

IMPACT OF RESTAURANT RANKING ON SALES AT SONNY'S BBQ

Introduction

The objective of this analysis was to evaluate the impact of restaurant ranking on sales at Sonny's BBQ. Management believes that a better restaurant ranking can drive increased sales, implying a direct link between rank position and financial performance. By understanding this relationship, Sonny's BBQ can develop strategies to improve its market position and potentially boost revenue. This report uses data from the top 250 ranked restaurants in the United States to investigate the relationship between ranking and sales using a Decision Tree model.

Data Understanding

The data set used to perform this analysis contains rankings and sales data for the top 250 restaurants in the United States. Key variables include:

Ranking: The ordinal rank of the restaurant in the top 250 restaurants.

Sales: The recorded yearly sales figures for each restaurant.

Other Variables: Information on the number of units per chain of restaurants (Units) and year-over-year sales growth (YOY_Sales).

They become necessary to understand, since they lay the foundation for predicting how a ranking will affect the economic performance of a restaurant.

Data Preparation

The dataset was imported using PROC IMPORT in SAS to ensure all variables were read properly.

```
PROC IMPORT DATAFILE=REFFILE
```

```
DBMS=XLSX
```

```
OUT=resdata;
```

```
GETNAMES=YES;
```

PROC CONTENTS was run as a quick summary to check data structure and identify any missing values. The dataset was clean, with no adjustments necessary.

Split train and test: The 70-30 split is done to get the training and test datasets with an assurance of the model's reliability.

```
PROC SURVEYSELECT DATA=resdata OUT=resttrain METHOD=SRS SAMPRATE=0.7 SEED=123;
```

PROC SURVEYSELECT was used to randomly select 70% of the data for model training. The SEED option allows for reproducibility.

Modeling

A Decision Tree has been selected for this analysis because it is capable of capturing complex and non-linear relationships between ranking and sales. The model is implemented using PROC HPSPLIT in the SAS environment.

```
PROC HPSPLIT DATA=resttrain;
```

```
MODEL Sales = Rank;
```

This procedure PROC HPSPLIT creates a Decision Tree model for predicting Sales based on Rank as the primary predictor variable. The output includes fit statistics, tree complexity information, and variable importance measures.

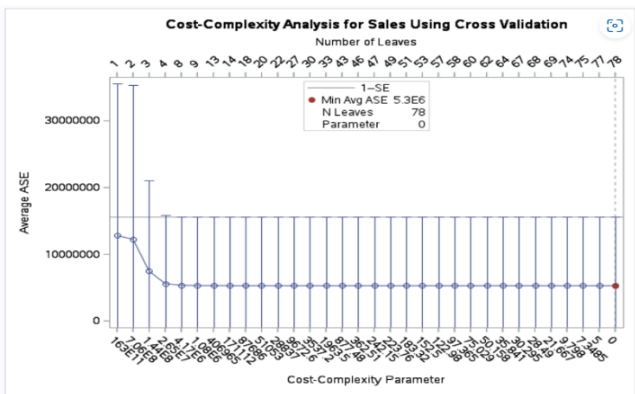
Evaluation

The Decision Tree model produced the following results:

Model-Based Fit Statistics: The selected tree with 80 leaves resulted in an Average Squared Error (ASE) of 2,502,041, and a Residual Sum of Squares (RSS) of 437,860,000. The ASE provides an average measure of prediction error, and lower values indicate better predictive performance.

The HPSPLIT Procedure				
Model-Based Fit Statistics for Selected Tree				
N Leaves		ASE	RSS	
80		2502041	4.3786E8	

Variable Importance				
Variable	Variable Label	Training		Count
		Relative	Importance	
Rank	Rank	1.0000	45302.2	79



The Cost-Complexity plot: The was part of the output, shows the relationship between the complexity of the model (number of leaves) and the prediction error (ASE). The selected model, with 78 leaves, corresponds to a point where the average ASE is minimized. This indicates that further increasing the number of leaves would not significantly improve the model's accuracy, suggesting an optimal balance has been achieved.

Variable Importance: Rank emerged as the most influential predictor for sales, with a relative importance score of 1.0000. This underscores that a restaurant's ranking has a significant impact on its sales figures.

Implications

The analysis confirms that restaurants of higher ranks are expected to achieve better sales. This is in line with expectations by the management, meaning efforts to improve the rank of a restaurant are expected to yield increased revenue. The Decision Tree model showed that 80 leaves strike a balance between capturing essential patterns in the data without overfitting.

Prioritization of Ranking Enhancement: As rank is one of the major predictors, Sonny's BBQ needs to focus on activities that will improve its ranking. These may involve activities like improving customer satisfaction, increasing the quality of food, and devising specific marketing campaigns.

Continual Evaluation: Constant updating of the model with new ranking and sales data will ensure that the model is as accurate as possible and leads to very informed business decisions.

Analyze Supplemental Variables: While ranking is a crucial predictor, future models should include more variables—like customer feedback, social media engagement, and regional market dynamics—to achieve a comprehensive understanding of the factors that contribute to sales.

Conclusion

The Decision Tree analysis shows a strong relationship between the restaurant ranking and sales figures. This relationship defines a clear-cut strategy for Sonny's BBQ to improve its sales performance by increasing the rankings. Again, the results suggest that while ranking is an important variable, further inquiry involving other variables that might influence sales outcomes should be taken into account.