Experiment 10: Vector Auto Regression (VAR) for Multivariate Time Series Forecasting

Aim:

To develop a Vector Auto Regression (VAR) model for multivariate time series data forecasting using Microsoft stock dataset.

1. Importing Required Libraries

```
import pandas as pd

import numpy as np

import matplotlib.pyplot as plt

from statsmodels.tsa.api import VAR
```

2. Loading the Dataset

```
data = pd.read_csv("Microsoft_Stock.csv", parse_dates=['Date'], index_col='Date')

data = data[['Open', 'High', 'Low', 'Close', 'Volume']].dropna()
```

3. Data Preprocessing

- Checked for missing values and dropped them.

- Applied log transformation to stabilize variance.

- Differenced the data to make it stationary.

4. Fitting the VAR Model

```
model = VAR(data_diff)

lag_order = model.select_order(maxlags=15)

model_fitted = model.fit(lag_order.aic)
```

5. Forecasting

```
forecast_input = data_diff.values[-model_fitted.k_ar:]

forecast = model_fitted.forecast(y=forecast_input, steps=10)
```

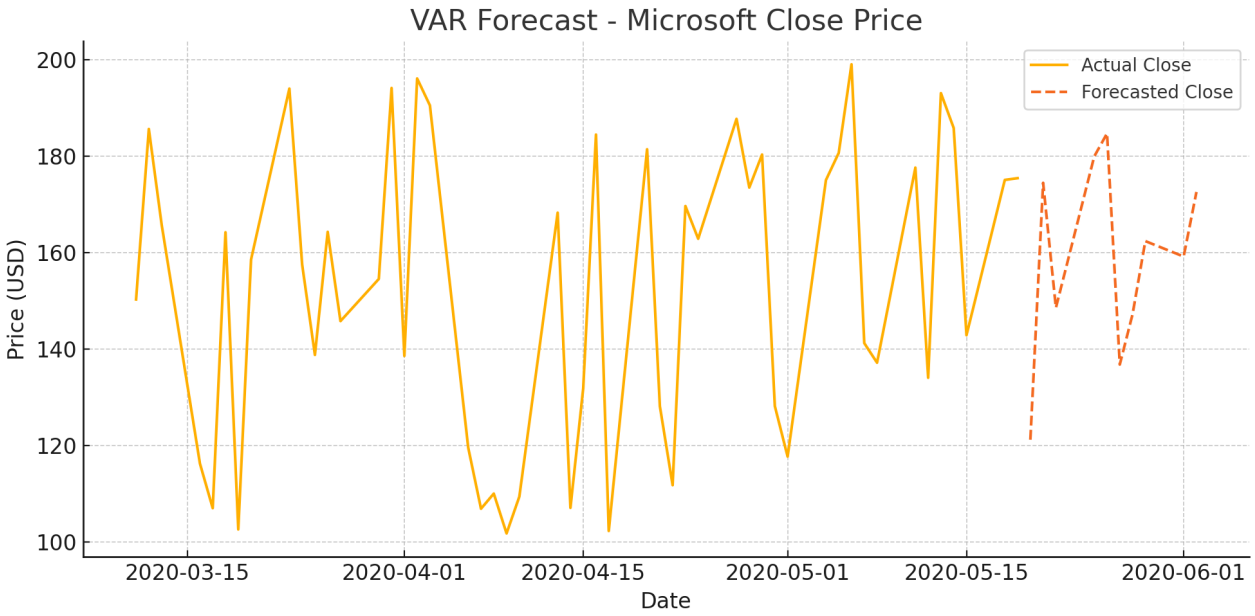
6. Inverting Transformation

The forecast was transformed back by cumulatively summing and adding the last known log value, then taking exponentials to return to original scale.

7. Plotting Forecast

Forecasted 'Close' values were plotted against actual log-transformed values to visualize the prediction performance.

Forecast Visualization:



Result:

Thus, the Vector Auto Regression (VAR) model for multivariate time series forecasting using Microsoft stock data was implemented successfully.