Date: 26-10-2023 ¶

Project Title: Stock Price Prediction

Team ID: 3879

1.Importing required packages:

In [51]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import MinMaxScaler
import seaborn as sns
```

2. Loading the dataset:

In [2]:
```
data = pd.read_csv("MSFT.csv")
```

3.Display the maximum columns:

In [5]:
```
pd.options.display.max_columns = None
```

In [6]:
```
data
```

Out[6]:

	Date	Open	High	Low	Close	Adj Close	Volume
0	1986-03-13	0.088542	0.101563	0.088542	0.097222	0.062549	1031788800
1	1986-03-14	0.097222	0.102431	0.097222	0.100694	0.064783	308160000
2	1986-03-17	0.100694	0.103299	0.100694	0.102431	0.065899	133171200
3	1986-03-18	0.102431	0.103299	0.098958	0.099826	0.064224	67766400
4	1986-03-19	0.099826	0.100694	0.097222	0.098090	0.063107	47894400
...	...	...	...	...	...	...	...
8520	2019-12-31	156.770004	157.770004	156.449997	157.699997	157.699997	18369400
8521	2020-01-02	158.779999	160.729996	158.330002	160.619995	160.619995	22622100
8522	2020-01-03	158.320007	159.949997	158.059998	158.619995	158.619995	21116200
8523	2020-01-06	157.080002	159.100006	156.509995	159.029999	159.029999	20813700
8524	2020-01-07	159.320007	159.669998	157.330002	157.580002	157.580002	18017762

8525 rows × 7 columns

4.Displaying top 5 Rows of data:

In [7]:
```
data.head()
```

Out[7]:

	Date	Open	High	Low	Close	Adj Close	Volume
0	1986-03-13	0.088542	0.101563	0.088542	0.097222	0.062549	1031788800
1	1986-03-14	0.097222	0.102431	0.097222	0.100694	0.064783	308160000
2	1986-03-17	0.100694	0.103299	0.100694	0.102431	0.065899	133171200
3	1986-03-18	0.102431	0.103299	0.098958	0.099826	0.064224	67766400
4	1986-03-19	0.099826	0.100694	0.097222	0.098090	0.063107	47894400

5.Displaying last 5 rows of data:

In [9]:
```
data.tail()
```

Out[9]:

	Date	Open	High	Low	Close	Adj Close	Volume
8520	2019-12-31	156.770004	157.770004	156.449997	157.699997	157.699997	18369400
8521	2020-01-02	158.779999	160.729996	158.330002	160.619995	160.619995	22622100
8522	2020-01-03	158.320007	159.949997	158.059998	158.619995	158.619995	21116200
8523	2020-01-06	157.080002	159.100006	156.509995	159.029999	159.029999	20813700
8524	2020-01-07	159.320007	159.669998	157.330002	157.580002	157.580002	18017762

6.Shows number of rows and columns:

In [10]:
```
print("Number of columns ",data.shape[1])
print("Number of rows ",data.shape[0])
```

```
Number of columns  7

Number of rows  8525
```

7.Getting basic information about the dataset:

In [11]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>

RangeIndex: 8525 entries, 0 to 8524

Data columns (total 7 columns):

 #   Column     Non-Null Count  Dtype

---  ------     --------------  -----

 0   Date       8525 non-null   object

 1   Open       8525 non-null   float64

 2   High       8525 non-null   float64

 3   Low        8525 non-null   float64

 4   Close      8525 non-null   float64

 5   Adj Close  8525 non-null   float64

 6   Volume     8525 non-null   int64

dtypes: float64(5), int64(1), object(1)

memory usage: 466.3+ KB
```

8.Data Exploration:

In [13]:
```
data['Date'].unique()
```

Out[13]:
```
array(['1986-03-13', '1986-03-14', '1986-03-17', ..., '2020-01-03',
       '2020-01-06', '2020-01-07'], dtype=object)
```

