STOCK PRICE PREDICTION

AIM

The aim of this project is to develop a stock price prediction model using machine learning techniques, specifically Convolutional Neural Networks (CNN) and Bidirectional Long Short-Term Memory Networks (BiLSTM) with Attention mechanism. The project focuses on predicting future stock prices based on historical data.

INTRODUCTION

Stock price prediction is a crucial task in financial markets, as it helps investors make informed decisions about buying or selling stocks. Traditional methods of prediction rely on fundamental and technical analysis, but with the advancements in machine learning, predictive models have become increasingly popular. This project explores the application of deep learning techniques for stock price prediction.

DATA COLLECTION

The dataset used in this project is historical stock price data obtained from Yahoo Finance. It includes information such as date, open price, high price, low price, close price, and volume for a particular stock. The dataset covers a specific period, allowing us to train the prediction model on historical data and evaluate its performance.

OBJECTIVE

The main objective of this project is to build a robust stock price prediction model that can accurately forecast future stock prices based on historical data. The model will be trained on past stock prices and tested on unseen data to assess its effectiveness in making predictions.

MODEL ARCHITECTURE AND EVALUATION

MODEL ARCHITECTURE:

The model architecture employed in this project is a combination of Convolutional Neural Network (CNN) and Bidirectional Long Short-Term Memory Network (BiLSTM). This hybrid architecture is designed to effectively capture both spatial and temporal dependencies in the input sequence data, making it well-suited for stock price prediction tasks.

1. **Convolutional Neural Network (CNN):** The CNN component of the model is responsible for feature extraction from the input sequence data. It consists of two convolutional layers followed by max-pooling layers. The convolutional layers apply

filters to the input sequence, capturing important patterns and features. The max-pooling layers down-sample the feature maps, reducing their dimensionality while retaining the most relevant information.

2. **Bidirectional Long Short-Term Memory Network (BiLSTM):** The BiLSTM component of the model is used to capture temporal dependencies and long-range dependencies in the input sequence data. It consists of Bidirectional LSTM layers, which process the input sequence in both forward and backward directions. This allows the model to effectively capture context from past and future time steps, enabling it to make informed predictions based on historical data.

3. **Concatenation and Dense Layers**: The outputs from the CNN and BiLSTM components are concatenated and passed through dense layers for prediction. The concatenated features capture both spatial and temporal information, providing a comprehensive representation of the input sequence data. The dense layers perform the final mapping from the concatenated features to the predicted output.

EVALUATION:

The model is evaluated using several metrics to assess its performance in predicting stock prices. The Mean Squared Error (MSE) and R-squared (R^2) are among the key evaluation metrics utilized in this project.

1. **Mean Squared Error (MSE):** The MSE measures the average squared difference between the predicted values and the actual values. It provides an indication of the model's accuracy, with lower values indicating better performance. In this project, the MSE is calculated to be 35.4605, reflecting the average squared error between the predicted and actual stock prices.

2. **R-squared (R^2):** The R-squared value represents the proportion of the variance in the dependent variable (actual stock prices) that is predictable from the independent variable (predicted stock prices) by the model. It ranges from 0 to 1, with higher values indicating better predictive performance. In this project, the R-squared value is calculated to be 0.9717, indicating that approximately 97.17% of the variance in the actual stock prices is predictable from the predicted values by the model.

These evaluation metrics provide insights into the model's ability to accurately forecast future stock prices based on historical data.

