Car Resale Value Prediction

PROJECT TITLE	Car Resale Value Prediction
TEAM ID	PNT2022TMID21639
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BRANCH	Computer Science and Engineering

1. ABSTRACT :

With difficult economic conditions, it is likely that sales of second-hand imported (reconditioned) cars and used cars will increase. In many developed countries, it is common to lease a car rather than buying it outright. After the lease period is over, the buyer has the possibility to buy the car at its residual value, i.e. its expected resale value. Thus, it is of commercial interest to sellers/financers to be able to predict the salvage value (residual value) of cars with accuracy. In order to predict the resale value of the car, we proposed an intelligent, flexible, and effective system that is based on using regression algorithms. Considering the main factors which would affect the resale value of a vehicle a regression model is to be built that would give the nearest resale value of the vehicle. We will be using various regression algorithms and algorithms with the best accuracy will be taken as a solution, then it will be integrated into the web-based application where the user is notified of the status of his product. The paper is concerned with statistical models to forecast resale prices of used cars. An empirical study is performed to explore how different degrees of freedom in the modeling process contribute toward forecast accuracy. First, a comparative analysis of alternative prediction methods evidences that random forest regression is particularly effective in resale price forecasting. It is also shown that the use of linear regression, the prevailing method in previous work, should be avoided. Second, empirical results evidence the presence of heterogeneity in resale price forecasting and identify methods that can automatically overcome its detrimental effect on forecast accuracy.

2. INTRODUCTION :

2.1 Project Overview:

In this project we have used different algorithms with different techniques for developing Car resale value prediction systems considering different features of the car. In a nutshell, car resale value prediction helps the user to predict the resale value of the car depending upon various features like kilometers driven, fuel type, etc. This resale value prediction system is made for general purpose to just predict the amount that can be roughly acquired by the user. We try to predict the amount of resale by best 70% accuracy so

the user can get estimated value before he resales the car and doesn't make a deal in loss.

2.2 Purpose

The main purpose of making a car resale value prediction system is to get hands-on practice for python using Data Science. Car resale value prediction is the system to predict the amount of resale value based on the parameters provided by the user. User enters the details of the car into the form given and accordingly the car resale value is predicted. Car resale value prediction system is made with the purpose of predicting the correct valuation of used cars that helps users to sell the car remotely with perfect valuation and without human intervention in the process to eliminate biased valuation.

3. LITERATURE SURVEY

3.1 Existing Problem

Data science can be used to gain knowledge about behaviors and processes, write algorithms that process large amounts of information quickly and efficiently, increase security and privacy of sensitive data, and guide data-driven decision-making. Existing System includes a process where a seller decides a price randomly and buyer has no idea about the car and it’s value in the present day scenario. In fact, seller also has no idea about the car’s existing value or the price he should be selling the car at. To overcome this problem we have developed a model which will be highly effective. Machine learning Algorithms are used because they provide us with continuous value as an output and not a categorized value. Because of which it will be possible to predict the actual price a car rather than the price range of a car. User Interface has also been developed which acquires input from any user and displays the Price of a car according to user’s inputs.

3.2 References

Mustapha Hankar; Marouane Birjali; Abderrahim Beni-Hssane Published in 2022 11th International Symposium on Signal, Image, Video and Communications (ISIVC) Several regression techniques were used based on supervised machine learning to predict the resale price of used cars given

many factors such as mileage, fuel type, fiscal power , mark , model, and the production year of the car. In all tested models, gradient boosting regressor showed a high R-squared score and low root mean square error. The results showed that gradient boosting regressor outperformed all tested models with a highest R2 score and a minimized root mean squared error. As a future work, it is intended to increase the performance of the model by scaling the training data and adding more other variables to the feature set.