In [14]:
```
data['Date'].nunique()
```

Out[14]:
```
8525
```

In [17]:
```
data['Date'].head(2)
```

Out[17]:
```
0    1986-03-13
1    1986-03-14
Name: Date, dtype: object
```

9.Checking null values presence:

In [20]:
```
data.isnull().sum()
```

Out[20]:
```
Date         0
Open         0
High         0
Low          0
Close        0
Adj Close    0
Volume       0
dtype: int64
```

10.Handling Missing Values:

In [22]:
```
data.dropna(inplace=True)
```

In [23]:
```
# Print the first 5 rows of the dataframe
print(data.head())
```

```
         Date      Open      High       Low     Close  Adj Close      Volume
0  1986-03-13  0.088542  0.101563  0.088542  0.097222   0.062549  1031788800
1  1986-03-14  0.097222  0.102431  0.097222  0.100694   0.064783   308160000
2  1986-03-17  0.100694  0.103299  0.100694  0.102431   0.065899   133171200
3  1986-03-18  0.102431  0.103299  0.098958  0.099826   0.064224    67766400
4  1986-03-19  0.099826  0.100694  0.097222  0.098090   0.063107    47894400
```

In [26]:
```
data
```

Out[26]:

	Date	Open	High	Low	Close	Adj Close	Volume
0	1986-03-13	0.088542	0.101563	0.088542	0.097222	0.062549	1031788800
1	1986-03-14	0.097222	0.102431	0.097222	0.100694	0.064783	308160000
2	1986-03-17	0.100694	0.103299	0.100694	0.102431	0.065899	133171200
3	1986-03-18	0.102431	0.103299	0.098958	0.099826	0.064224	67766400
4	1986-03-19	0.099826	0.100694	0.097222	0.098090	0.063107	47894400
...	...	...	...	...	...	...	...
8520	2019-12-31	156.770004	157.770004	156.449997	157.699997	157.699997	18369400
8521	2020-01-02	158.779999	160.729996	158.330002	160.619995	160.619995	22622100
8522	2020-01-03	158.320007	159.949997	158.059998	158.619995	158.619995	21116200
8523	2020-01-06	157.080002	159.100006	156.509995	159.029999	159.029999	20813700
8524	2020-01-07	159.320007	159.669998	157.330002	157.580002	157.580002	18017762

8525 rows × 7 columns

11.Split the dataset into features (X) and target (Y):

In [ ]:
```
X = df.drop('Date', axis=1)
Y = df['Open']
```

12.Print the shape of the training and testing sets:

In [43]:
```
print('X_train shape:', X_train.shape)
print('X_test shape:', X_test.shape)
print('Y_train shape:', Y_train.shape)
print('Y_test shape:', Y_test.shape)
```

```
X_train shape: (6820, 6)

X_test shape: (1705, 6)

Y_train shape: (6820,)

Y_test shape: (1705,)
```

13.Feature Scaling.(import StandardScaler):

In [44]:
```
import pandas as pd
from sklearn.preprocessing import StandardScaler
```

In [45]:
```
#Select the columns you want to scale
cols_to_scale = ['Open', 'High', 'Low', 'Close', 'Adj Close', 'Volume']
```

