BAE SYSTEMS

INTRODUCTION

The Controls and Avionics Solutions sector of BAE Systems is dedicated to the development and integration of avionics systems and flight control technologies. Their current analytical models are forecasted using Excel, but they occasionally require manual manipulation to enhance accuracy.

GOAL

Our main goal for this project was to create a predictive model using machine learning tools that can identify external market factors and internal data trends to then accurately forecast the sales of spare airplane parts.

WORKFLOW



Predictive Analysis for Sales 29 PURDUE UNIVERSITY.

EXPLORATORY DATA ANALYSIS



MACHINE LEARNING



Key Metrics of Model Performance

- MAE (Mean Absolute Error) and MSE (Mean Squared Error): Measure prediction errors — lower is better.
- **R²** Score: Indicates how well the model explains data variance — closer to 1 is ideal.



THE DATASETS AND RESULTS

<u>Region Dataset</u>

Yearly accounts of the sales and fleet data in reference to the total number of units sold to each region

Random Forest Performance: MAE: 9.7 MSE: 4.8 R2 Score: 0.9807

Operators Dataset

Variables pertaining only to customers with fleet data including part group, hub count, MTBUR, and total units

| Model | R^2 | MSE |
|-------------------|-----|---------|
| Random Forest | .76 | 1522.27 |
| Decision Tree | .66 | 2196.97 |
| Linear Regression | .44 | 3649.84 |
| SVR | .01 | 6498.60 |

Financial Dataset

Dataset split into two subsets to model separate sales behavior. XGBoosting produces the best performance. Dataset 1 XGB MSE: 5558.6868 Dataset 2 XGB MSE: 299.9030





CONCLUSION

Our high accuracy models will help BAE systems forecast the sale of spare parts. This will help them manage their inventory, ultimately resulting in saved time and money.

FUTURE GOALS

The models can be fine-tuned for accuracy and precision. Also, the input of the model should be adjusted to better match BAE System's data format to minimize the difficulty in use.

CONTRIBUTORS

Vishal Bhat, Sudarshan Krishnan, David Panek, Ishita Gupta, Mihika Ghosh, Angel Tlamani, Saidutta Emani, Chloe Moore, Pranavi Pothuganti, Naisha Jain, Emily Hershey, Prisha Joshi, Elise Huhn

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