Kiran S,Computer Science Engineering,SJB Institute of Technology, Bangalore, India In this research the price of the car is considered as dependent variable for target prediction .The data used for prediction was taken from web. The suitability of linear regression algorithm is identified and implemented in this research work for accurately predicting the resale value of the vehicle based on most significant attributes that are been selected on the basis of highest correlation.The Linear Regression model for prediction of resale value of the car is providing an accuracy of 90% and an error of 10%. Linear Regression model is better suited for prediction of target attribute that is msrp (car price). Further this work can be implemented using different machine learning algorithms and approaches in order to get higher accuracy rate and lower error percentage.

Stefan Voß (corresponding author) Institute of Information Systems,University of Hamburg, Germany The objective of this paper is to provide empirical answers to these questions. i) to which degree are resale prices predictable, ii) what is the relative accuracy of different prediction methods and are some methods particularly effective, iii) given that market research agencies have specialized in residual value estimation, is it sensible for car makers to invest into an in-house resale price forecasting system? The results suggest that the methods most widely used in resale price modeling are least effective. In particular, linear regression methods predict significantly less accurately than advanced methods such as RF and ES. Advanced methods are able to extract useful predictive information from PI and are robust toward high dimensionality.

Saamiyah Peerun, Nushrah Henna Chummun and Sameerchand Pudaruth University of MauritiusReduit, Mauritius 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. And it was

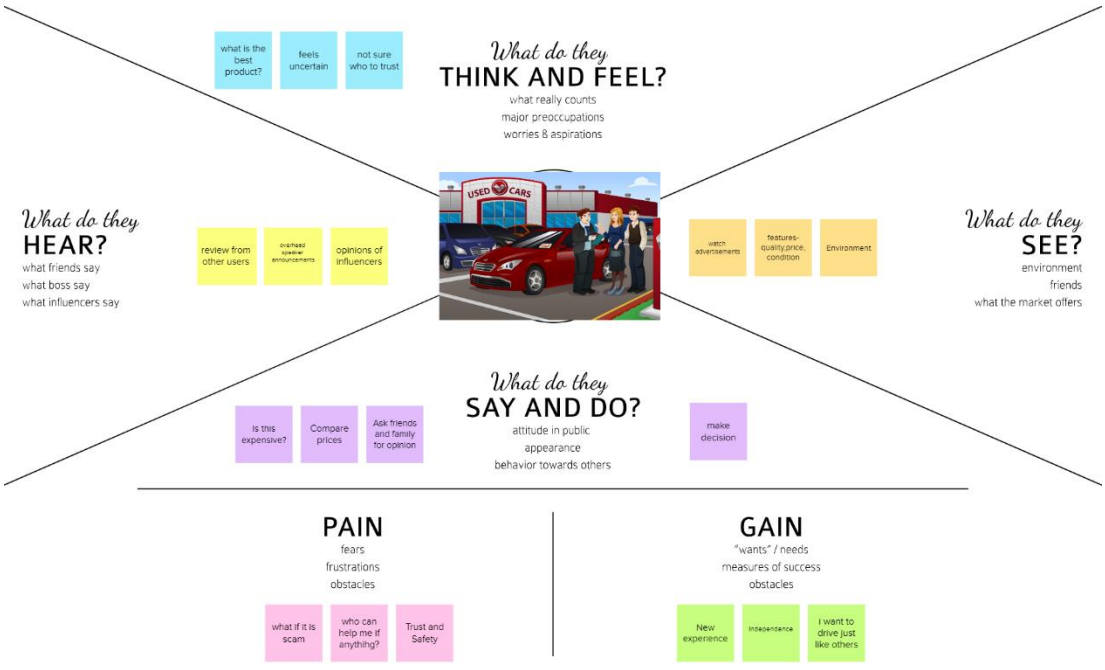
found that support vector machine regression produced slightly better results than using a neural network or linear regression. However, some of the predicted values are quite far away from the actual prices, especially for higher priced cars. Thus, more investigations with a larger data set are required and more experimentation with different network type and structures is still required in order to obtain better predictions.