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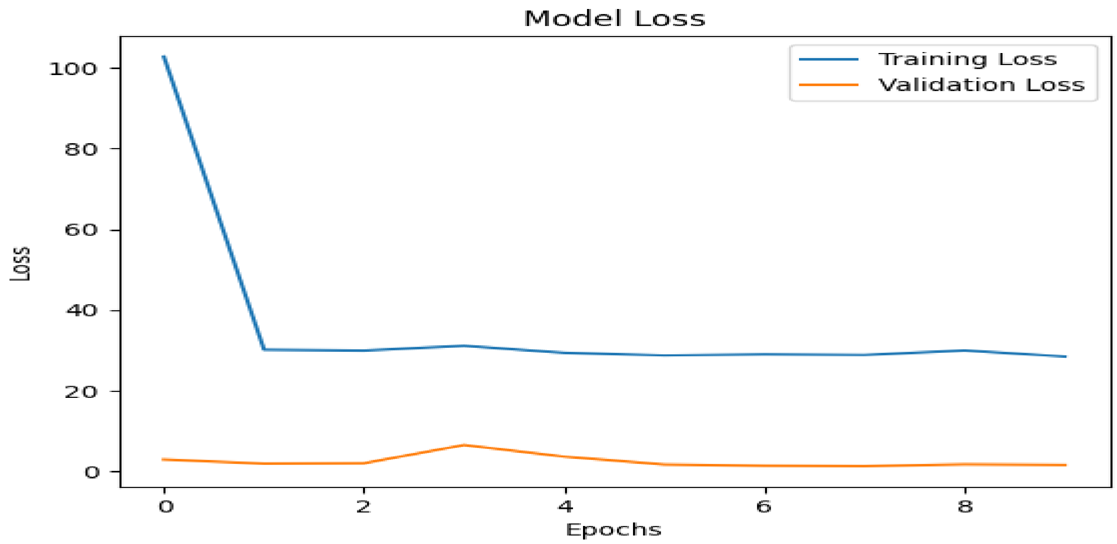


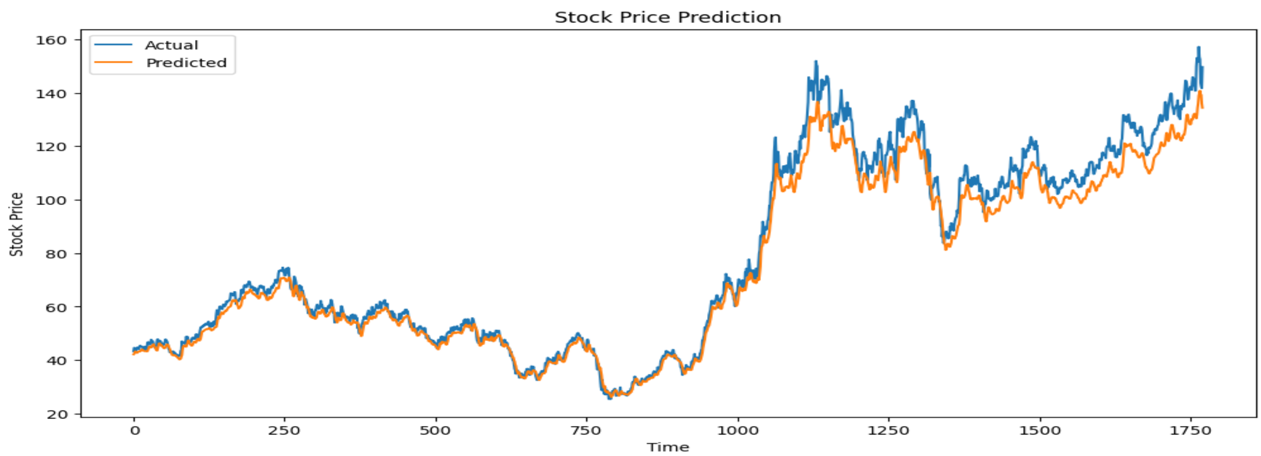
Additionally, visualizations such as training and validation loss curves are plotted to visualize the model's learning process and performance over epochs. These metrics and visualizations provide insights into the effectiveness of the model in predicting future stock prices based on historical data.

CONCLUSION

In conclusion, this project demonstrates the effectiveness of deep learning techniques in predicting stock prices. The developed model shows promising results in forecasting future stock prices based on historical data. However, further optimization and fine-tuning may be required to improve its accuracy and robustness.

RESULT

The results of the project include the trained model's ability to predict future stock prices, as well as the evaluation metrics such as MSE and RMSE. The predicted values are compared with actual stock prices to assess the model's performance.



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