. Imputation (Handling Missing Values) ---
No missing values found in the dataset. Imputation is not necessary.


--- 3. Binarization ---
Binarizing 'Volume' column. Threshold (mean) = 95405.52
Binarization complete. New column 'Volume_Binarized' added.
   Volume  Volume_Binarized
0   93133                 0
1   64993                 0
2   70326                 0
3   17358                 0
4   20847                 0
```

```
--- 4. Normalization (Min-Max Scaling) ---
Normalization complete. New column 'Close_Normalized' added.
    Close  Close_Normalized
0  303.72          0.481208
1  191.40          0.184966
2  205.89          0.223183
3  258.95          0.363128
4  252.20          0.345325


--- 5. & 6. Label and One-Hot Encoding ---
Created new categorical column 'Day_of_Week':
        Date Day_of_Week
0 2024-01-01      Monday
1 2024-01-02     Tuesday
2 2024-01-03   Wednesday
3 2024-01-04    Thursday
4 2024-01-05      Friday
```

```
Applying Label Encoding to 'Day_of_Week'...
Label Encoding complete. New column 'Day_of_Week_LabelEncoded' added.
Label Encoder Mapping:
Friday -> 0
Monday -> 1
Saturday -> 2
Sunday -> 3
Thursday -> 4
Tuesday -> 5
Wednesday -> 6


Applying One-Hot Encoding to 'Day_of_Week'...
One-Hot Encoding complete. New 'Day_*' columns added.


--- Final Processed Data (Head) ---
        Date    Open    High     Low   Close  Volume  Volume_Binarized  \
0 2024-01-01  296.45  307.31  293.96  303.72   93133                 0
1 2024-01-02  190.11  193.10  187.21  191.40   64993                 0
2 2024-01-03  197.41  208.64  193.37  205.89   70326                 0
3 2024-01-04  253.13  262.67  248.67  258.95   17358                 0
4 2024-01-05  241.35  253.09  238.99  252.20   20847                 0
```

```
   Close_Normalized Day_of_Week  Day_of_Week_LabelEncoded  Day_Friday  \
0          0.481208      Monday                         1       False
1          0.184966     Tuesday                         5       False
2          0.223183   Wednesday                         6       False
3          0.363128    Thursday                         4       False
4          0.345325      Friday                         0        True

   Day_Monday  Day_Saturday  Day_Sunday  Day_Thursday  Day_Tuesday  \
0        True         False       False         False        False
1       False         False       False         False         True
2       False         False       False         False        False
3       False         False       False          True        False
4       False         False       False         False        False

   Day_Wednesday
0          False
1          False
2           True
3          False
4          False


All processing complete. The new DataFrame has been saved to 'stock_data_processed.csv'
```