In [46]:
```
#Create a Standard Scalar object
scaler = StandardScaler()
```

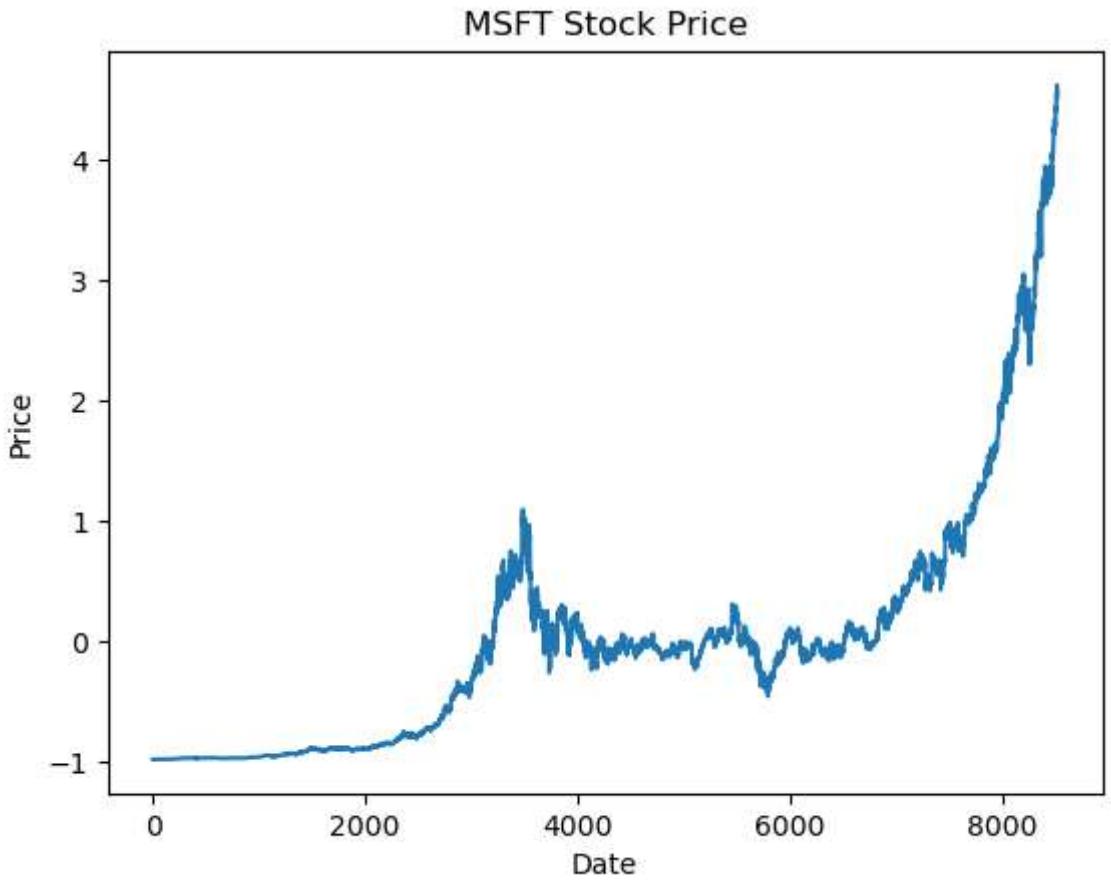
In [47]:
```
#Fit the scalar to the selected coloumn
df[cols_to_scale] = scaler.fit_transform(df[cols_to_scale])
```

