

Car Resale value Prediction

LITERATURE SURVEY 1

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LITERATURE SURVEY FOR CAR RESALE VALUE PREDICTION

SURVEY 1

Sameerchand Pudaruth [1] proposed predicting the Price of Used cars using Machine Learning Techniques. In this paper, they collected the historical data of used cars in Mauritius from the newspapers and applied different machine learning techniques like decision tree, K-nearest neighbours, Multiple Linear Regression and Naïve Bayes algorithms to predict the price. This model has the mean error about Rs.27000 for Nissan cars and about Rs45000 for Toyota cars using KNN and around Rs51000 using linear regression. The accuracy of decision trees and NaïveBayes algorithm dangled between 60 to 70 percentile with different parameters and the overall training accuracy of the model is 61%.

Nitis Monburinon et al. [2] proposed a prediction of Prices for Used Car by Using Regression Models. In this paper, the authors selected the data from the German ecommerce site. The main goal of this work is to find a suitable predictive model to predict the used cars price. They used different machine learning techniques for comparison and used the mean absolute error(MAE) as the metric. They proposed that their model with gradient boosted regression has a lower error with MAE value 0.28 and this gives the higher performance where linear regression has the MAE value 0.55, random forest with MAE value 0.35.

Enis Gegic et al.[3] proposed Car Price Prediction using Machine Learning Techniques. In this paper, they proposed an ensemble model by collecting different types of machine learning techniques like Support Vector Machine, Random Forest and Artificial neural network. They collected the data from the web portal www.autopijaca.ba and build this model to predict the price of used cars in Herzegovina and Bosnia.The accuracy of their model is 87%.

Kanwal Noor and Sadaqat Jan[4] proposed Vehicle Price Prediction System using Machine Learning Techniques. In this paper, they proposed a model to predict the price of the cars through multiple linear regression method. They selected the most influencing feature and removed the rest by performing feature selection technique. The Proposed model achieved the prediction precision of about 98%.

A machine learning model is proposed to estimate the cost of the used cars using the K-Nearest Neighbor algorithm. The model is trained with used cars data for different trained and test ratios. Then the proposed model is cross-validated using K fold method to examine the performance to avoid the over fit.

Predicting the price of Used Car Using Machine Learning Techniques. In this paper, they investigate the application of supervised machine learning techniques to predict the price of used cars in Mauritius. The predictions are based on historical data collected from daily newspapers. Different techniques like multiple linear regression analysis, k-nearest neighbours, naïve bayes and decision trees have been used to make the predictions.

Car Price Prediction Using Machine Learning Techniques. Considerable number of distinct attributes are examined for the reliable and accurate prediction. To build a model for predicting the price of used cars in Bosnia and Herzegovina, they have applied three machine learning techniques (Artificial Neural Network, Support Vector Machine and Random Forest).

Price Evaluation model in second hand car system based on BP neural networks. In this paper, the price evaluation model based on big data analysis is proposed, which takes advantage of widely circulated vehicle data and a large number of vehicle transaction data to analyze the price data for each type of vehicles by using the optimized BP neural network algorithm. It aims to establish a second-hand car price evaluation model to get the price that best matches the car.

FUTURE SCOPE

In future this machine learning model may bind with various website which can provide real time data for price prediction. Also we may add large historical data of car price which can help to improve accuracy of the machine learning model. We can build an android app as user interface for interacting with user. For better performance, we plan to judiciously design deep learning network structures, use adaptive learning rates and train on clusters of data rather than the whole dataset.

CONCLUSION

In this paper, we have trained our model with used cars data set to predict the price. Here we have used the K nearest Neighbor algorithm and we got accuracy 85% where the accuracy of linear regression is 71%. The proposed model is also validated with 5 and 10 folds by using K Fold Method. The experimental analysis shows that the proposed model is fitted as the optimized model.

In our future work, we will apply advanced machine learning techniques and validate the model with different methods to enhance the optimization of the model with improved accuracy.

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SURVEY 2

The first paper is Predicting the price of Used Car Using Machine Learning Techniques. In this paper, they investigate the application of supervised machine learning techniques to predict the price of used cars in Mauritius. The predictions are based on historical data collected from daily newspapers. Different techniques like multiple linear regression analysis, k-nearest neighbours, naïve bayes and decision trees have been used to make the prediction

The Second paper is Price Evaluation model in second hand car system based on BP neural networks. In this paper, the price evaluation model based on big data analysis is proposed, which takes advantage of widely circulated vehicle data and a large number of vehicle transaction data to analyze the price data for each type of vehicles by using the optimized BP neural network algorithm. It aims to establish a second- hand car price evaluation model to get the price that best matches the car.

