The problem statement revolves around optimizing ticket prices for a ski resort, leveraging data science techniques to inform pricing decisions. The primary objective is to maximize revenue by adjusting ticket prices in accordance with the value offered by the resort's facilities. This entails utilizing data on various attributes of ski resorts to build predictive models that can estimate optimal ticket prices.

The data wrangling process involved cleaning and preparing the ski resort dataset for analysis. This included identifying and addressing issues such as erroneous data entries, missing values, and inconsistent formatting. Columns deemed irrelevant or containing excessive missing data were removed. The target feature for modeling, 'AdultWeekend' prices, was chosen based on data quality and relevance.

The exploratory data analysis (EDA) uncovered strong correlations between ticket prices and features such as vertical drop, fastQuads, runs, and total chairs. Scatterplots revealed nuanced relationships, highlighting the impact of various resort attributes on ticket prices. New features were engineered to better capture these relationships, providing valuable insights into feature importance for modeling.

Prior to modeling, preprocessing steps were undertaken to handle categorical variables and scale numerical features. Feature engineering techniques were employed to create new features that enhanced the predictive power of the models. Careful consideration was given to multicollinearity and complex feature relationships during feature selection.

Two regression models were explored: linear regression and random forest regression. Evaluation metrics such as mean absolute error were utilized to assess model performance. While linear regression provided insights into significant features driving ticket prices, the random forest regressor outperformed it in terms of predictive accuracy, capturing nonlinear relationships more effectively.

The random forest regression model emerged as the winning model, demonstrating superior predictive performance compared to linear regression. Scenario modeling was conducted to evaluate the impact of potential changes to the resort, such as adding runs and installing additional chair lifts, on ticket prices. These scenarios were assessed for their feasibility and potential revenue impact.

Based on the modeling results, a pricing recommendation was formulated, suggesting an adjusted ticket price that better aligns with the value of the resort's facilities. Consideration was given to additional operating costs, such as expenses related to new chair lifts, to ensure pricing adjustments are financially viable while maximizing revenue potential.

The project successfully utilized data science techniques to inform pricing decisions for the ski resort. By leveraging predictive modeling and scenario analysis, actionable insights were generated to optimize ticket prices and maximize revenue. The chosen random forest

regression model demonstrated superior performance and reliability, providing a valuable tool for strategic decision-making.

Future work could focus on refining the model by incorporating additional cost information and integrating market research and customer feedback to enhance accuracy. A user-friendly interface could be developed to facilitate decision-making processes, allowing business analysts to explore different pricing scenarios easily. Regular updates and improvements to the model should be prioritized to adapt to changing market conditions and operational factors, supported by a robust feedback loop for validation.