In [48]:
```
print(df.head())
```

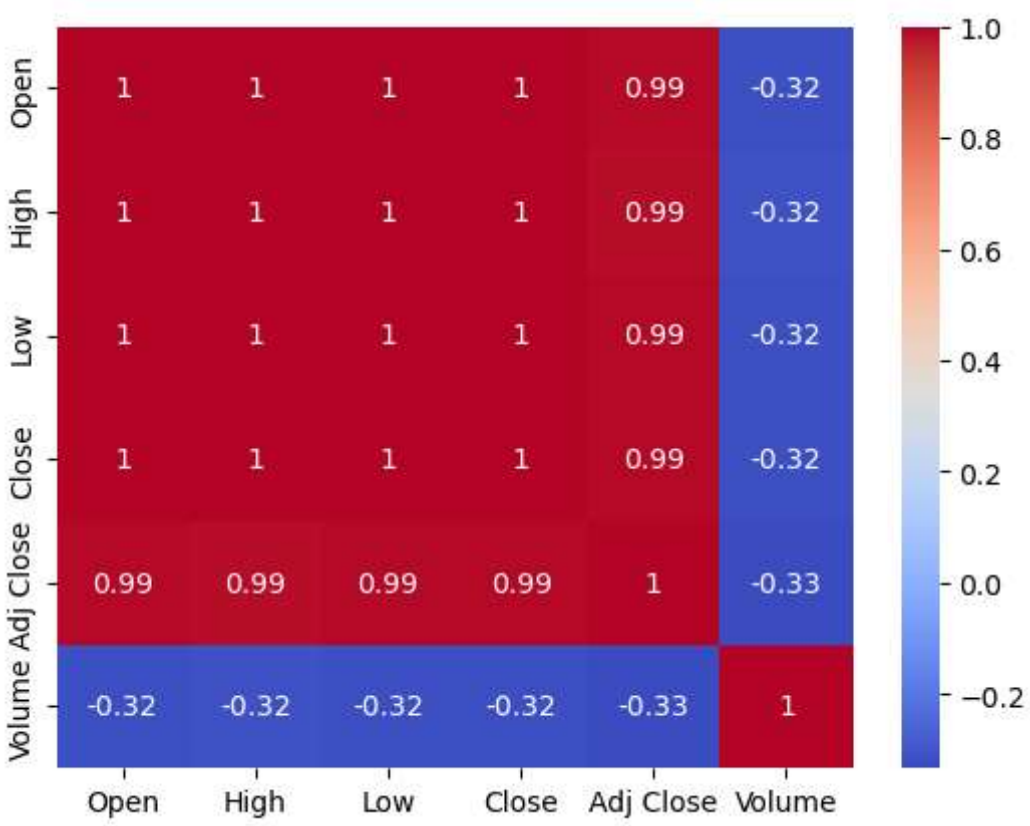
```
         Date      Open      High       Low     Close  Adj Close     Volume
0  1986-03-13 -0.982764 -0.984942 -0.981026 -0.982615  -0.828391  24.963577
1  1986-03-14 -0.982461 -0.984912 -0.980720 -0.982494  -0.828312   6.366058
2  1986-03-17 -0.982340 -0.984882 -0.980598 -0.982433  -0.828272   1.868783
3  1986-03-18 -0.982279 -0.984882 -0.980659 -0.982524  -0.828331   0.187856
4  1986-03-19 -0.982370 -0.984972 -0.980720 -0.982585  -0.828371  -0.322861
```

14.Finding relationship each column using heatmap:

In [49]:
```
# Plot the 'Close' column
plt.plot(df['Close'])
plt.title('MSFT Stock Price')
plt.xlabel('Date')
plt.ylabel('Price')
plt.show()
```



In [52]:
```
# Load the dataset into a pandas dataframe:

df = pd.read_csv('MSFT.csv', index_col=0, parse_dates=True)


# Create a correlation matrix:

corr_matrix = df.corr()


# Create a heatmap using seaborn:

sns.heatmap(corr_matrix, annot=True, cmap='coolwarm')
plt.show()
```



Linear Regression

In [1]:
```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error
import matplotlib.pyplot as plt
```

In [2]:
```
# Load the dataset
df = pd.read_csv('MSFT.csv')
```

In [3]:
```
# Feature engineering
X = df[['Open']]
y = df['Close']
```

In [4]:
```
# Split the dataset into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, randc
```

In [5]:
```
# Train the Linear Regression model
model = LinearRegression()
model.fit(X_train, y_train)
```