The Second paper is Car Price Prediction Using Machine Learning Techniques. Considerable number of distinct attributes are examined for the reliable and accurate prediction. To build a model for predicting the price of used cars in Bosnia and Herzegovina, they have applied three machine learning techniques (Artificial Neural Network, Support Vector Machine and Random Forest).

(Monburinon, et al., 2018) Gathered data from a German e-commerce site that totalled to 304,133 rows and 11 attributes to predict the prices of used car using different techniques and measured their results using Mean Absolute Error (MAE) to compare their results. Same training dataset and testing dataset was given to each model. Highest results achieved was by using gradient boosted regression tree with a MAE of 0.28, and MAE of 0.35 and 0.55 for mean absolute error and multiple linear regression respectively. Authors suggested adjusting the parameters in future works to yield better results, as well as using one hot encoding instead of label encoding for more realistic data interpretations on categorical data

(Noor & Jan, 2017) were able to achieve high level of accuracy using Multiple linear regression models to predict the price of cars collected from used cars website in Pakistan called Pak Wheels that totalled to 1699 records after pre-processing, and where able to achieve accuracy of 98%, this was done after reducing the total amount of attributes using variable selection technique to include significant attributes only and to reduce the complexity of the model.

(Kuiper, 2008) Collected data from General Motor of cars that are produced in 2005, where he as well used variable selection technique to include the most relevant attributes in his model to reduce the complexity of the data. He proposed used Multivariate regression model that would be more suitable for values with numeric format.

(Listiani, 2009) used Support Vector Machines to evaluate leased cars prices, results have shown that SVM is far more accurate in large dataset with high dimensional data than Multiple linear regression. Whereas the computation Multiple linear regression can take several minutes and the SVM would take up to a day to compute the results. Multiple linear regression may be simple, but SVM is far more accurate. Moreover, the study includes Samples with up to 178 attributes which is far more than the proposed variable in our study, hence the use of multiple linear regression may be more suitable in our case

(Gongqi, Yansong, & Qiang, 2011) proposed using Artificial Neural Network (ANN) through a combined method of BP neural network and nonlinear curve fit and have achieved accurate value prediction with a feasible mode

(K.Samruddhi & Kumar, 2020) Proposed using Supervised machine leaning model using K-Nearest Neighbour to predict used car prices from a data set obtained from Kaggle containing 14 different attributes, using this method accuracy reached up to 85% after different values of K as well as Changing the percent of training data to testing data, expectedly when increasing the percent of data that is tested better accuracy results are achieved. The model was also cross validated with 5 and 10 folds by using K fold method.

In order to predict the price of used cars, researchers (Nabarun Pal, 2018) used a supervised learning method known as Random Forest. Kaggle's dataset was used as a basis for predicting used car prices. In order to determine the price impact of each feature, careful exploratory data analysis was performed. 500 Decision Trees were trained with Random Forests. It is most commonly used for classification, but they turned it into a regression model by transforming the problem into an equivalent regression problem. Using experimental results, it was found that training accuracy was 95.82%, and testing accuracy was 83.63%. By selecting the most correlated features, the model can accurately predict the car price

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Overfitting and underfitting come into picture when we create our statistical models. The models might be too biased to the training data and might not perform well on the test data set. This is called overfitting. Likewise, the models might not take into consideration all the variance present in the population and perform poorly on a test data set. This is called underfitting.

A perfect balance needs to be achieved between these two, which leads to the concept of Bias-Variance tradeoff. Pierre Geurts [2] has introduced and explained how bias-variance tradeoff is achieved in both regression and classification. The selection of variables/attribute plays a vital role in influencing both the bias and variance of the statistical model. Robert Tibshirani [3] proposed a new method called Lasso, which minimizes the residual sum of squares.

This returns a subset of attributes which need to be included in multiple regression to get the minimal error rate. Similarly, decision trees suffer from overfitting if they are not pruned/shrunk. Trevor Hastie and Daryl Pregibon [4] have explained the concept of pruning in their research paper. Moreover, hypothesis testing using ANOVA is needed to verify whether the different groups of errors really differ from each other. This is explained by TK Kim and Tae Kyun in their paper .

Conclusion

The increased prices of new cars and the financial incapability of the customers to buy them, Used Car sales are on a global increase. Therefore, there is an urgent need for a Used Car Price Prediction system which effectively determines the worthiness of the car using a variety of features. The proposed system will help to determine the accurate price of used car price prediction. This paper compares 3 different algorithms for machine learning : Linear Regression, Lasso Regression and Ridge Regression.

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