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# Forecasting Resale Values : Leveraging Artificial Neural Networks and Machine Learning for Pre-owned Car Price Predictions

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**ABSTRACT:** Since cars are so widely used, newly manufactured vehicles frequently encounter obstacles in their marketing strategy, including high costs, restricted supply, and limited financial resources. There has consequently been a notable increase in the worldwide used car market. In India, however, the used automobile market is still in its infancy and is primarily driven by the unorganized sector. This situation opens the door to fraudulent activity when buying old cars. Because of this, a very accurate model that can fairly predict the cost of a used car is required, one that will be advantageous to both buyers and sellers. A machine learning model based on supervised learning has been created to meet this demand. These algorithms are able to generate precise predictions with little bias against the vendor or the customer because they are trained on an extensive amount of automotive data. The study presents a low error value functional model for used automobile price prediction. To guarantee accurate and dependable forecasts, the model takes into account a wide range of unique properties.

**KEYWORDS :** Seller, Cars, Fraudulent, Car Price, Prediction

## I. INTRODUCTION

A car that has had one or more retail owners in the past is referred to as a used car, pre-owned car, or secondhand car. Numerous venues provide used automobiles for sale, such as lease offices, buy here pay here dealerships, independent and franchised car dealers, rental car companies, auction houses, and private parties[5]. Some auto dealers provide extended service contracts or warranties, "no-haggle prices," and "certified" used vehicles.

Predicting the price of a used car is dependent on several factors. The production year, make, model, mileage, horsepower, and place of origin are the most crucial ones. The type and quantity of fuel used per usage, the kind of braking system, the car's acceleration, the interior design, its physical condition, the number of cylinders (measured in cubic centimeters), the car's size, number of doors, weight, customer reviews, the color and type of paint, the transmission, whether the car is a sports car, the sound system, the cosmic wheels, the power steering, the air conditioning, the GPS navigator, the safety index, etc. are all important factors[6]. Certain unique variables are also typically taken into account in the Mauritius setting, such as the former owners' identities and the history of any significant accidents involving the vehicle.

In this study, we will evaluate if the price of used automobiles can be properly predicted using machine learning. The outcomes will also be contrasted with other techniques, such as support vector regression and linear regression[8]. In this study, we will evaluate if the price of used automobiles can be properly predicted using machine learning. Additionally, a comparison with alternative techniques such as linear regression as well as support vector regression[7].

## II. RECENT WORKS

In [1], this paper, examine the use of supervised machine learning methods to forecast Mauritius used vehicle prices. The forecasts rely on historical information gathered from daily publications. The predictions have been made using a variety of methods, including decision trees, k-nearest neighbors, Naive Bayes, and multiple linear regression analysis.

Next, the predictions are assessed and contrasted to determine which yield the best results. It turns out that a problem that seemed simple might actually be exceedingly challenging to address accurately. The four approaches all yielded results that were equivalent. We plan to make the predictions in the future using more advanced algorithms.

In [2], the industry, a new automobile's price is set by the manufacturer plus a few extra expenses, however used car sales are rising globally as a result of new car prices rising and consumers being less able to afford them. The reason this approach is used is that the buyer is unaware of the car's current value and the seller sets the price at random. Research indicates that determining a reasonable estimate for a secondhand car is difficult yet crucial. Thus, a precise method for predicting used automobile prices is required. Machine learning prediction approaches can be useful here.

In [3], Over the last ten years, there has been a steady increase in car production, with about 92 million cars produced in 2019. This has led to a significant increase in the used automobile market, which is now recognized as a rapidly expanding sector of the economy. Customers, clients, dealers, and sellers now need to stay up to date on current events and trends in order to determine the true value of any used automobile in the market, thanks to the emergence of several internet portals and websites. Although there are many real-world uses for machine learning, one of the most prominent ones is its use to prediction difficulties. Once more, the number of issues on which a prediction can be made is finite. This project is heavily concentrated and grounded in one of these applications. We will attempt to forecast the price of a used car by using a machine learning algorithm, such as linear regression, and create a statistical model based on data that has been provided with a certain set of attributes.

In [4], Over 70 million passenger automobiles were produced in 2016—a steady increase in car production over the previous ten years. Due to this, the used automobile market has grown to be a thriving business in and of itself. It is now easier for both the seller and the buyer to learn more about the trends and patterns that influence a used car's market value thanks to the development of online portals. Our aim is to create a statistical model that can forecast the price of a used car by utilizing machine learning algorithms like Lasso Regression, Multiple Regression, and Regression trees. This model will be dependent on past consumer data and a predetermined set of variables.

### **III. PROPOSED WORK**

Predicting the cost of used cars is therefore a very commendable endeavor. The purpose of this article is to evaluate if the price of secondhand automobiles can be properly predicted using neural networks. The outcomes will also be contrasted with those of other techniques, such as K nearest neighbors, Random Forest Algorithm, logistic regression, and support vector machines algorithms.