3.3 Problem Statement Definition

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	Owner of a car	Sell	I don't know about its current value	Of it wear and tear	Confused
PS-2	Owner of a car	Find its resale value	I am concerned about the minor dents	Of a small accident	A little worried

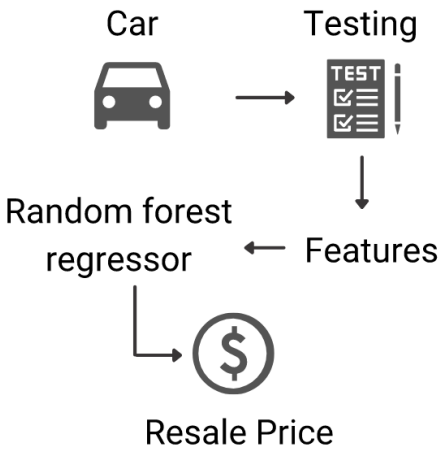
4. IDEATION & PROPOSED SOLUTION

4.1 Empathy Map Canvas



4.2 Ideation & Brainstorming

The price of a new car in the industry is fixed by the manufacturer with some additional costs incurred by the Government in the form of taxes. So, customers buying a new car can be assured of the money they invest is worthy. But, due to 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 that effectively determines the worthiness of the car using a variety of features. The existing System includes a process where a seller decides a price randomly and the buyer has no idea about the car and it's value in the present-day scenario. In fact, the seller also has no idea about the car's existing value or the price he should be selling the car. To overcome this problem we have developed a model which will be highly effective. Regression Algorithms are used because they provide us with continuous value as output and not a categorized value. Because of this, it will be possible to predict the actual price of a car rather than the price range of a car. A user Interface has also been developed which acquires input from any user and displays the Price of a car according to the user's inputs. Determining whether the listed price of a used car is a challenging task, due to the many factors that drive a used vehicle's price on the market. The focus of this project is developing machine learning models that can accurately predict the price of a used car based on its features, in order to make informed purchases. We implement and evaluate various learning methods on a dataset consisting of the sale prices of different makes and models . We will compare the performance of various machine learning algorithms like Linear Regression, Ridge Regression, Lasso Regression, Elastic Net, Decision Tree Regressor and choose the best out of it. Depending on various parameters we will determine the price of the car. Regression Algorithms are used because they provide us with continuous value as an output and not a categorized value because of which it will be possible to predict the actual price a car rather than the price range of a car. User Interface has also been developed which acquires input from any user and displays the Price of a car according to user's inputs.

