Optimizing eBay Sales with Predictive Analytics

Analyzing Trends and Forecasting Future Performance!

Contents

Introduction

Overview of eBay:

eBay as a global eCommerce marketplace which facilitates transactions for a wide variety of products, from electronics to collectibles.

Project Objective:

- Use predictive analytics to optimize sales.
- Enhance decision-making across different business functions.
- Staying competitive in a dynamic market.

QUOTE

What makes eBay successful - the real value and the real power at eBay - is the community. It's the buyers and sellers coming together and forming a marketplace.

Pierre Omidyar

Business Understanding

Who are our stakeholders?

- Executive Leadership.
- Inventory management team.
- Marketing team.

Problem Statement

The challenge fluctuations in sales due to various factors including seasonal trends, promotional activities, market demand, and external economic conditions. This leads to poor decision-making, Inefficient resource allocation, and poor financial planning.

Data Understanding

Data Source:
Collected using Yahoo Finance via the yfinance API.

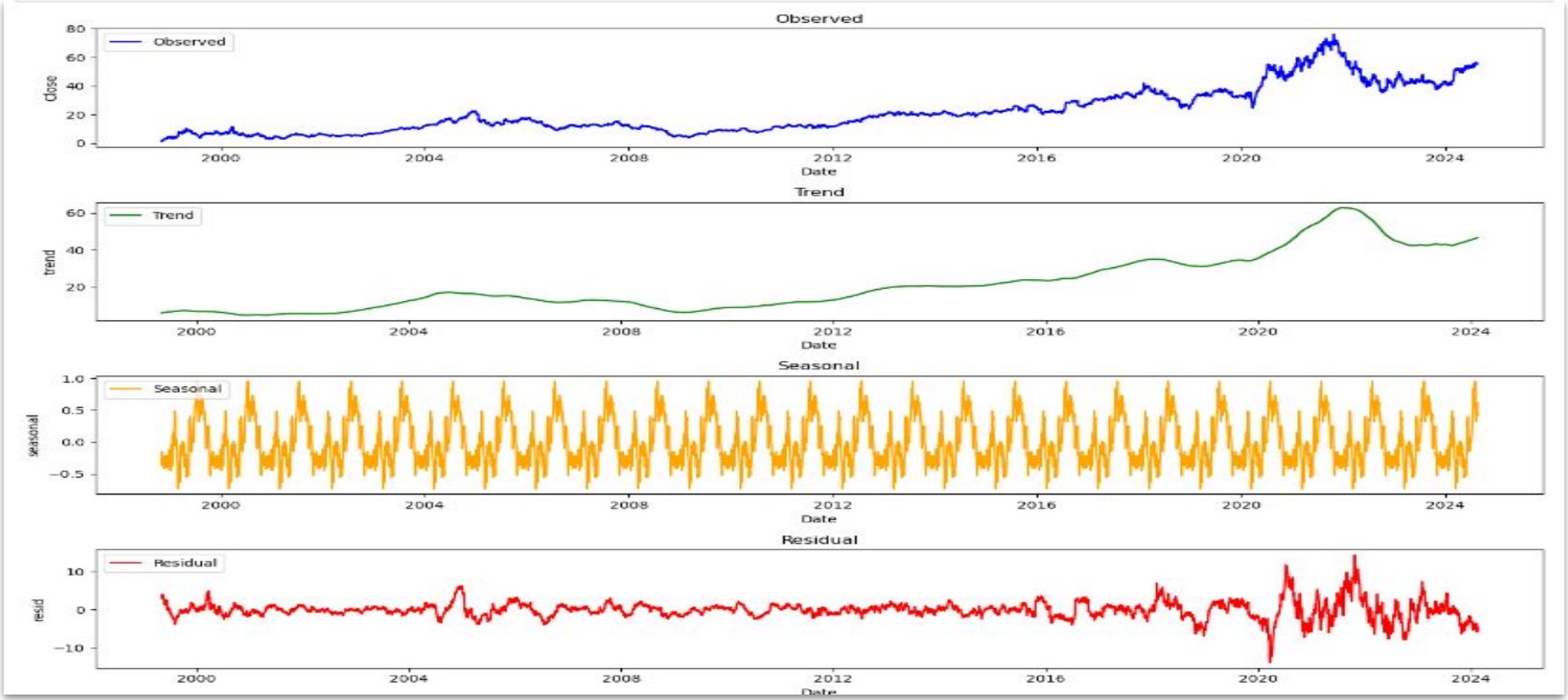
Types of Data Collected:
Historical Stock Prices:

- Open Price
- High Price
- Low Price
- Close Price
- Volume

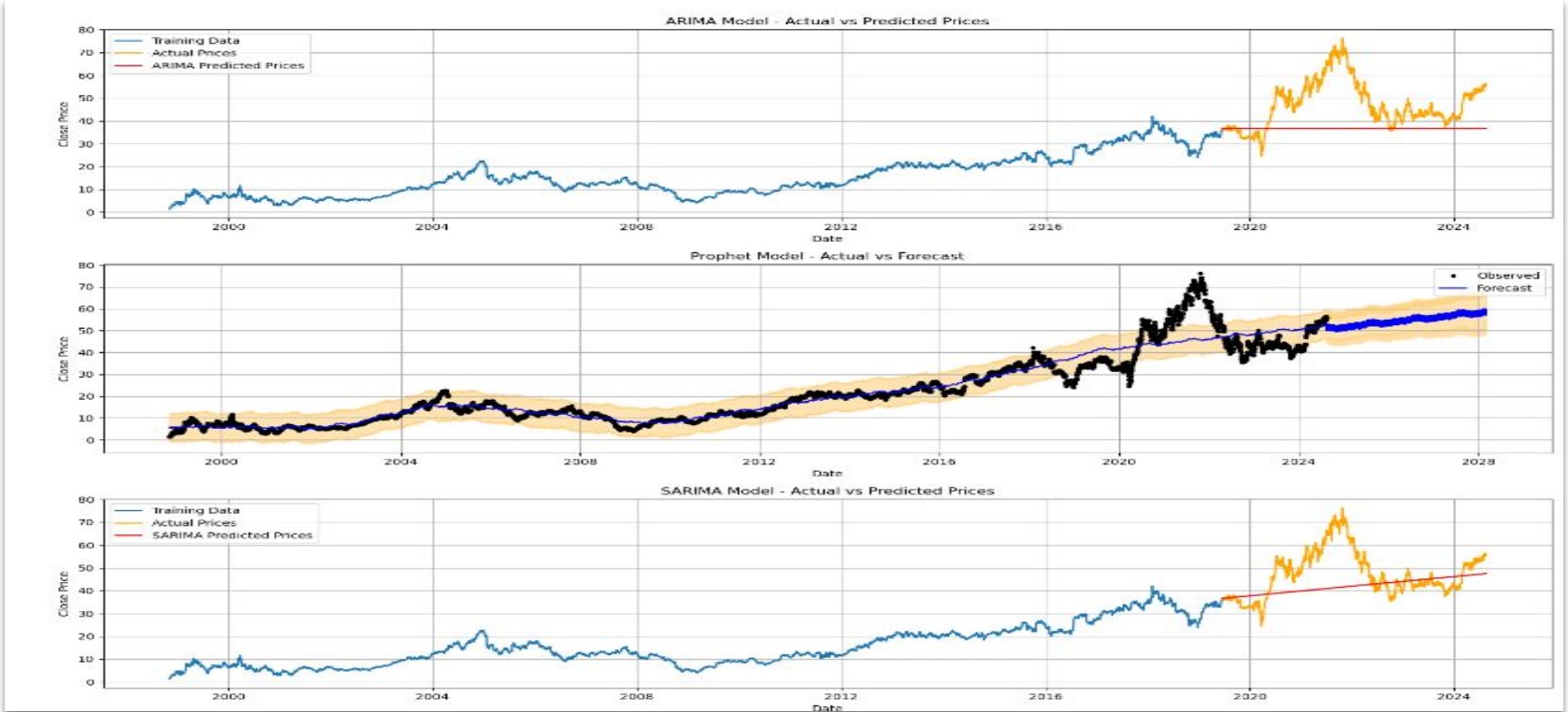
Adjusted Close Prices:

- Adjusts for corporate actions like dividends and stock splits.