To conduct this research, information was gathered from many auto websites as well as the minor advertisement parts of daily newspapers such as L'Express and Le Defi. In August of 2014, the data was gathered in less than a month because, similar to other items, car prices fluctuate over time. It was possible to gather 200 records. A variety of characteristics for used cars are included in the data, including the year the vehicle was manufactured, the make, the engine capacity (measured in cubic centimeters), the type of paint (normal or metallic), the type of transmission (manual or automatic), the mileage (the number of kilometers the vehicle has been driven), and the price (in Mauritian rupees).



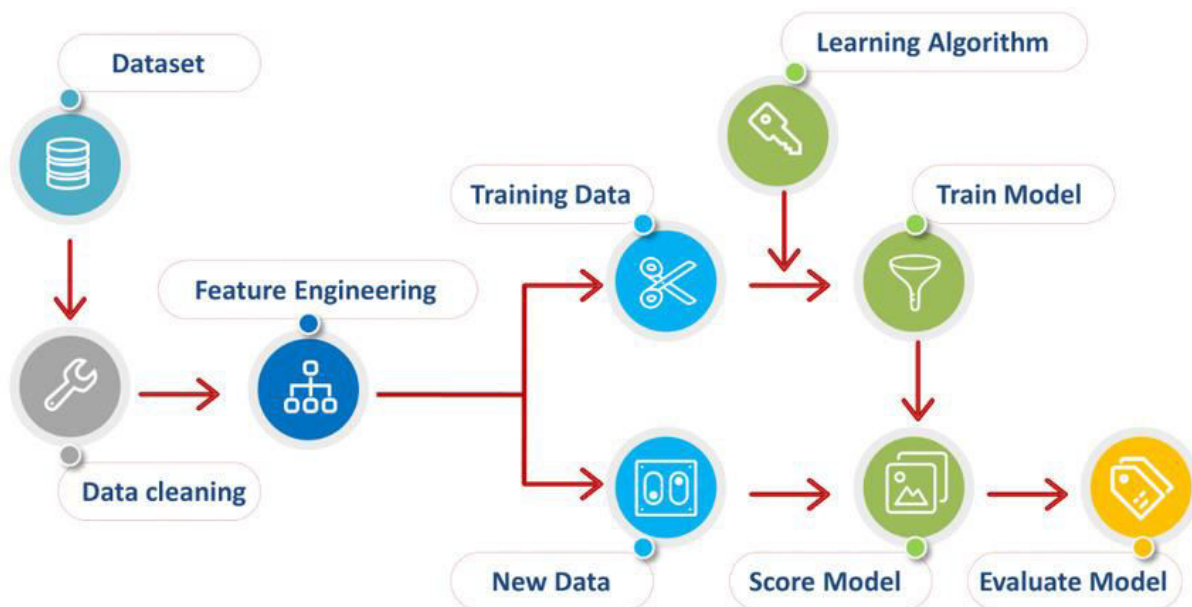


Fig 1. Proposed System Architecture

#### IV.RESULTS AND DISCUSSION

SVM can be effective for prediction problems like estimating used car prices because they can handle nonlinear relationships between features and the target variable. The algorithm uses kernel functions to map data into higher dimensional spaces where it can find linear separation. Key factors that would impact used car price predictions include mileage, make/model, age, condition, options/packages, location, demand, etc. The SVM model would need to be trained on labeled historical sales data with these features.

Identified relevant features that could influence the price of a pre-owned car. Perform feature engineering if needed to create new features or transform existing ones to improve prediction accuracy. Evaluate the trained model on the testing dataset using appropriate evaluation metrics such as mean squared error (MSE), root mean squared error (RMSE), mean absolute error (MAE), or R-squared (R<sup>2</sup>) score and Fine-tune the SVM model by adjusting hyper parameters further if necessary, based on performance metrics and insights gained during evaluation. Once satisfied with the model performance, deploy it in a production environment where it can be used to predict pre-owned car prices. To guarantee the model's accuracy and applicability over time, keep an eye on its performance and occasionally retrain it using fresh data.

#### V.CONCLUSION

This paper aimed to develop a model for predicting prices of used and reconditioned cars in Mauritius. The local car market has seen steady 5% growth annually for a decade, indicating high demand. While numerous car websites exist in Mauritius, none offer price prediction based on car attributes. Using a dataset of entries, four machine learning approaches were tested to predict prices using make, manufacture year, paint type, transmission, engine capacity, and mileage. All four methods achieved reasonably low average residual values, demonstrating feasibility despite inherent risk in used car valuation. The system could benefit dealers and owners in assessing car values. Future work entails collecting more data and features and exploring additional algorithms to improve predictions.

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