Forex Price Prediction using LSTM

This project focuses on predicting Forex prices (EUR/USD) using machine learning models, specifically Long Short-Term Memory (LSTM). It includes steps such as data collection, preprocessing, feature engineering, model training, evaluation, and strategy backtesting to simulate a trading environment.

Objectives

- Build a predictive model to forecast Forex prices.
- Enhance model accuracy using feature engineering.
- Simulate a trading strategy and evaluate its profitability.

Steps Overview

1. Data Collection:
   - Used Alpha Vantage API to fetch historical EUR/USD Forex data.

2. Feature Engineering:
   - Added technical indicators like SMA, EMA, RSI, MACD, and Bollinger Bands.

3. Data Preprocessing:
   - Normalized the data and created sequences for LSTM.

4. Model Training:
   - Trained an LSTM model to predict the next closing price.

5. Strategy Backtesting:
   - Simulated a trading strategy with stop-loss and take-profit rules.

6. Evaluation:

   - Compared strategy returns with market returns to assess performance.

Results

- Final Model: LSTM with Mean Squared Error of 0.00035.

- Backtesting showed profitability with Stop-Loss and Take-Profit rules.

- Strategy Performance:

  Initial Balance: $10,000

  Final Balance: $11,068.32

  Profit/Loss: $1,068.32

Technology Stack

- Programming Language: Python

- Libraries: TensorFlow/Keras, Scikit-learn, Pandas, NumPy, Matplotlib, FPDF

- Data Source: Alpha Vantage API

Files in the Repository

- `data_fetching.py`: Script for fetching Forex data using Alpha Vantage API.

- `feature_engineering.py`: Adds technical indicators to the dataset.

- `lstm_model.py`: Trains and evaluates the LSTM model.

- `backtesting.py`: Simulates the trading strategy.

- `requirements.txt`: Dependencies for the project.

- `README.md`: Overview and setup instructions.

Instructions for Setup

1. Clone the repository:

`git clone <repository_url>`

2. Install dependencies:

`pip install -r requirements.txt`

3. Run the scripts in sequence:

- `data_fetching.py`
- `feature_engineering.py`
- `lstm_model.py`
- `backtesting.py`

Conclusion

This project demonstrates the use of machine learning for Forex price prediction and highlights the importance of risk management in trading strategies. The inclusion of Stop-Loss and Take-Profit significantly improved profitability.