Exploratory Data Analysis



Models Trained



Modeling Approach

Chosen Models:
Prophet Model: Developed by Facebook, ideal for time series forecasting.

Why Prophet?
Handles seasonality well, which is crucial for sales forecasting.
Capable of accommodating holiday effects and other special events.
Easily interpretable by non-technical stakeholders.

Model Training and Validation

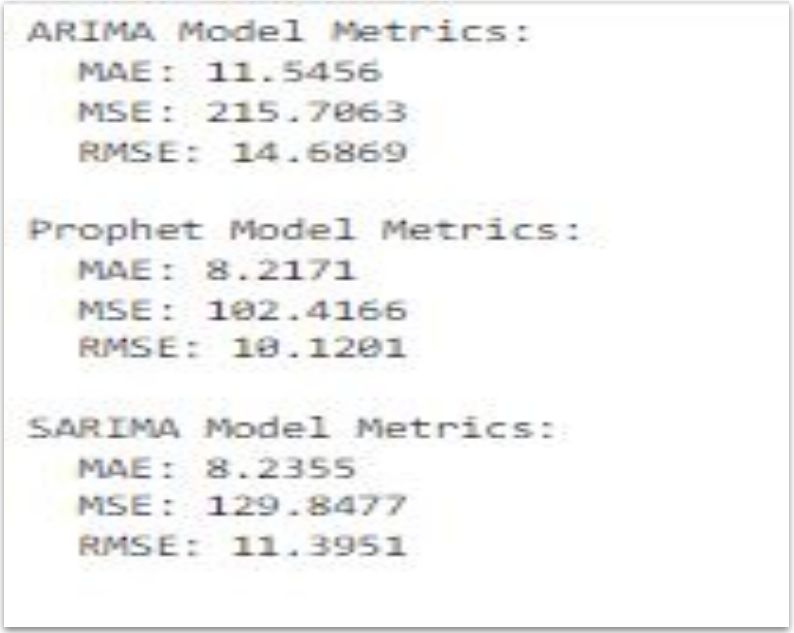
Validation Strategy:
Cross-validation to assess model performance over different time periods.
Metrics used: Mean Absolute Error (MAE), Root Mean Squared Error (RMSE).
Comparison with baseline models (e.g., simple moving averages).

Challenges:
Overfitting: Avoiding a model that performs well on training data but poorly on unseen data.
Seasonality adjustments: Ensuring the model accounts for yearly or quarterly trends.

Results

The Prophet model performs best based on the provided metrics:

It has the lowest MAE, indicating smaller average errors. It has the lowest MSE and RMSE, showing better overall accuracy and less impact from large errors. In summary, the Prophet model is the most accurate among the three models for this dataset.



Business Implications

For Inventory Management:
- Improved stock level predictions reduce the risk of overstock or stockouts.
- Better alignment of inventory with expected sales volumes.

For Marketing:
- Timing marketing campaigns with predicted sales peaks.
- Allocating resources more effectively to maximize ROI.

For Financial Planning:
- More accurate sales forecasts leading to better budgeting and resource allocation.
- Improved ability to forecast revenue and profit margins.

For Strategic Decision-Making:
- Data-driven insights informing executive decisions on market positioning and resource investment.
- Ability to anticipate market trends and adjust strategies accordingly.

Conclusion

Summary of Findings:
The importance of predictive analytics in optimizing sales on eBay.
How the Prophet model helps in forecasting sales trends and improving business outcomes.

Key Takeaways:

- Accurate forecasts lead to better decision-making across inventory, marketing, and finance.
- The approach can be scaled and adapted to other eCommerce platforms or industries.

Future Work:
Potential to incorporate more variables like economic indicators or consumer sentiment.
Exploring advanced models or ensemble approaches for even greater accuracy.
Continuous model refinement as new data becomes available.

Thank You

Optimizing eBay Sales with Pred
Analytics