

Experiment 6: ARIMA Model for Microsoft Stock Price Forecasting

Aim:

To create an ARIMA model for univariate time series forecasting using Microsoft (MSFT) stock closing prices from 2015 to 2024.

1. Importing Required Libraries

Python

```
import yfinance as yf
import pandas as pd
import matplotlib.pyplot as plt
from statsmodels.tsa.arima.model import ARIMA
from pandas.plotting import register_matplotlib_converters
register_matplotlib_converters()
```

2. Loading the Dataset

Python

```
msft = yf.download("MSFT", start="2015-01-01", end="2024-12-31")
data = msft[['Close']].dropna()
```

- Downloaded historical stock data for Microsoft from Yahoo Finance.
 - Selected only the **Close** price column and removed any missing values.
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3. Data Preparation

Python

```
train_size = int(len(data) * 0.9)
```

```
train, test = data[:train_size], data[train_size:]
```

- Used 90% of the data for training and 10% for testing.
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4. Building and Fitting ARIMA Model

Python

```
model = ARIMA(train['Close'], order=(5,1,2))  
model_fit = model.fit()
```

- Configured ARIMA with parameters (p=5, d=1, q=2).
 - Trained the model using the training set.
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5. Forecasting

Python

```
forecast_steps = len(test)  
forecast = model_fit.forecast(steps=forecast_steps)
```

- Generated forecasts for the same number of steps as in the test set.
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6. Forecast Visualization

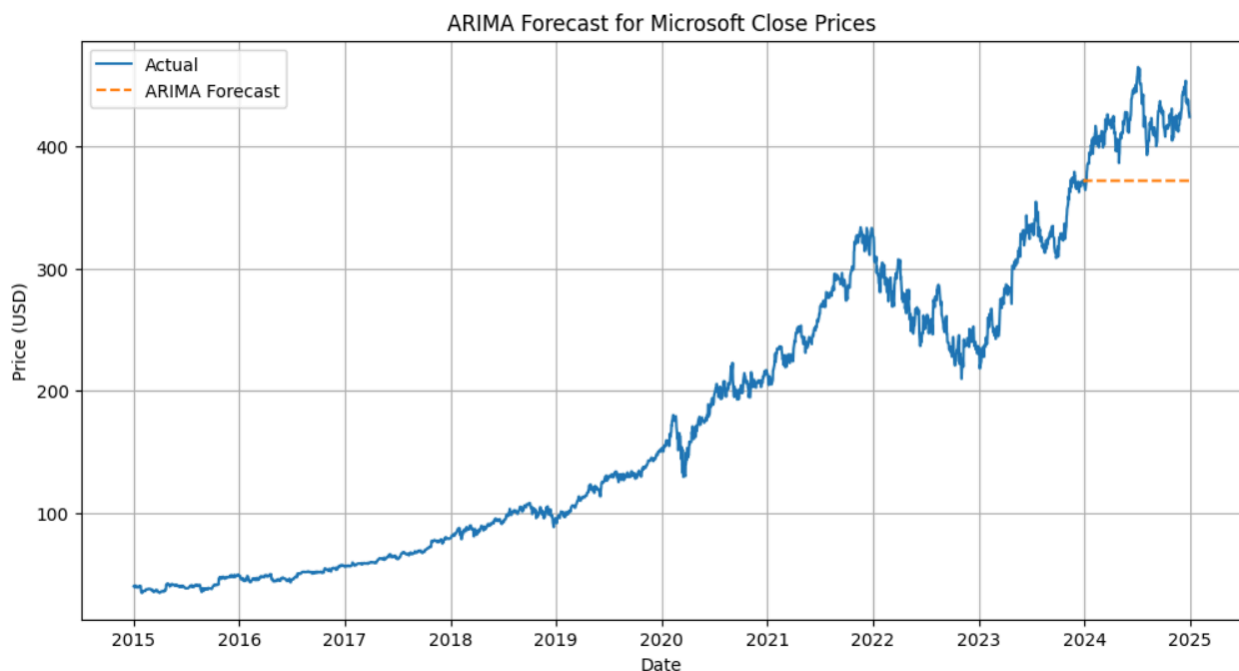
Python

```
plt.figure(figsize=(12,6))
```

```
plt.plot(data.index, data['Close'], label='Actual')
plt.plot(test.index, forecast, label='ARIMA Forecast',
linestyle='dashed')
plt.title("ARIMA Forecast for Microsoft Close Prices")
plt.xlabel("Date")
plt.ylabel("Price (USD)")
plt.legend()
plt.grid(True)
plt.show()
```

- Visualized actual versus predicted closing prices using a line plot.
- Dashed line represents the ARIMA model forecast.

Output:



Result: Thus, an ARIMA model was successfully built and used to forecast Microsoft's closing stock prices. The forecast was compared visually with the actual values to evaluate the model's performance.

