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PREDICTIONOF USED CAR PRICES USING ARTIFICIAL NEURAL NETWORKS AND MACHINE LEARNING

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ABSTRACT

The number of cars on Mauritian roads has been rising consistently by 5% during the last decade. In 2014, 173 954 cars were registered at the National Transport Authority. Thus, one Mauritian in every six owns a car, most of which are second hand reconditioned cars and used cars. The aim of this study is to assess whether it is possible to predict the price of second-hand cars using artificial neural networks. Thus, data for 200 cars from different sources was gathered and fed to four different machine learning algorithms. We found that support vector machine regression produced slightly better results than using a neural network or linear regression. However, some of the predicted values are quite far away from the actual prices, especially for higher priced cars. Thus, more investigations with a larger data set are required and more experimentation with different network type and structures is still required in order to obtain better predictions.

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1.INTRODUCTION

The National Transport Authority (2014) reports that the number of automobiles has increased by 254% between 2003 and 2014, with a rise from 68, 524 to 173, 954 (Figure 1). The fact that new automobiles make up such a tiny fraction of the overall vehicle sales suggests that the market for used and reconditioned cars has grown throughout the years. When purchasing a new automobile in Mauritius, the majority of buyers are interested in finding out how much their vehicle will be worth when they decide to sell it in the future.

A lot of things go into determining how much used automobile prices will go up or down. The year of production, manufacturer, model, mileage, horsepower, and place of origin are the most crucial ones. Factors such as fuel type and amount used, braking system type, acceleration, interior style, physical condition, engine size (in cubic centimeters), number of doors, weight, consumer reviews, paint color and type, transmission type, sports car status, sound system, cosmic wheels, power steering, air conditioning, GPS navigation, safety index, and so on are included. Whether the vehicle has been in any major accidents and the identities of its former owners are two of the unique considerations in a Mauritius environment. So, it's a commendable endeavor to try to forecast the value of used autos. With the help of neural networks, we will try to estimate how much used automobiles will cost in the future. There will be comparisons to other approaches' outcomes as well, such as support vector regression and linear regression.

What follows is the outline of the paper. A number of studies on neural networks and financial market forecasting have been compiled in this system. This system is used to define the approach of data collecting. To forecast the value of used automobiles, the algorithm offers its findings. A conclusion and some suggestions for further research round out the report.

2.LITERATURE SURVEY

Title: The Use of Artificial Neural Networks and Machine Learning for the Prediction of Used-Car Prices

Over the last decade, the number of vehicles on the roads of Mauritius has increased at a steady rate of 5%. The number of vehicles registered with the National Transport Authority in 2014 was 173,925. The

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majority of the vehicles in Mauritius are either old or refurbished models, however one out of six residents owns a car. Examining the feasibility of utilizing artificial neural networks to forecast the value of pre-owned automobiles is the primary objective of this research. Two hundred vehicles' worth of data was therefore collected from various sources and input into four separate machine learning methods. Results from neural network and linear regression were somewhat better than those from support vector machine regression. But for more expensive vehicles in particular, some of the forecasted values are far off from the market. In order to improve prediction accuracy, more research using bigger datasets and experiments with various network types and architectures are necessary.

Title: Utilizing Machine Learning for the Prediction of Used Car Prices

New automobiles were more costly owing to higher technological expenditures when the Indian auto-industry entered the BS-VI era from April 2020. This made secondhand cars a more attractive investment. In addition, during the COVID-19 pandemic, individuals are forced to rely on their own transportation due to the lack of public transportation options and the fear of contracting the virus. However, due to the increased demand for old automobiles, some merchants started charging exorbitant rates. The creation of a model that can forecast the price of used automobiles by factoring in various attributes and prices of other cars in the nation is necessary to keep customers informed about market trends and used car costs. We have utilized various machine learning algorithms in this paper, including k-nearest neighbor (KNN), decision tree, random forest regression, and light gradient boosting machine (LightGBM), to forecast the used car market in India based on various buyer-specific features. After comparing these models, we have implemented the one that we believe will best serve our purpose.

Title:Predicting Vehicle Prices using an Artificial Neural Network

It may be difficult to determine an appropriate price when purchasing or selling a vehicle. This kind of computation is often outsourced to artificial neural networks, a subfield of AI. Using data collected from a website that deals in the sale of automobiles, we trained two separate artificial neural

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networks to predict future prices. We built a program to read data from the website using the HTMLAgilityPack package and the C# programming language. The database management system we utilized was MSSQL Server. For the purpose of digitization, a process was coded in T-SQL. The research found a success rate of 91.38 percent utilizing data from about a thousand vehicles. To get better results, more data is required.

