Project Title: Stock Analysis Prediction

Category: AI in Finance

Subject: CS767 - Advance Machine Learning and Neural Networks

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ABSTRACT

The use of artificial intelligence (AI) for stock market analysis has grown in importance within the field of financial technology. The goal of this research, "Stock Analysis Prediction," is to estimate Apple Inc. (AAPL) stock values using historical data spanning from 1980 to 2023 by utilizing sophisticated machine learning algorithms. The project captures the difficulty of forecasting changes in the stock market, a process made more difficult by the erratic and frequently surprising nature of financial markets.

DATA SET

The YFinance library was utilized to get historical stock prices of Apple Inc. for the dataset. This large dataset, which covers more than 40 years, provides a thorough understanding of the company's stock performance, short- and long-term market patterns.

TECHNOLOGY AND MODELS

Four advanced neural network models are utilized in the research, selected based on their suitability and capability for time series analysis:

- Convolutional Neural Network (CNN)
- Multi-Layer Perceptron (MLP)
- Gated Recurrent Unit (GRU)
- Long Short-Term Memory (LSTM)

The original stock data was used to build these models. Then, a number of financial indicators, including SMA, EMA, RSI, OBV, and Bollinger Bands, were calculated in order to improve the features.

FEATURE SELECTION AND REDUCTION

Feature selection and reduction using methods such as PCA, Random Forest Regressor, Lasso CV, Correlation Analysis, Recursive Feature Elimination and mutual information were vital to the project's success. This stage, which determined the most important characteristics for precise stock price prediction, was essential to improving the model.

USES, BENEFITS AND DRAWBACKS

There are many advantages to using these models in the financial markets, including helping investors manage financial risks, comprehend market movements, and make well-informed judgments. The possibility for overfitting, reliance on historical data that might not reliably forecast future patterns, and the stock market's inherent unpredictability are the disadvantages, though.

CHALLENGES

Overfitting in the models had to be minimized, handling the large dataset, and guaranteeing forecast accuracy were among the obstacles the project had to overcome. The modeling technique became more sophisticated due to the stock market's dynamic and unpredictable nature.

RESULTS

R2 Score, RMSE, MAE, and MSE were among the metrics used to assess the models' performance. These assessments provided information about the accuracy and predictive power of each model, enabling a comparison of their efficacy.

WORKING EXAMPLE

Every model was applied to the AAPL stock dataset to create a working example. The example showed how to prepare data, train a model, create features, make predictions, and assess

performance. This real-world example gave viewers a hands-on grasp of how machine learning is applied to stock analysis prediction.

YOUTUBE URL's

3min Video - https://youtu.be/Ao5izxCJhR0

15min Video - https://youtu.be/RP9aTaBKoLg