Project Documentation: Second-Hand Car Price Prediction

1. Introduction

- **1.1 Project Overview:**
  - This project aims to develop a machine learning model capable of accurately predicting the selling price of second-hand cars.
  - The model will leverage historical sales data and car feature information to provide reliable price estimations.
  - The goal is to provide a valuable tool for both buyers and sellers in the used car market.
- **1.2 Project Goals:**
  - Develop a robust and accurate price prediction model.
  - Identify key features that significantly influence used car prices.
  - Evaluate the model's performance and provide insights into its limitations.
- **1.3 Target Audience:**
  - Individuals looking to buy or sell used cars.
  - Car dealerships and automotive businesses.
  - Market analysts and researchers.

2. Data Acquisition and Preparation

- **2.1 Data :**
  - Kaggle Dataset
  - 8128 Rows & 13 Columns
  - Labeled Data (Continuous Data).
- **2.2 Data Cleaning and Preprocessing:**
  - Dropped Duplicates , Replaced Null values.
  - In column changes by splitting str and int according to conditions.
  - Label encoding done for Transmission type.
  - One hot encoding of categorical columns(Fuel , Seller type ,owner)
- **2.3 Data Splitting:**
  - Splitting of Data for Train and Test within 30 – 70 % proportion

3. Model Development

- **3.1 Model Selection:**
    - Machine Learning model used Linear Regression , Decision Tree and Random Forest which provided 90% accuracy score.
- **3.2 Feature Selection:**
    - Most imp features and corelation evaluated through heatmaps and domain specification.
- **3.3 Model Training and Tuning:**
    - Hyper Parameter Tuning with max_depth, min_samples_leaf, min_samples_split,random_state .
    - Performance Metrices with mean squared error, root mean squared error, R-squared.
- **3.4 Model Evaluation:**
    - Train set score :- 0.9835775571085945.
    - Test set score :- 0.9021438061045652

4. Conclusion and Future Work

- **4.1 Summary of Findings:**
    - Fuel type , individual seller , transmission has most impact on selling price
- **4.2 Limitations:**
    - Does not take into account cars external apperiance.

5. Code Repository:

    - https://github.com/Nikhil-G08/Car-Price-Prediction

This documentation serves as a comprehensive guide to the project, ensuring transparency and reproducibility.