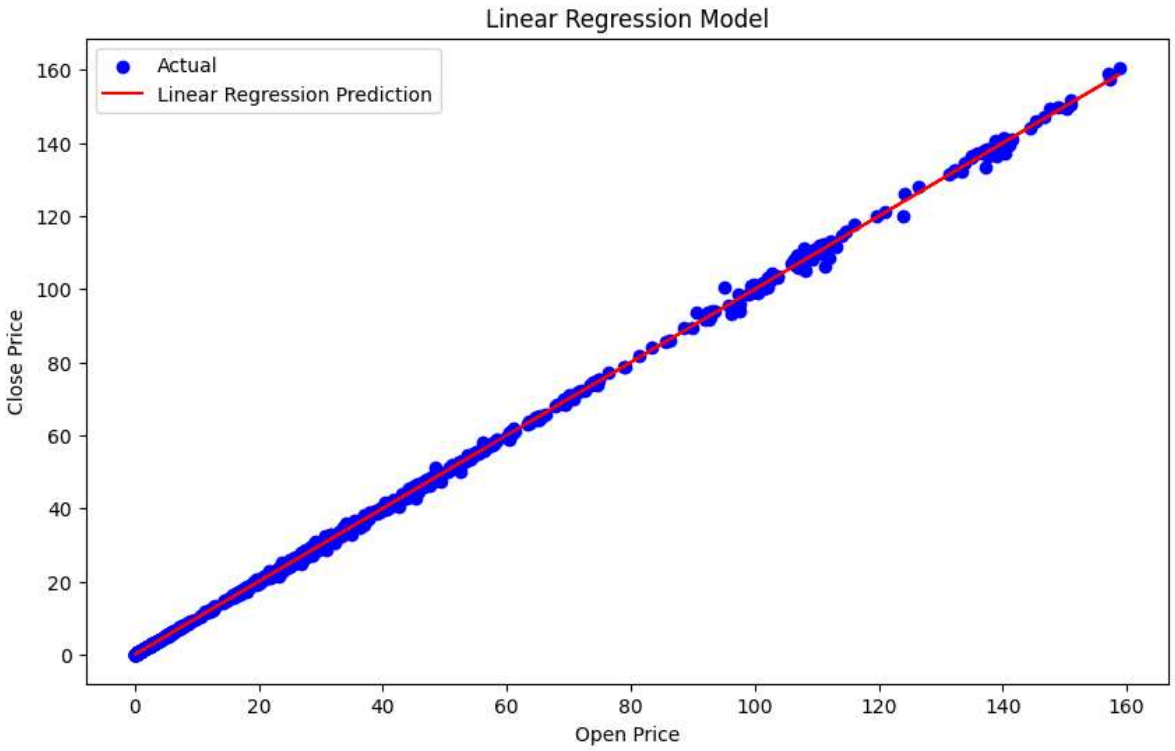
Out[5]:
```
LinearRegression()
```

In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.
On GitHub, the HTML representation is unable to render, please try loading this page with nbviewer.org.

In [6]:
```
# Evaluate the model
y_pred = model.predict(X_test)
mse = mean_squared_error(y_test, y_pred)
print('Linear Regression - Mean squared error:', mse)
```

```
Linear Regression - Mean squared error: 0.3173272652079265
```

In [7]:
```
# Visualize the predictions of the Linear Regression model
plt.figure(figsize=(10, 6))
plt.scatter(X_test, y_test, color='blue', label='Actual')
plt.plot(X_test, y_pred, color='red', label='Linear Regression Prediction')
plt.title('Linear Regression Model')
plt.xlabel('Open Price')
plt.ylabel('Close Price')
plt.legend()
plt.show()
```



Decision Tree Regression:

In [8]:
```
#  2.Decision Tree Regression:
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.tree import DecisionTreeRegressor
from sklearn.metrics import mean_squared_error
import matplotlib.pyplot as plt
```

In [9]:
```
# Load the dataset
df = pd.read_csv('MSFT.csv')
```

In [10]:
```
# Feature engineering
X = df[['Open']]
y = df['Close']
```

In [11]:
```
# Split the dataset into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, randc
```

In [12]:
```
# Train the Decision Tree Regression model
model = DecisionTreeRegressor()
model.fit(X_train, y_train)
```