Title: The Use of Artificial Neural Networks and Machine Learning for the Prediction of Used-Car Prices

Due to factors such as exorbitant pricing, limited availability, financial incapability, and others, newly manufactured automobiles are not reaching consumers despite the tremendous increase in car use. So, although the used automobile industry is booming worldwide, it is still in its infancy in India and is mostly controlled by the unorganized sector. Buying a secondhand automobile becomes more vulnerable to fraud because of this. Accordingly, a model free of consumer or merchandiser bias is needed to predict the used automobile pricing with high accuracy. This model incorporates a Random Forest Machine Learning model with an Artificial Neural Network model based on supervised learning. It is capable of learning from the automobile dataset that is given to it. With a low error value, this study shows a model for used vehicle price prediction that works. For trustworthy and precise forecasts, a large number of unique characteristics are investigated. The outcomes achieved are in accordance with the anticipated theoretical outcomes and demonstrate an improvement over models that rely on basic linear models. The Keras Regressor method, along with other Machine Learning Algorithms like Random Forest, Lasso, Ridge, and Linear regressions, is used to construct an Artificial Neural Network (ANN). The automobile dataset is used to test these techniques. According to the experimental data, out of all the algorithms, the Random Forest model produced the fewest errors with a Mean Absolute Error of 1.0970472 and an R2 error value of 0.772584. The findings of this study have important consequences for the development of more accurate methods of predicting the prices of used cars using Random Forest, which might lead to the eventual elimination of fraud altogether

3. EXISTING SYSTEM

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Despite the vital necessity of predicting the price of used cards to society, the field has not garnered much attention from academics. Artificial neural networks (ANNs) were used in the stock market analysis and prediction made by Bharambe and Dharmadhikari (2015). The authors said that, compared to current methods, their suggested methodology is 25% more accurate.

To forecast the value of pre-owned vehicles, Pudaruth (2014) used four distinct supervised machine learning methods, including kNN (k-Nearest Neighbour), Naïve Bayes, linear regression, and decision trees. An average error of 27,000 rupees was the finest outcome achieved by kNN. Two separate neural networks and regression techniques were used by Jassbi et al. (2011) to forecast the thickness of automobile paint coats. When it came time to determine the paint's ultimate thickness, neural networks were off by 2.99 microns and regression by 17/86 microns. Additionally, Ahangar et al. (2010) evaluated neural networks and linear regression for predicting Iranian company stock values. In comparison to linear regression, they discovered that neural networks performed faster and more accurately. Rental vehicle prices were forecasted by Listiani (2009) using support vector machines (SVM).

Supervised multivariate regression and basic linear regression were both outperformed by SVM. The mean square error for neural networks employed by Iseri and Karlik (2009) to forecast car prices was 8%, whereas regression obtained a mean square error of 14.4%. The retention rate of vehicle insurance policyholders was predicted by Yeo (2009) using neural networks. Neural networks were able to foretell which policyholders will renew and which would likely cancel in the near future. Predicting sales of fresh milk with a 95.4% accuracy rate was achieved by Doganis et al. (2006) using artificial neural networks and genetic algorithms. Neural networks were used by Rose (2003) to forecast the manufacturing of automobiles for several brands.

Disadvantages

- An existing methodology doesn’t implement DATA PRE-PROCESSING & LABELLING method.

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- The system not implemented an effective ML Classifiers for predictions in the datasets.
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3.1 PROPOSED SYSTEM

Information for this research came from a variety of sources, including automobile websites and the classified ads sections of daily newspapers such as L'Express and Le Defi. Since the price of vehicles fluctuates over time like the price of other items, the data was gathered in less than one month's time (specifically, in August 2014). A total of 200 records were gathered. The data includes various details about used cars, including the year it was made, the make, the engine size in cubic centimeters, the paint type (normal or metallic), the transmission type (manual or automatic), the mileage (number of kilometers driven), and the price (in Mauritian rupees).
Finding the optimal neural network parameters and network structure has required a great deal of experimentation. Out of all the neural network architectures tested, one with one hidden layer and two nodes yielded the best results in terms of mean absolute error. Nevertheless, out of these four methods, k-Nearest Neighbor had the lowest accuracy, while Support Vector Regression and a multilayer perception with back-propagation made somewhat better predictions than linear regression..

Advantages

- The purpose of linear regression, support vector regression which are more effective for testing and training accuracy.
- In this work, the system will assess whether neural networks can be used to accurately predict the price of secondhand cars

4. OUTPUT SCREENS

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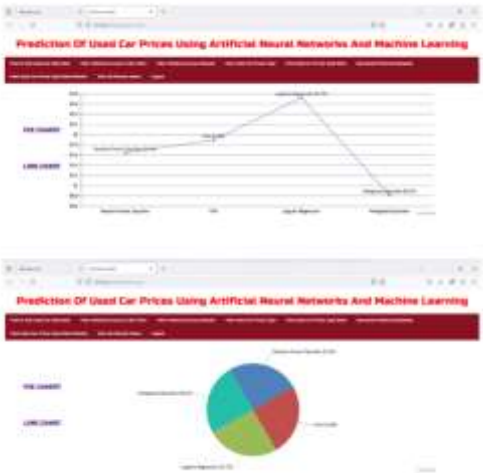

5. CONCLUSION

This article set out to do just that—project how much used and refurbished automobiles in Mauritius would cost in the future. As evidence of the significant demand for automobiles among Mauritian residents, the automotive market has been growing at a steady rate of around 5% over the last decade. While Mauritius is home to a plethora of automobile websites, not one of them offers a tool to estimate the value of a used vehicle according to its specifications. We utilized the cross-validation method with 10 folds on our dataset of 200 records. To forecast the value of pre-owned vehicles, four distinct machine learning algorithms were used, taking into account the following variables: year of production, paint kind, gearbox type, engine capacity, mileage, and automobile marque. Across all four methods, the average residual value was quite small. So, we draw the conclusion that it is possible, but very dangerous, to attempt to forecast the value of used automobiles. Auto owners and dealers will find this approach quite helpful when trying to determine a car's worth. We want to apply a wider range of machine learning algorithms for future predictions, as well as to gather additional data and attributes.

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