ORIE 4741 Final Project Proposal

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1 Background Information

CarMax is a renowned American used-car retailer that operates more than 225 stores across the country. Customers who purchase a car from CarMax often use their current vehicle as a trade-in, for which they receive an appraisal offer. This project aims to analyze a sample of CarMax appraisal data to understand the relationship between a customer's appraised vehicle and the vehicle they purchase. By doing so, we hope to identify insights that can help CarMax improve its business operations and provide customers with a more personalized shopping experience.

2 Data Set Introduction

The data set we shall use for this project was published as a part of CarMax Analytics Showcase Winter 2023. It is a sample of 200,000 customers who have purchased a car from CarMax and their accompanying appraisal details. The data set includes vehicle attributes for purchased and appraised cars, including make/model/trim, mileage, appraisal, and purchase value. Appraised vehicle data can be identified by the suffix '_appraisal' (for example, 'make_appraisal' identifies the make of the vehicle customers sold to CarMax). Among 30 features, there are 17 string, 12 numeric, and 1 integer variables.

3 Questions to explore

The two questions we will explore using the CarMax dataset are:

- What does a customer's appraised vehicle tell us about the vehicle they will end up purchasing?
- How can CarMax use this information to improve business operations and provide customers a personalized shopping experience?

3.1 How does the data set help to answer the question

The data set is composed of vehicle attributes and the vehicles they purchased at CarMax. We will use this information to build a regression model to analyze the relationship between the attributes of the appraised vehicle and those of the purchased vehicle. We will also use clustering techniques to segment customers based on their appraised vehicle and purchased vehicle attributes to identify patterns and preferences.

3.2 How will the insights developed benefit the stakeholder (CarMax)

Customer's shopping experience is extremely important to a car dealership, such as CarMax. Providing a positive experience purchasing a car from CarMax can lead to customer satisfaction, loyalty, and, most importantly, repeat business. The insights based on patterns in the dataset can be used by CarMax to create a more personalized experience for CarMax shoppers.

In addition, CarMax has customer experience centers where associates can help customers through chat or on the phone during their journey of looking for a new vehicle, as well as the associates who work in the stores where cars are being sold. These existing touchpoints can be a recommendation point for change or improvement in CarMax's business operations.

On a bigger scale, our data analysis project findings can help CarMax optimize their inventory, pricing strategy, and customer outreach efforts to better meet the needs of their customers and stay ahead of competitors in the market, which can lead to increased sales and revenue.