Short Term Price Optimization For Amazon

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Introduction

To optimize the prices for Amazon using hybrid model for the historic UK dataset obtained from Kaggle

Literature Review

Amazon uses several independent models where the data is real time data. These independent models are used to obtain future prices based on the trends and patterns of historic prices yielding optimal prices. My objective is same but strategy is different in the sense of using hybrid model instead of independent models

Data Collection

Data has been collected from a single public resource, i.e., Kaggle

Feature Engineering

Feature engineering has been performed to add several key features as Date Time, Popularity Growth, Market Share, Inventory Turnover Rate and Price Elasticity as prerequisites in order to develop hybrid models and use the best performing model's predictions along with the other key features that affects sales to boost the optimal prices, as well as use these key features as evaluation metrics in order to evaluate the performance of the model as well as the obtained optimal prices

Models Used

1. ARIMA (Auto Regressive Integrated Moving Average) a time series model to add dynamicity to the given static data
2. Random Forest Regressor a robust machine learning model that used input of ARIMA and other key features and yielded predictions as output
3. Hypertuned Random Forest Regressor is hypertuned Random Forest Regressor model where parameters are added in order to improve performance of model
4. LGBM (Light Gradient Boosting Machine) Regressor yet another robust model implemented for more improved performance
5. Hypertuned LGBM Regressor is hypertuned LGBM regressor model where hyperparameters are added to hypertune the model in order to improve it's performance

Model's Performance

Evaluated on the basis of Root Mean Square Error (RMSE) :

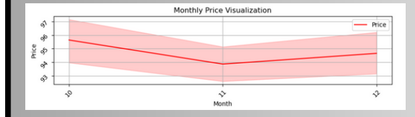
1. Random Forest Regressor RMSE : 487.92
2. Hypertuned Random Forest Regressor RMSE : 431.80
3. Light Gradient Boosting Machine Regressor : 430.03
4. Hypertuned Light Gradient Boosting Machine Regressor : 429.95

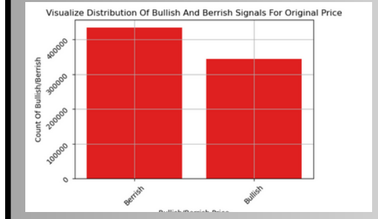
Thus, hypertuned LGBM Regressor model's predictions have been used further

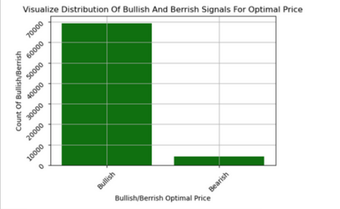
Further Steps

Used the ARIMA predictions, Hypertuned LGBM Regressor Model predictions, Popularity Score, Market Share, Inventory Turnover Rate and Price Elasticity to obtain and boost Optimal Prices

Visuals







Result

Metric	Price	Optimal Price
Profit	$7.92 Billion	$42.99 Billion
Revenue	$9.32 Billion	$43.57 Billion
Inventory Turnover Rate	63.12	1806.84
Market Share	0.00	0.01
Popularity Score	3565.28	46982.67
Price Elasticity	2.33	6.55

Conclusion : As the visuals and result says it all, by optimizing prices I was able to improve the sales for the given dataset