

Amazon Stock Price Prediction Report

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Introduction

Welcome to the Amazon Stock Price Prediction project! The primary goal here is to build a machine learning model that can accurately predict the stock prices of Amazon based on historical data, specifically focusing on the company's stock price and trading volume. This project includes several steps, from exploratory data analysis (EDA) and feature engineering to model development and validation using 5-fold cross-validation to ensure our predictions are reliable.

Challenges

Like any good project, we faced a few challenges along the way:

1. **High Error Rates in Initial Predictions:** At first, our linear regression model struggled, showing high error rates. This meant that the predicted prices were quite far from the actual values, which was frustrating.
2. **Scaling and Normalization:** The range of our stock volume data was quite wide, which made it difficult for the model to learn effectively. We realized that normalizing the data was essential for improving performance.
3. **Model Validation:** Ensuring our model could generalize well to unseen data was crucial. Stock prices are notoriously volatile, and we wanted to avoid overfitting our model to the training data.

Solutions

To tackle these challenges, we implemented several strategies:

1. **Data Normalization:** We normalized the Amazon stock volume data to bring it in line with the stock prices. This step was vital for enhancing the model's performance.
2. **Cross-Validation:** We used a 5-fold cross-validation approach to evaluate how well our model performed across different subsets of data. This technique helped us understand the model's accuracy and robustness better.
3. **Feature Engineering:** We added a few simple time-based features, like the day of the week and the month, to capture any patterns related to the timing of stock price changes. Keeping the features minimal allowed us to focus on the most impactful variables.

Roadblocks

1. **Interpreting High Errors:** In the beginning, we were faced with high Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE) values for our initial predictions, which made us question the reliability of our model.
2. **Improving Model Accuracy:** Despite employing cross-validation, we found that our model's predictive accuracy wasn't as high as we had hoped. This pushed us to dig deeper and explore additional methods for optimization.

Conclusion

Through our efforts, we managed to improve our model's performance significantly by normalizing the data and applying 5-fold cross-validation. This process taught us just how crucial robust evaluation techniques are for understanding our model's strengths and weaknesses. The final error metrics, including MAE and RMSE, indicated that our model could make reasonably accurate stock price predictions, though there is always room for improvement.

Looking ahead, we see an opportunity to enhance our model by incorporating more relevant features, such as financial indicators or external market data. Additionally, experimenting with more advanced regression models could further boost our prediction accuracy. We're excited to see where this project will lead us next!

GitHub repository Link

<https://github.com/akashauti23/Amazon-Stock-Price-Prediction-Using-Linear-Regression>