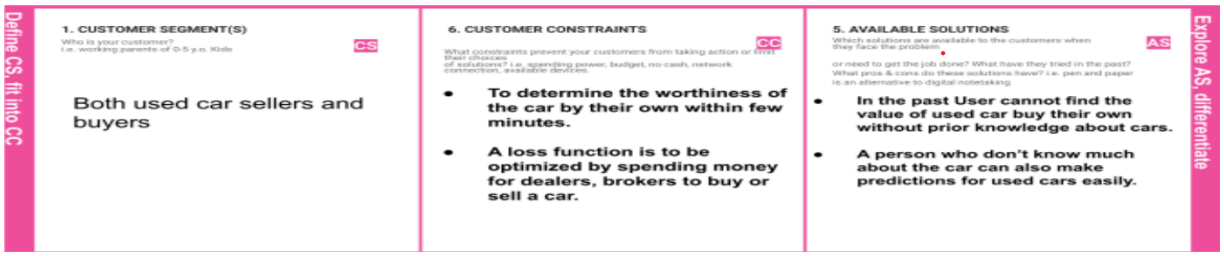


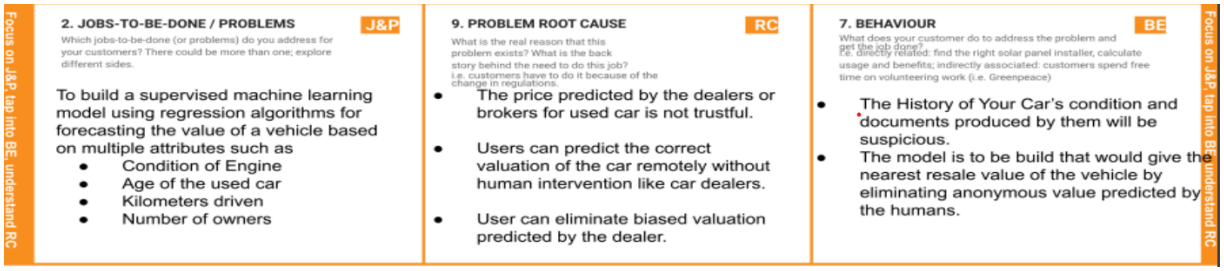
4.3 Proposed Solution

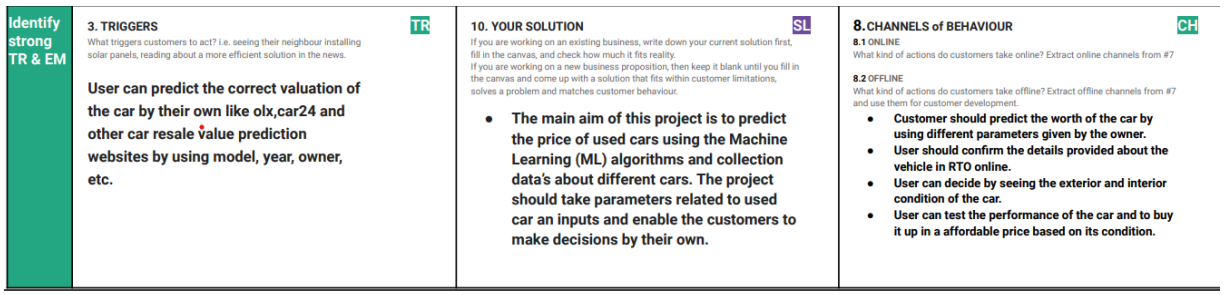
S. No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	• The main aim of this project is to predict the price of used cars using the various Machine Learning (ML) models. • The project should take parameters related to used car as inputs and enable the customers to make decisions by their own.
2.	Idea / Solution description	The model is to be built that would give the nearest resale value of the vehicle. By using these best accuracy value will be taken as a solution and it will be integrated to the web-based application where the user is notified with the status of his product.

3.	Novelty / Uniqueness	Used car price prediction is effectively used to determine the worthiness of the car by their own within few minutes by using various features such as year, model, mileage(km), etc.
4.	Social Impact / Customer Satisfaction	• If the user wants to buy or sell a own car it helps users to predict the correct valuation by their own. • A loss function is to be optimized and mainly a weak learner can make predictions for used cars easily.
5.	Business Model (Revenue Model)	It helps users to predict the correct valuation of the car remotely with perfect valuation and without human intervention like car dealers in the process to eliminate biased valuation predicted by the dealer.
6.	Scalability of the Solution	Using Stored data and machine learning approaches, this project proposed a scalable framework for predicting values for different type of used cars present all over India.

