Stock Price Prediction using LSTM and Streamlit Dashboard

Introduction

Stock market forecasting is a valuable technique in the finance industry. With the advancement of machine learning, models like Long Short-Term Memory (LSTM) neural networks are now commonly used for time-series prediction tasks such as stock price forecasting. This project aims to develop a model that predicts Apple's (AAPL) stock closing prices and visualizes the performance using an interactive Streamlit dashboard.

Abstract

This project involves predicting future stock prices using historical data of AAPL stock and visualizing the results using a web-based dashboard. An LSTM model was used to capture the sequential nature of stock prices. Technical indicators such as Simple Moving Average (SMA) and Relative Strength Index (RSI) were integrated to enhance the model input. The model performance was evaluated using RMSE (Root Mean Square Error), and the dashboard displays actual vs. predicted prices with insights.

Tools Used

- Python
- Keras
- Pandas, NumPy
- Matplotlib, Streamlit
- Yahoo Finance (yfinance)
- TA-Lib
- Scikit-learn

Steps Involved in Building the Project

1. Data Collection: Historical stock data of AAPL from 2015 to 2023 using yfinance.
2. Feature Engineering: SMA and RSI technical indicators.
3. Data Preprocessing: Normalized prices with MinMaxScaler and prepared time-series data.
4. Model Building: LSTM neural network using Keras.
5. Model Training: 20 epochs to predict stock prices.
6. Evaluation: Used RMSE to evaluate model performance.
7. Visualization: Developed a Streamlit dashboard to compare actual and predicted prices.

Conclusion

The LSTM-based model successfully predicts Apple stock prices with reasonable accuracy. The RMSE value indicates low error, and the predicted values closely follow actual trends. The project delivers a full pipeline from data acquisition to dashboard deployment, providing a strong base for further enhancements such as integrating news sentiment or deploying the model for real-time predictions.