# Deliverables

## Objective

The goal of this analysis is to provide actionable insights to a group of used car dealers interested in optimizing their inventory and pricing strategies. By analyzing the key factors influencing car prices, this report outlines recommendations for improving profitability and catering to consumer preferences.

## Primary Findings

1. Key Factors Influencing Car Prices:  
- Region: Regional preferences significantly impact pricing. "Region\_abilene" has the highest influence.  
- Vehicle Age: Newer cars command higher prices, as indicated by the strong impact of the log\_year feature.  
- Mileage: Lower odometer readings correspond to higher prices, highlighting the importance of mileage in consumer purchasing decisions.

2. Model Performance:  
- The Random Forest Regressor emerged as the best-performing model with the following metrics:  
 - RMSE: 0.29 (indicating low prediction error).  
 - MAE: 0.16 (indicating low average prediction error).  
 - R²: 0.88 (88% of the variance in car prices is explained by the model).  
- Ensemble models like Random Forest outperformed simpler linear models, capturing non-linear relationships effectively.

3. Feature Importance:  
- The feature importance plot shows that region, vehicle age, and mileage are the top contributors to car pricing, providing valuable insights for decision-making.

## Recommendations

Based on the findings, the following strategies are recommended:  
1. Focus Inventory on Newer Cars:  
- Prioritize acquiring cars with recent manufacturing years to meet consumer demand for newer models.  
2. Adjust Pricing Based on Regional Trends:  
- Tailor pricing strategies based on regional preferences and demand variations.  
3. Emphasize Low-Mileage Cars:  
- Low-mileage cars attract higher prices; prioritize such vehicles in inventory.  
4. Offer Incentives for Less Desirable Vehicles:  
- For older or high-mileage cars, consider offering promotions or incentives to improve turnover.

## Next Steps

1. Deploy the Random Forest model for real-time car price predictions.  
2. Perform further analysis on other categorical features (e.g., brand, fuel type) to uncover additional insights.  
3. Update inventory management and pricing tools with the insights provided by the analysis.

## Conclusion

By understanding the factors driving car prices and implementing the recommended strategies, used car dealers can refine their inventory and pricing, ultimately increasing customer satisfaction and profitability.