4.4 Problem Solution







5. REQUIREMENT ANALYSIS

5.1 Hardware Requirements

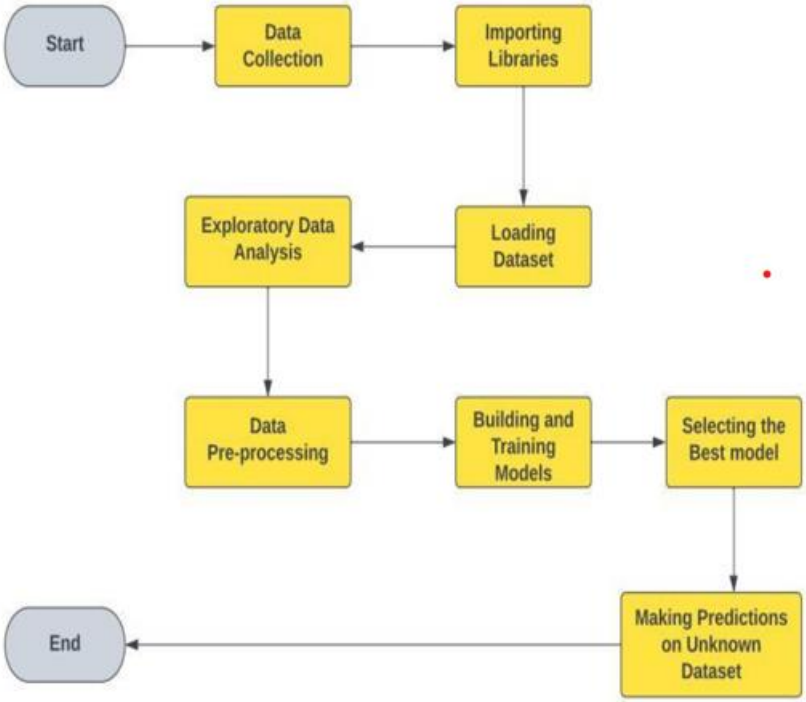
Operating system- Windows 7,8,10
Processor- dual core 2.4 GHz (i5 or i7 series Intel processor or equivalent AMD)
RAM-4GB

5.2 Software Requirements

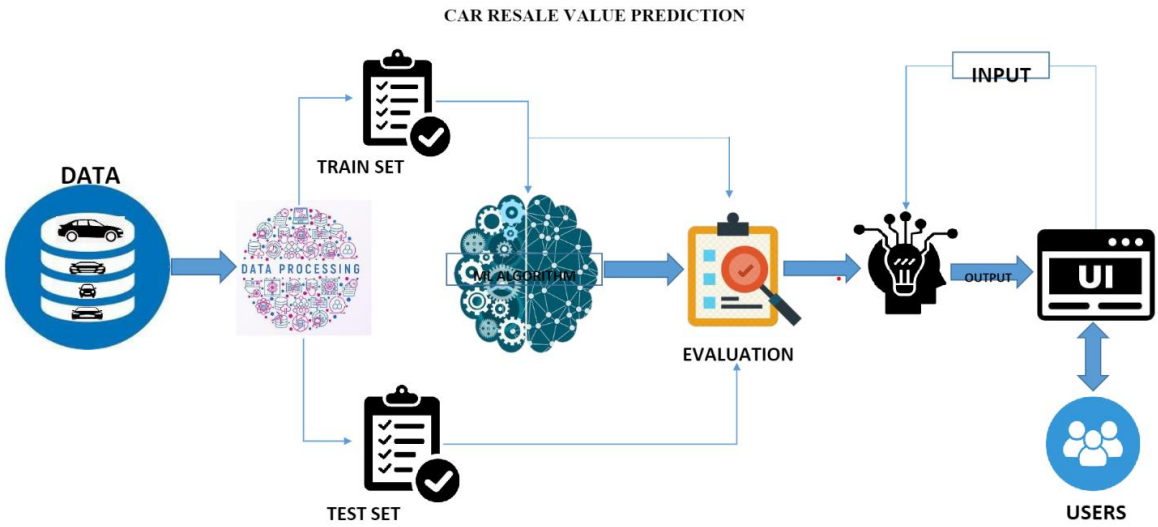
Python
Pycharm
PIP 2.7
Jupyter Notebook
Chrome