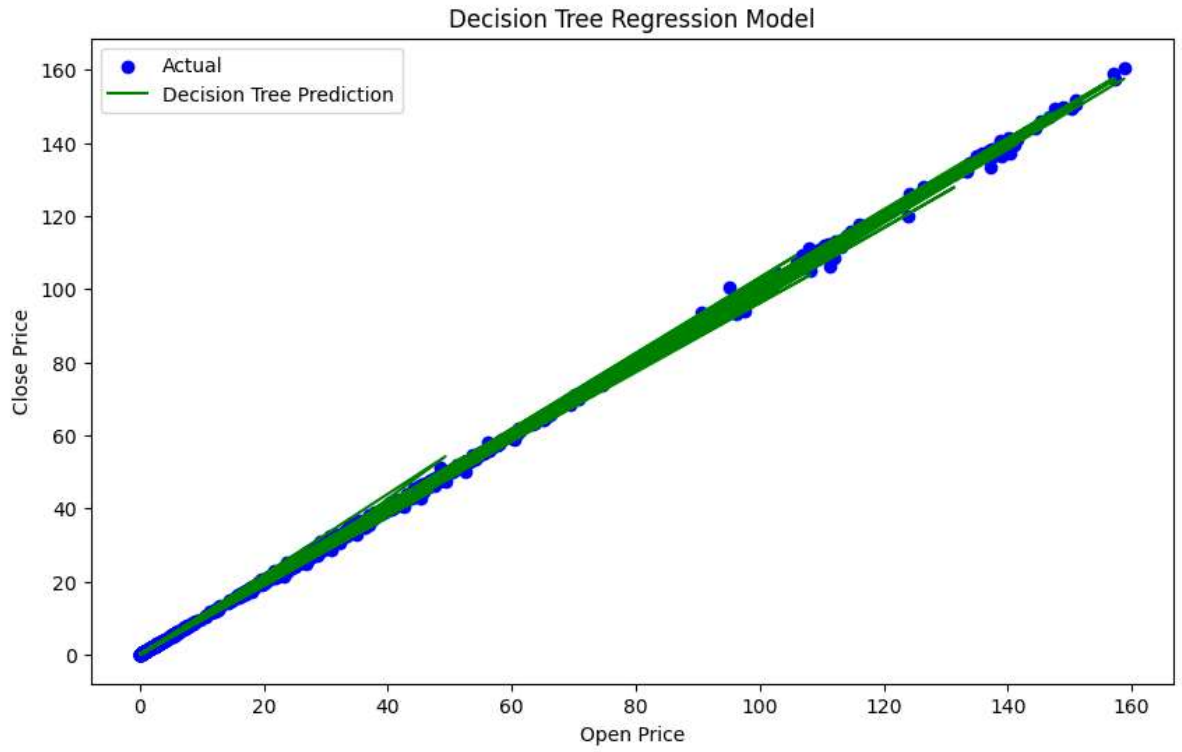
Out[12]:
```
DecisionTreeRegressor()
```

In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.
On GitHub, the HTML representation is unable to render, please try loading this page with nbviewer.org.

In [13]:
```
# Evaluate the model
y_pred = model.predict(X_test)
mse = mean_squared_error(y_test, y_pred)
print('Decision Tree Regression - Mean squared error:', mse)
```

```
Decision Tree Regression - Mean squared error: 0.5548571671154341
```

In [14]:
```
# Visualize the predictions of the Decision Tree Regression model
plt.figure(figsize=(10, 6))
plt.scatter(X_test, y_test, color='blue', label='Actual')
plt.plot(X_test, y_pred, color='green', label='Decision Tree Prediction')
plt.title('Decision Tree Regression Model')
plt.xlabel('Open Price')
plt.ylabel('Close Price')
plt.legend()
plt.show()
```



Random Forest Regression:

In [15]:
```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.ensemble import RandomForestRegressor
from sklearn.metrics import mean_squared_error
```

In [16]:
```
# Load the dataset
df = pd.read_csv('MSFT.csv')
```

In [17]:
```
# Feature engineering
X = df[['Open']]
y = df['Close']
```

In [18]:
```
# Split the dataset into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, randc
```

