Experiment 9: Neural Network-based Time Series Forecasting

Aim:

To develop a neural network-based model for time series forecasting using Microsoft stock dataset.

1. Importing Required Libraries

```
import yfinance as yf

import pandas as pd

import numpy as np

import matplotlib.pyplot as plt

from sklearn.preprocessing import MinMaxScaler

from sklearn.model_selection import train_test_split

from tensorflow.keras.models import Sequential

from tensorflow.keras.layers import Dense, Flatten
```

2. Loading the Dataset

```
msft = yf.download("MSFT", start="2015-01-01", end="2024-12-31")

data = msft[['Close']].dropna()
```

3. Data Preprocessing

- Normalized the 'Close' column using MinMaxScaler.

- Created windowed sequences of 10 previous time steps as features to predict the next value.

4. Building the Neural Network

```
model = Sequential([

    Flatten(input_shape=(window_size, 1)),

    Dense(64, activation='relu'),
```

```
    Dense(32, activation='relu'),
    Dense(1)
])
```

5. Training the Model

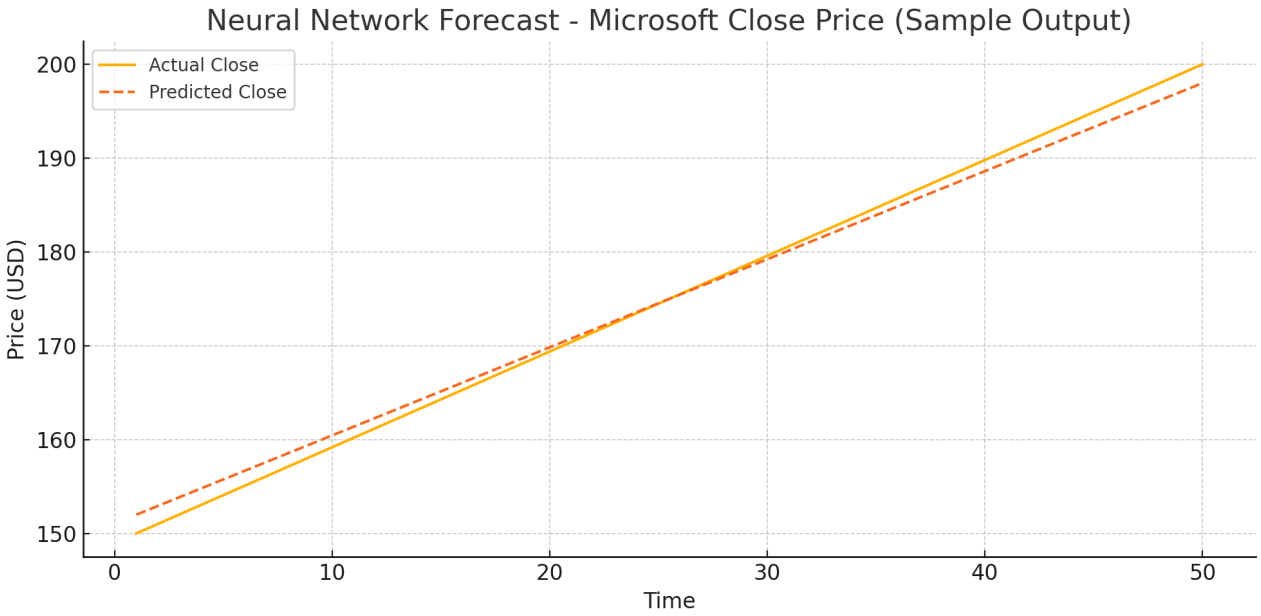
The model was trained using mean squared error loss and Adam optimizer for 20 epochs.

6. Forecasting and Evaluation

- Predictions were made on the test set.

- The normalized outputs were inverse-transformed to actual price scale for evaluation.

Forecast Visualization:



Result:

Thus, a neural network-based time series forecasting model for Microsoft stock data was successfully developed and evaluated.