

PREDICTING CAR PRICES WITH MACHINE LEARNING

Explore methodologies and insights for accurate car price prediction using advanced machine learning techniques.



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CAR PRICE PREDICTION

Machine Learning Overview

01

DATA COLLECTION

Gather data on car features like make, model, year, and mileage.

02

FEATURE SELECTION

Identify key features influencing car prices.

03

MODEL TRAINING

Use machine learning algorithms to train prediction models.

04

MODEL EVALUATION

Assess model accuracy and reliability.

05

STAKEHOLDER INSIGHTS

Provide insights to dealers, buyers, and financial institutions.

PREDICTING CAR PRICES

Key Objectives and Focus Areas

01

MAIN PROBLEM

How to accurately predict car prices using machine learning?

02

IMPORTANCE

Optimize sales strategies, enhance customer satisfaction, and improve inventory management.

03

KEY AREAS OF INVESTIGATION

Examine variables affecting car prices and evaluate machine learning models.

EVALUATION CRITERIA

Metrics for Car Price Prediction

ACCURACY



Measures the match between predicted and actual car prices.

MEAN ABSOLUTE ERROR (MAE)



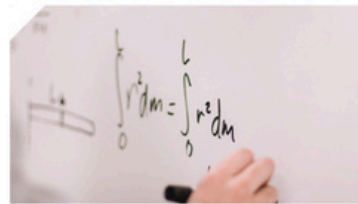
Average of absolute errors between predicted and actual values.

ROOT MEAN SQUARE ERROR (RMSE)



Calculates differences between predicted and observed values.

R-SQUARED



Shows variance proportion in car prices predictable by model.

DATA PREPARATION STEPS

Key Procedures for Dataset Preparation



DATA CLEANING

Removing duplicates and handling missing values.

FEATURE SELECTION

Identifying relevant features such as age, mileage, and make.

DATA TRANSFORMATION

Normalizing and encoding categorical variables.

DATASET READINESS

Ensures dataset readiness for effective model training and evaluation.

KEY INSIGHTS FROM EDA

Understanding Car Price Influencers

POSITIVE CORRELATION WITH ENGINE SIZE

Larger engine size generally correlates with higher car prices.

PRICE VARIATIONS BY BRAND AND YEAR

Car prices vary significantly based on brand and model year.

NEGATIVE CORRELATION WITH MILEAGE

Higher mileage is associated with lower car prices.

GUIDING FEATURE ENGINEERING

These insights inform feature engineering and model selection.

MACHINE LEARNING FOR CAR PRICING

Overview of Techniques Used



LINEAR REGRESSION

Simplistic and interpretable for predicting car prices.



DECISION TREES

Captures nonlinear relationships effectively.



RANDOM FORESTS

Improves accuracy with ensemble learning.



GRADIENT BOOSTING MACHINES

Performs robustly on complex datasets.

MODEL PERFORMANCE COMPARISON

Evaluation Metrics for Different Models

MODEL	MAE	RMSE	R-SQUARED
Linear Regression	\$2,500	\$3,200	0.82
Decision Tree	\$2,800	\$3,500	0.78
Random Forest	\$2,100	\$2,400	0.89
Gradient Boosting	\$1,900	\$2,200	0.91

CAR PRICE PREDICTION INSIGHTS

Key insights to refine sales strategies and manage inventory

FEATURE IMPORTANCE

Engine size, mileage, and age are key predictors of car prices.

MARKET TRENDS

Newer models and luxury brands command higher prices.

MODEL CHOICE

Ensemble methods like Random Forest and GBM deliver superior results.

PRACTICAL IMPLICATIONS

Insights refine sales strategies and inventory management.



PRICE PREDICTION STRATEGIES

Enhancing Decision-Making in Automotive

UTILIZE ENSEMBLE LEARNING METHODS.

Leverage multiple models for more accurate price predictions in automotive markets.

FOCUS ON ENGINE SIZE AND MILEAGE.

Enhance models by emphasizing crucial features like engine size and mileage.

REGULARLY UPDATE MODELS WITH NEW DATA.

Incorporate the latest data to align with current market trends effectively.

MACHINE LEARNING IN CAR PRICING

Key Findings and Future Directions

■ HIGH ACCURACY IN PREDICTIONS

Machine learning achieves high accuracy in car price predictions.

■ EFFECTIVENESS OF ENSEMBLE METHODS

Ensemble methods enhance prediction accuracy.

■ IMPORTANCE OF FEATURE SELECTION

Feature selection is crucial for improving prediction models.

■ EXPLORING DEEP LEARNING TECHNIQUES

Future work includes exploring deep learning for better accuracy.

■ INTEGRATION OF REAL-TIME DATA

Real-time data integration can refine predictions.

■ CONTINUOUS INNOVATION IN AUTOMOTIVE

Ongoing innovations drive market efficiencies.

REVOLUTIONIZE CAR PRICING WITH AI

Explore the transformative impact of machine learning on car pricing strategies for better decision-making in the automotive market.