6. PROJECT DESIGN

6.1 Data Flow Diagram



6.2 Solution & Technical Architecture



6.3 User Stories

Determining whether the listed price of a used car is a challenging task, due to the many factors that drive a used vehicle's price on the market. The focus of this project is developing machine learning models that can accurately predict the price of a used car based on its features, in order to make informed purchases. We implement and evaluate various learning methods on a dataset consisting of the sale prices of different makes and models . We will compare the performance of various machine learning algorithms like Linear Regression, Ridge Regression, Lasso Regression, Elastic Net, Decision Tree Regressor and choose the best out of it. Depending on various parameters we will determine the price of the car. Regression Algorithms are used because they provide us with continuous value as an output and not a categorized value because of which it will be possible to predict the actual price a car rather than the price range of a car. User Interface has also been developed which acquires input from any user and displays the Price of a car according to user's inputs.

7. PROJECT PLANNING & SCHEDULING

7.1 Sprint Planning & Estimation

- Collect Dataset
- Import required libraries
- Read and clean data sets
- Split data into independent and dependent variables
- Apply using regression model
- Build python flask application and HTML page
- Execute and test
- Train machine learning model

7.2 Sprint Delivery Schedule

- Sprint 1
- Sprint 2
- Sprint 3
- Sprint 4

We are Developing the code in this Schedule

8. CONCLUSION

One can draw the conclusion from this project's performance that the project system's detection of Car Resale Value is remarkable. Useful for both domestic and professional needs. However, once more data is collected and various different cars are included in the system, deep learning-based ANN or LSTM would perform better. But currently, GBR based car valuation system can predict resale value of a car with Root Mean Squared Error (RMSE) of 50,000 INR.

9. 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.

10. APPENDIX

Source Code:

```
from flask import Flask, render_template, request
import jsonify
import requests
import pickle
import numpy as np
import sklearn
from sklearn.preprocessing import StandardScaler
app = Flask(__name__)
model = pickle.load(open('random_forest_regression_model.pkl', 'rb'))
@app.route('/',methods=['GET'])
def Home():
    return render_template("index.html")
standard_to = StandardScaler()
@app.route("/predict", methods=['POST'])
def predict():
    Fuel_Type_Diesel=0
    if request.method == 'POST':
        Year = int(request.form['Year'])
        Present_Price=float(request.form['Present_Price'])
        Kms_Driven=int(request.form['Kms_Driven'])
        Kms_Driven2=np.log(Kms_Driven)
        Owner=int(request.form['Owner'])
        Fuel_Type_Petrol=request.form['Fuel_Type_Petrol']
        if(Fuel_Type_Petrol=='Petrol'):
                Fuel_Type_Petrol=1
                Fuel_Type_Diesel=0
        else:
            Fuel_Type_Petrol=0
            Fuel_Type_Diesel=1
        Year=2020-Year
        Seller_Type_Individual=request.form['Seller_Type_Individual']
        if(Seller_Type_Individual=='Individual'):
            Seller_Type_Individual=1
        else:
```

```
        Seller_Type_Individual=0
    Transmission_Mannual=request.form['Transmission_Mannual']
    if(Transmission_Mannual=='Mannual'):
        Transmission_Mannual=1
    else:
        Transmission_Mannual=0

prediction=model.predict([[Present_Price,Kms_Driven2,Owner,Year,Fuel_Type_Diesel,Fuel_Type_Petrol,Seller_Type_Individual,Transmission_Mannual]])
    output=round(prediction[0],2)
    if output<0:
        return render_template('index.html',prediction_texts="Sorry you cannot sell this car")
    else:
        return render_template('index.html',prediction_text="You Can Sell The Car at {}".format(output))
  else:
    return render_template('index.html')

if __name__=="__main__":
  app.run(debug=True)
```
Footer

Demo Link:
https://github.com/IBM-EPBL/IBM-Project-12081-1659369589/blob/main/FINAL%20DELIVERABLES/PROJECT%20DEMONSTRATION/Demo%20Video.mp4

GitHub Repo Link:
https://github.com/IBM-EPBL/IBM-Project-12081-1659369589