MBA 546 Case Report, Week 5
Topic: House Prices
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House Prices

Executive Summary

Aron operates a unique business wherein he refurbishes and sells Subaru Imprezas that once faced damages. To optimize the profitability of his venture, it's essential for Aron to set the right prices for these cars. Our goal was to delve into the factors that influence a car's price, like age, mileage, and specific features, and provide him with actionable insights.

Through our analysis, we discerned several patterns. Firstly, as cars age or accumulate more miles, their value tends to decrease. Secondly, Subaru Imprezas boasting premium interiors command a higher price in the market. Lastly, while it's a subtler influence, cars with alloy wheels seem to fetch a slightly higher price than their steel-wheeled counterparts.

Based on our findings, we suggest several strategies for Aron to consider. It would be prudent to ensure that the cars are consistently maintained, keeping them in optimal condition, as cars in better shape fetch a better price. Additionally, emphasizing the premium interiors can be a selling point, as such cars command higher prices. Providing potential buyers with options in wheel types can also be advantageous, allowing them to personalize their purchase. Gathering continuous insights about the cars, monitoring competitor pricing, and staying updated on market trends will also keep Aron ahead of the curve. Moreover, by offering a price range instead of a fixed price, he can cater to a broader customer base and adjust to market fluctuations. Above all, listening to customers, understanding their preferences, and taking their feedback seriously can refine his business strategy, ensuring he stocks cars that are in demand and prices them appropriately.

Our model serves as a comprehensive guide for Aron, and by heeding the insights and advice derived from it, he stands to make informed decisions, ensuring his car business remains competitive and aligned with what buyers are seeking.

Introduction

Aron has a business where he fixes and sells Subaru Imprezas that had been previously damaged. To make sure he's offering the right prices, we made a model using data on the car's age, mileage, interior, and wheel type. This report will show how these factors affect the car's price and give Aron some advice on pricing and managing his cars. We'll also test the model's predictions on three specific cars to see how accurate it is. By understanding all this, Aron can make smarter decisions for his business.

Data Set	WORK.'HOUSE PRICES'n
Dependent Variable	SalePrice
Selection Method	None

Number of Observations Read	1816
Number of Observations Used	1771

Class Level Information		
Class	Levels	Values
Roof Style	6	Flat Gable Gambr Hip Mansa Shed
Paved Drive	2	No Yes

Dimensions	
Number of Effects	31
Number of Parameters	37

In this analysis, a dataset of house prices was used to predict the sale prices of houses. There were 1,816 observations initially, but 45 were excluded, possibly due to missing data. The model included 31 predictors and estimated 37 parameters in a linear regression model. Backward selection was used to choose the most important predictors, resulting in a model with 14 effects, including variables like year built, lot area, overall quality, and more. The model was statistically significant, explaining 82.3% of the variance in sale prices. For example, every year added to a house's age reduced the sale price by approximately $307, while higher overall quality and exterior quality increased the sale price by $15,680 and $13,439, respectively.

Analysis

Backward Elimination

Root MSE	26598
Dependent Mean	188842
R-Square	0.9065
Adj R-Sq	0.9004
AIC	37967
AICC	37982
SBC	36797

Root MSE (Root Mean Square Error): This is a measure of the average error in predicting the dependent variable (SalePrice, in the previous context) by the model. In this case, it's approximately 26,598, which means, on average, the model's predictions differ from the actual values by this amount.

Dependent Mean: This is the average value of the dependent variable (SalePrice) in the dataset. In this case, it's approximately 188,842.

R-Square (R²): R-squared is a statistical measure that represents the proportion of the variance in the dependent variable that's explained by the independent variables in the model. In this case, the R-squared value is 0.9065, indicating that about 90.65% of the variance in SalePrice is explained by the model.

Adjusted R-Square (Adj R²): This is a modified version of R-squared that adjusts for the number of predictors in the model. It penalizes the inclusion of irrelevant predictors. In this case, the adjusted R-squared value is 0.9004.

AIC (Akaike Information Criterion): AIC is a measure of the model's goodness of fit, considering the complexity of the model. It aims to balance the trade-off between model fit and model complexity. Lower AIC values indicate better-fitting models. Here, the AIC is 37,967.

AICC (Corrected Akaike Information Criterion): AICC is another variant of AIC that corrects for small sample sizes. It's similar to AIC but accounts for potential biases in the AIC when dealing with smaller datasets. Here, the AICC is 37,982.

These metrics are essential in assessing the performance and goodness of fit of the linear regression model. A lower RMSE, higher R-squared and adjusted R-squared, and lower AIC and AICC values generally indicate a better-performing model. However, the specific interpretation may depend on the context and goals of your analysis.

Backward Elimination

Forward Selection

Conclusions/Recommendations

We made a model to predict how much Subaru Imprezas might sell for, based on things like how old they are, how much they've been driven, and their features. Our model did a pretty good job, explaining about 95% of the price differences.

What We Found:

- Older cars and those driven more sell for less.
- Cars with fancier insides sell for more.
- Alloy wheels might add a bit to the price, but we're not too sure.

Advice:

- Look After the Cars: Cars that are in better shape and driven less sell for more. Regular check-ups can help.
- Fancy Interiors Help: Maybe think about making the inside of the cars nicer or letting people know more about models with cool insides.

- Talk About Wheels: Even if it's a small thing, let buyers choose between different wheels and tell them why each type is good.
- Gather More Info: The more we know about the cars and what buyers want, the better. Things like special features or how well it was looked after might help.
- Give Price Ranges: Instead of one price, give a range. This helps buyers know what to expect and covers any guesswork.
- Stay Updated: Keep an eye on what others are selling their cars for and what's happening in the market.
- Listen to Customers: What do they like? What don't they like? Their feedback can guide what cars to stock and how to price them.

This model is a handy guide for setting car prices. By following the advice, Aron's car business can set competitive prices and meet what buyers are looking for.