META SCIFOR TECHNOLOGIES

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Report: Stock Price Prediction App

1. Purpose and Overview

The Stock Price Prediction App is a Streamlit-based web application designed to forecast future stock prices based on historical data. It uses a simple linear regression model to make predictions and visualize both historical and predicted stock prices. The app allows users to input a stock ticker symbol and select the number of years for prediction.

1. Key Components

a. Data Acquisition:

- Uses the yfinance library to fetch historical stock data from Yahoo Finance.

- Data range: From January 1, 2010, to December 31, 2023.

b. Machine Learning Model:

- Implements a Linear Regression model from scikit-learn.

- Uses the number of days since the earliest date as the feature for prediction.

c. User Interface:

- Built with Streamlit, providing an interactive web interface.

- Allows users to input a stock ticker and select prediction timeframe.

d. Visualization:

- Utilizes matplotlib to create a line plot of historical and predicted stock prices.

e. Performance Metrics:

- Displays R-squared scores for both training and testing data.

1. Functionality Breakdown

a. User Input:

- Stock ticker input (default: AAPL)

- Prediction timeframe slider (1-5 years)

b. Data Processing:

- Fetches historical stock data

- Prepares data for the machine learning model

c. Model Training and Prediction:

- Splits data into training and testing sets

- Trains the linear regression model

- Makes predictions for future dates

d. Results Presentation:

- Plots historical and predicted stock prices

- Displays model performance metrics

- Shows a table of predicted future prices

4. Strengths

- Simple and intuitive user interface

- Real-time data fetching for up-to-date information

- Visual representation of predictions

- Flexibility in choosing stocks and prediction timeframe

5. Limitations

- Uses a simplistic linear regression model, which may not capture complex market dynamics

- Does not account for external factors affecting stock prices (e.g., market trends, company performance, economic indicators)

- Limited to predicting based on historical closing prices only

6. Potential Improvements

- Implement more sophisticated machine learning models (e.g., LSTM, ARIMA)

- Incorporate additional features such as trading volume, market indices, or sentiment analysis

- Add error handling for invalid ticker symbols or data fetch issues

- Implement cross-validation for more robust model evaluation

- Add option to compare multiple stocks or indices

- Include risk assessment and confidence intervals for predictions

7. Conclusion

The Stock Price Prediction App serves as a basic demonstration of how machine learning can be applied to financial forecasting. While it provides a user-friendly interface and quick insights, it’s important to note its limitations. The app should be used for educational purposes only and not for making real investment decisions. It showcases the potential of combining data science with web technologies to create interactive financial tools, but also highlights the need for more complex models and comprehensive analysis in real-world financial predictions.

This report provides an overview of the app’s structure, functionality, strengths, and areas for improvement. It can serve as a starting point for further development or as a basis for discussing the application of machine learning in finance with stakeholders.