Project Title

Car Price Prediction

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Statement about the problem: The used car market has seen a rise in demand, making it essential for sellers and buyers to determine the most appropriate price for a vehicle. Predictive analysis of car prices based on factors such as model, mileage, year, fuel type, and transmission is critical to provide accurate valuations.

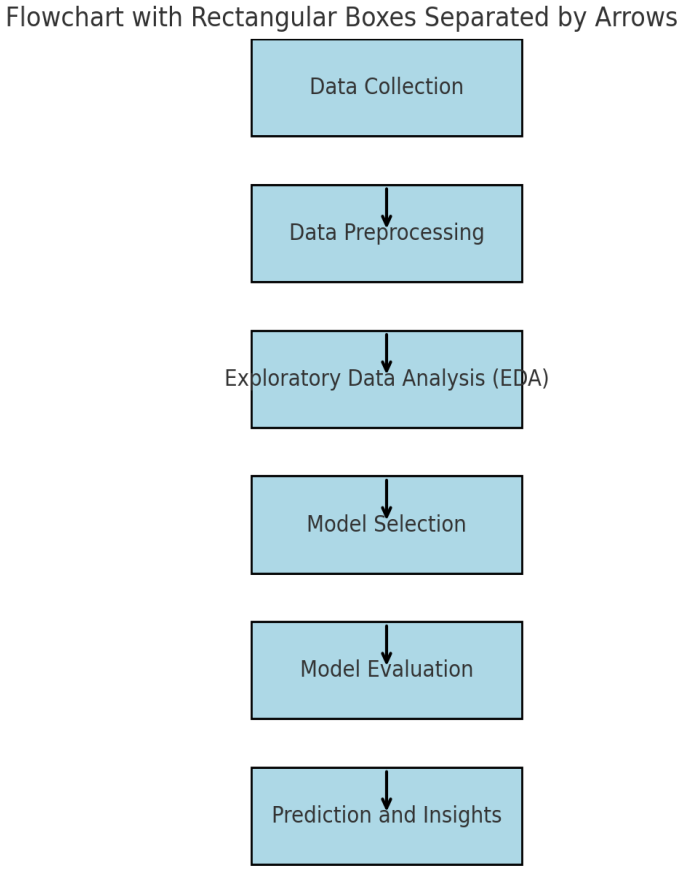
Description: The dataset contains cleaned information about used cars, including features like price, model, year, mileage, fuel type, and transmission. By performing data analysis and building a predictive model, the aim is to forecast the prices of used cars based on these features, providing a tool for both buyers and sellers in the car market.

Objective and Scope of the Project:

Objective: To analyse the given dataset and create a model that accurately predicts car prices based on various features like model, mileage, year, fuel type, and transmission.

Scope: The project involves data cleaning, feature selection, exploratory data analysis (EDA), and building a predictive model using machine learning algorithms such as Linear Regression. The model will be evaluated for performance, and predictions will be made on new data.

Flow Diagram for this Model:



1. **Data Collection:**
   - Input: Cleaned car dataset.
   - Output: Raw data ready for preprocessing.
2. **Data Preprocessing:**
   - Handle missing values, outliers, and scale the data.
3. **Exploratory Data Analysis (EDA):**
   - Visualization: Create plots and graphs to understand the distribution and relationships in the data
   - Correlation Analysis: Identify correlations between features
4. **Model Selection:** Choose Algorithms: Select suitable machine learning algorithms (e.g., Linear Regression, Decision Trees, etc.)

- Model Training: Train the models using the training dataset.

5. **Model Evaluation:**
   - Testing: Evaluate the model using the testing dataset
   - Performance Metrics: Calculate accuracy, precision, recall, F1 score, etc.
   - Model Tuning: Fine-tune hyperparameters for better performance
6. **Model Deployment:**
   - Implementation: Deploy the model into a production environment (if applicable)
   - Monitoring: Set up monitoring to track model performance over time
7. **Prediction and Insights:**
   - Prediction: Use the model to make predictions on new data
   - Insights: Generate insights from the model predictions for decision-making

Methodology: The process involves the following steps:

- Load the cleaned car data into the Python environment.
- Data Preprocessing: Clean the data, handle missing values, and prepare it for analysis.
- Exploratory Data Analysis: Visualize important relationships between car features and their prices.
- Model Training: Train models such as Linear Regression and Decision Trees using scikit-learn.
- Evaluation: Use metrics like R-squared, MSE to evaluate model performance.
- Visualizations: Use Python libraries like Matplotlib and Seaborn for graphs and charts.

Hardware & Software used:

- **Hardware:** Standard computing resources (laptop/desktop with adequate RAM and processing power).
- **Software:** Python, Jupyter Notebook, Pandas, Matplotlib, Seaborn, and other relevant Python libraries.

Future Work of this Project:

- Expanding the analysis to include global data.
- Integrating additional features such as car reviews, resale values, and brand effects.

- Developing a web-based tool or dashboard to predict car prices in real-time.

References/Bibliography:

- **scikit-learn Documentation:** scikit-learn: machine learning in Python— scikit-learn 1.5.1 documentation
- **Python Official Documentation:** Welcome to Python.org
- **Matplotlib library:** Matplotlib — Visualization with Python
- **Seaborn library:** https://seaborn.pydata.org
- **Pandas library:** https://pandas.pydata.org/
- **Jupyter Notebook:** https://jupyter.org/