In [19]:
```
# Train the Random Forest Regression model
model = RandomForestRegressor()
model.fit(X_train, y_train)
```

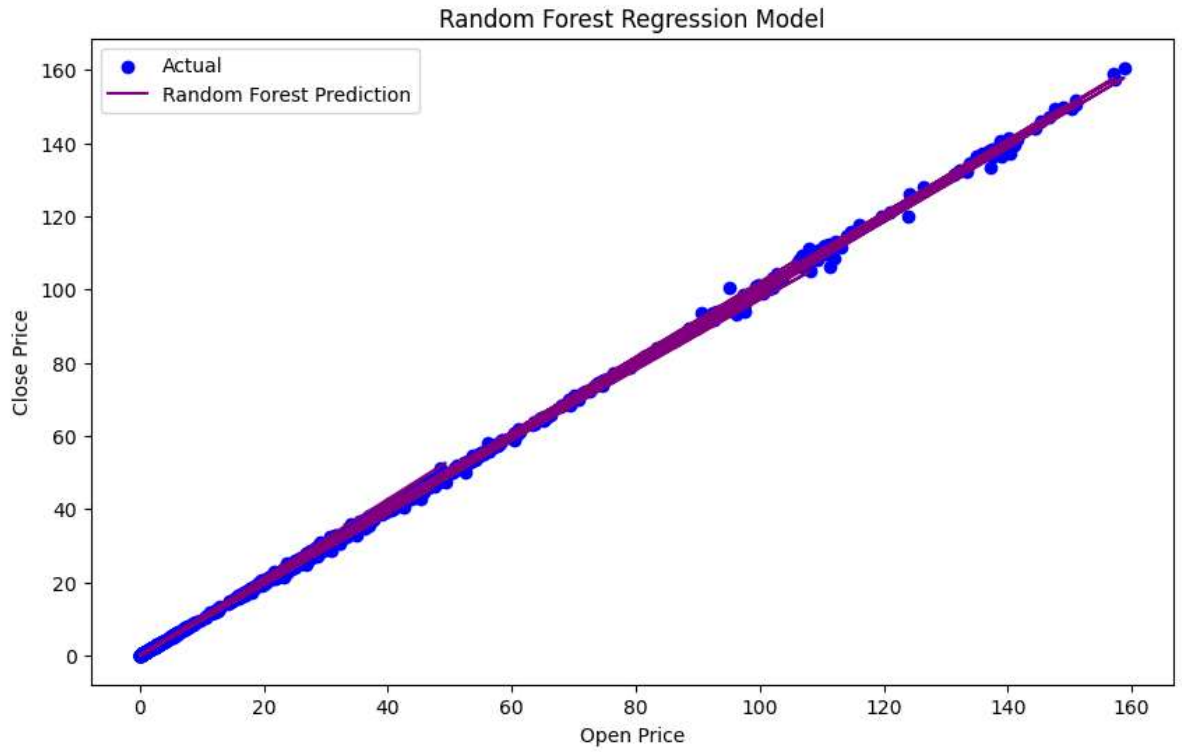
Out[19]:
```
RandomForestRegressor()
```

In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.
On GitHub, the HTML representation is unable to render, please try loading this page with nbviewer.org.

In [20]:
```
# Evaluate the model
y_pred = model.predict(X_test)
mse = mean_squared_error(y_test, y_pred)
print('Random Forest Regression - Mean squared error:', mse)
```

```
Random Forest Regression - Mean squared error: 0.4242970114385307
```

In [21]:
```
# Visualize the predictions of the Random Forest Regression model
plt.figure(figsize=(10, 6))
plt.scatter(X_test, y_test, color='blue', label='Actual')
plt.plot(X_test, y_pred, color='purple', label='Random Forest Prediction')
plt.title('Random Forest Regression Model')
plt.xlabel('Open Price')
plt.ylabel('Close Price')
plt.legend()
plt.show()
```



In [ ]: