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Car Price Prediction using Machine Learning

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Abstract: *Due to the exceptional number of vehicles being purchased and sold, estimating the value of used cars is a strongly discussed topic. In poorer countries, where they are more inexpensive, people prefer to purchase used cars more frequently. This project's primary objective is to develop a prediction model, sometimes referred to as a fair pricing mechanism, to anticipate the selling price of an automobile based on attributes including its model, age in years, gasoline type, seller type, gearbox type, and mileage. The recommended model makes use of machine learning algorithms in addition to statistical regression techniques including linear, decision tree, and random forest regressions to achieve this purpose.*

Keywords: Recommendation System, Sentiment Analysis, Web Scraping

I. INTRODUCTION

Machine Learning (ML), which is a key component of artificial intelligence (AI). ML is a technique used by computers to learn from past data and algorithms to make autonomous decisions without human intervention. It involves the use of algorithms and statistical models that can automatically learn patterns and relationships in the data to make predictions and decisions.

The primary objective of the research mentioned in the passage is to develop a model that can accurately predict fair pricing for old automobiles in the used car market. This model has the potential to benefit sellers, buyers, and automakers by providing them with reliable and unbiased pricing estimates for used cars.

The model combines statistical regression techniques including linear, decision tree, and random forest regressions with machine learning algorithms to achieve this goal. With the use of these methodologies, the model may examine a number of variables, including the car's age, mileage, condition, make, and model, as well as other pertinent data, to determine the vehicle's fair market value.

II. EXISTING SYSTEM

The current method of evaluating automotive prices frequently entails speaking with subject-matter specialists, which can be a difficult and time-consuming process. Various factors that affect a car's price, such as brand, model, age, condition, mileage, market trends, and demand for comparable vehicles, are evaluated by subject-matter experts using their knowledge and experience. However, because it is based on individual judgements and subjective evaluations, this process can be tedious and arbitrary.

Additionally, it's possible that human experts don't always have access to all the data required to predict prices accurately. For instance, they could not be knowledgeable about current market trends or might not have access to enough information to examine how certain elements affect a car's value. This can lead to incorrect price forecasts, which would cause market inconsistencies

III. PROPOSED SYSTEM

The technique of applying machine learning to forecast used car prices without a lot of human intervention is described in the paragraph, leading to more impartial results. Training and testing are the two stages of the process. The recommended model fitting technique is used to fit the model during the training step, which involves training the model using a dataset. During the testing phase, the model's accuracy is assessed using pertinent data. The model is made to detect and calculate the price of a used car based on a number of variables, such as the car's make, model, year, mileage, petrol type, seller type, gearbox, and owner. advantages.

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The main goal of the suggested model is to predict the selling price of an automobile utilising cutting-edge machine learning methods like linear regression and random forest regression. For precise pricing projections, the algorithm takes into account a number of variables, including the make, model, year, mileage, petrol type, seller type, gearbox, and owner of the car. The model is trained on a dataset of car attributes with the use of Python tools like Scikit-Learn and TensorFlow, and is then fitted with the desired model fitting method

IV. SYSTEM ARCHITECHTURE

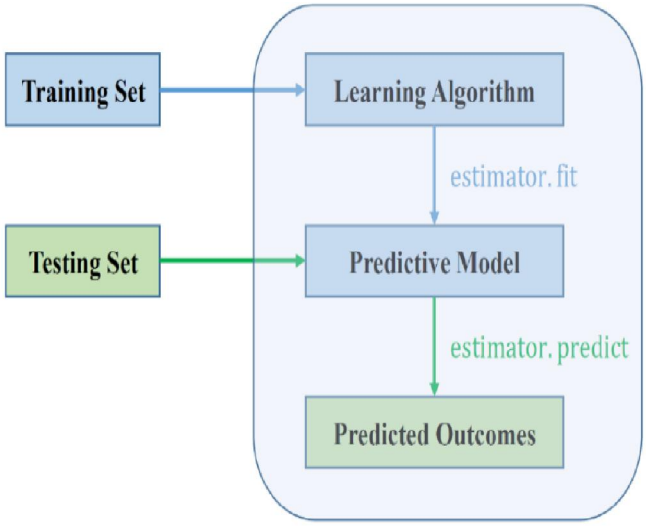

Figure 1: System Architecture

The system architecture for automobile price prediction using machine learning includes a number of crucial elements.
A complete dataset of features connected to cars and their associated costs is first gathered through data collecting.
To maintain uniformity and eliminate outliers or inconsistencies, the obtained data is then preprocessed. This calls for actions like feature scaling, missing value management, and data cleansing.
Then, key elements that might aid in the prediction job, such as automobile make, model, year, mileage, and engine specs, are extracted from the raw data using feature engineering.
By comparing the trained model's predictions to a different validation dataset and using metrics like mean squared error or R-squared, the trained model is assessed.
The model may be deployed in a production setting after it has been trained and tested. In order to do this, the model must be integrated into a programme or system that produces price forecasts based on input data (automotive attributes).
In order to preserve accuracy and relevance over time, the deployed model's performance is tracked, and it can be frequently updated with fresh data.
Data collection, preprocessing, feature engineering, model training, assessment, deployment, and implementation make up the architecture as a whole

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V. UML DIAGRAMS

Use Case Diagram:

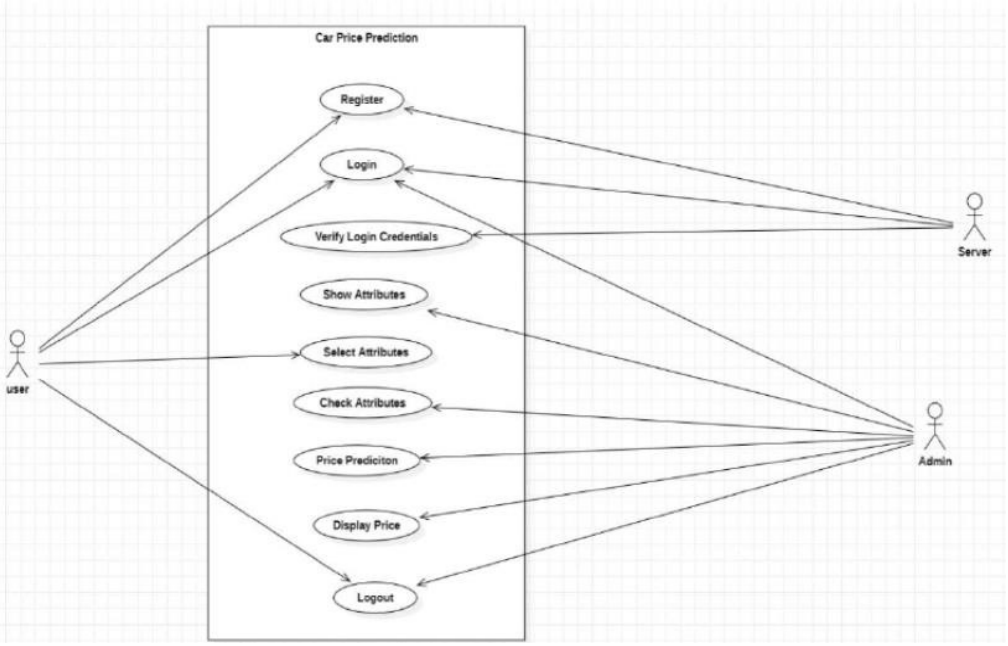

Figure 2: Use Case Diagram

Activity Diagram:

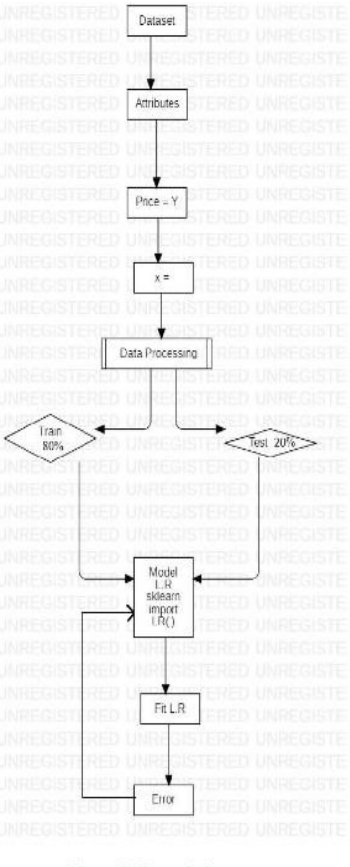

Figure 3: Activity Diagram

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VI. METHODS USED IN CAR PRICE PREDICTION

Linear Regression

A well-liked machine learning approach for regression and predictive modelling is linear regression. It is a straightforward yet efficient technique that counts on a linear connection between the properties of the input and the variable to be predicted.

A continuous target variable can be predicted using a supervised learning process called linear regression based on one or more input characteristics.

The goal variable may be seen of as a linear combination of the input characteristics, and it is assumed that the input features and the target variable have a linear connection.

While multiple linear regression uses several input characteristics, basic linear regression simply requires one input feature.Finding the best-fitting line that reduces the gap between the predicted values and the actual values is the aim of linear regression.

Estimating the slope and intercept coefficients, which characterise the relationship between the input characteristics and the target variable, yields the line.

Metrics like mean squared error (MSE), root mean squared error (RMSE), or R-squared are frequently used to assess the effectiveness of a linear regression model.

If the model is overly complicated in comparison to the available data or if there is multicollinearity (high correlation) among the input characteristics, linear regression may be prone to overfitting.By include a penalty term in the loss function, regularisation techniques like L1 regularisation (Lasso) and L2 regularisation (Ridge) may be used to avoid overfitting.

Certain presumptions are made by linear regression, such as linearity, independence, homoscedasticity (constant variance), and normally distributed errors.

For tasks including price prediction, demand forecasting, trend analysis, and effect evaluation, linear regression is often used in a variety of disciplines, including economics, finance, the social sciences, and engineering

VII. CONCLUSION

Machine learning may be used to anticipate car prices, which is helpful for buyers and sellers in determining the fair worth of a car based on its attributes and past performance. It is feasible to train several regression models, such as Linear Regression, Decision Tree Regression, and Random Forest Regression on a dataset including automobile characteristics, such as year, kilometres driven, fuel type, etc., with the aid of Python libraries such as ScikitLearn and TensorFlow. The trained model can be linked to a frontend interface using Flask, enabling customers to input information about their cars and get real-time price predictions. Overall, by offering precise estimations of a vehicle's value, automobile price prediction utilising machine learning may save buyers and sellers time and money.

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