PROJECT REPORT

DATE	**19 NOVEMBER 2022**
TEAM ID	**PNT2022TMID09388**
PROJECT NAME	**CAR RESALE VALUE PREDICTION**

1. INTRODUCTION

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.

1.1 Project Overview

The system is defined in the python language that predicts the amount of resale value based on the given information. The system works on the trained dataset of the machine learning program that evaluates the precise value of the car. User can enter details only of fields like purchase price of car, kilometers driven, fuel of car, year of purchase.

1.2 Purpose

The main idea 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.

2. LITERATURE SURVEY

The various methodologies that are all used are discussed as follows:

1. Car's Selling Price Prediction using Random Forest Machine Learning Algorithm
   Abhishek Pandey, Vanshika Rastogi , Sanika Singh

   India has one of the biggest automobile markets all over the globe every day many buyers usually sell their cars after using for the time to another buyer, we call them as 2nd /3rd owner etc. Many platforms such as cars24.com, cardekho.com and OLX.com provides these buyers with a platform where they can sell their used cars, but what should be the price of the car, this is the toughest question ever. Machine Learning algorithms can bring a solution to this problem. Using a history of previously used cars selling data and using machine learning techniques such as Supervised Learning can predict a fair price of the car, here I also used machine learning algorithms such as Random Forest and Extra Tree Regression along with powerful python library Scikit-Learn to predict the selling price of the used car. The result has shown that these both algorithms are highly accurate in prediction even the dataset is large or small, irrespective of the size of the dataset they give a precise result.

2. Prediction of Resale Value of the Car Using Linear Regression Algorithm
   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.

3. PREDICTIVE ANALYSIS OF USED CAR PRICES USING MACHINE LEARNING
   Ashutosh Datt Sharma, Vibhor Sharma, Sahil Mittal, Gautam Jain, Sudha Narang

   In this swiftly-moving world, managing our professional as well as personal lives have become quite hectic and if we don't have our own personal vehicle for transportation, life is a lot more hectic. To be on the safe side, one should have a more reliable and easy mode for transportation and a personal vehicle is always the best option. Having a car is very important for people these days as it gives a certain social status and also gives a certain extent of personal control to individual owning it. In some areas with low population, having a car becomes essential as it provides the only option for covering long distances in case of an absence of public transport. Old aged people, who have difficulties in walking or cycling to places, have driving the sole option for moving without being dependent. And for those that don't have enough resources to purchase a brand-new car, buying an old vehicle becomes a necessity and that too at a reasonable price. The car manufacturing has been increasing swiftly over the years during past decade, with about 92 million cars that were manufactured in 2019. This provides a big boost for the market of old and used cars which is now coming up as a progressively growing industry. The recent entries of various websites and web-portals have fulfilled the requirements of customers up to some extent as they now know the present trends and scenario to get the market value of any old vehicle present in the market. Machine Learning has a lot of applications in real world scenario but one of the most known application is the use of Machine Learning in resolving the prediction problems. The project being discussed here is very much based upon one among such applications. Employing various Machine Learning Algorithms, we will try and build a statistical model based upon given data and features set to estimate the prices of used cars.

4. Used Car Price Prediction using Machine Learning: A Case Study
   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.

5. Car Price Prediction using Machine Learning Techniques
   Enis Gegic, Becir Isakovic, Dino Keco, Zerina Masetic, Jasmin Kevric

   A car price prediction has been a high interest research area, as it requires noticeable effort and knowledge of the field expert. 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, we applied three machine learning techniques (Artificial Neural Network, Support Vector Machine and Random Forest). However, the mentioned techniques were applied to work as an ensemble. The data used for the prediction was collected from the web portal autopijaca.ba using web scraper that was written in PHP programming language. Respective performances of different algorithms were then compared to find one that best suits the available data set. The final prediction model was integrated into Java application. Furthermore, the model was evaluated using test data and the accuracy of 87.38% was obtained.

6. An Automated Car Price Prediction System Using Effective Machine Learning Techniques
   Santosh Kumar Satapathy,Rutvikraj Vala,Shiv Virpariya ICT, Pandit Deendayal Energy University, Gandhinagar, INDIA

   This research focuses on Building a mathematical model that could predict the price of a second-hand car based on its current features. Determining the price of a used automobile is a difficult task because several factors like Current Mileage, Current Condition, Make, Year, etc.,can influence the prediction prices of an automobile. And, from the perspective of a person who sells, it becomes a dilemma to predict the price of a second-hand car accurately. Thus, the point of interest of this challenge is in growing gadgets, studying models that can correctly expect the price of a used car primarily based on its capabilities. Due to this, in turn, a consumer can make a much more informed purchase. Therefore, implementing and examining various Machine Learning Techniqueswith Data Analysis will be useful to Provide an Accurate and Easy to use solution.

7. Used Cars Price Prediction and Valuation using Data Mining Techniques
   AlShared, Abdulla, "Used Cars Price Prediction and Valuation using Data Mining Techniques" (2021). Thesis. Rochester Institute of Technology. Accessed from https://scholarworks.rit.edu/theses/11086

   A primary objective of this project is to estimate used car prices by using attributes that are highly correlated with a label (Price). To accomplish this, data mining technology has been employed. Null, redundant, and missing values were removed from the dataset during pre-processing. In this supervised learning study, three regressors (Random Forest Regressor, Linear Regression, and Bagging Regressor) have been trained, tested, and compared against a benchmark dataset. The researchers of this project anticipate that in the near future, the most sophisticated algorithm is used for making predictions, and then the model will be integrated into a mobile app or web page for the general public to use.

8. Used Cars Price Prediction using Supervised Learning Techniques
   P Venkatasubbu, M Ganesh - Int. J. Eng. Adv. Technol.(IJEAT), 2019 -researchgate.net

   The recent advent of online portals has facilitated the need for both the customer and the seller to be better informed about the trends and patterns that determine the value of a used car in the market. Using Machine Learning Algorithms such as Lasso Regression, Multiple Regression and Regression trees, they try to develop a statistical model which will be able to predict the price of a used car, based on previous consumer data and a given set of features and also comparing the prediction accuracy of these models to determine the optimal one. To get even more accurate models, we can also choose more advanced machine learning algorithms such as random forests, an ensemble learning algorithm which creates multiple decision/regression trees, which brings down overfitting massively or Boosting, which tries to bias the overall model by weighing in the favor of good performers. More data from newer websites and different countries can also be scraped and this data can be used to retrain these models to check for reproducibility.

9. Predicting the Price of Pre-Owned Cars Using Machine Learning and Data Science
   RSS.GAUTAM, Dr.S.Selvi3, K.HARIHARAN, Dr.S.VARUN4, P.DINESHKUIMAR2, Department ofComputer Science And Engineering, Sethu Institute of Technology, TamilNadu,India

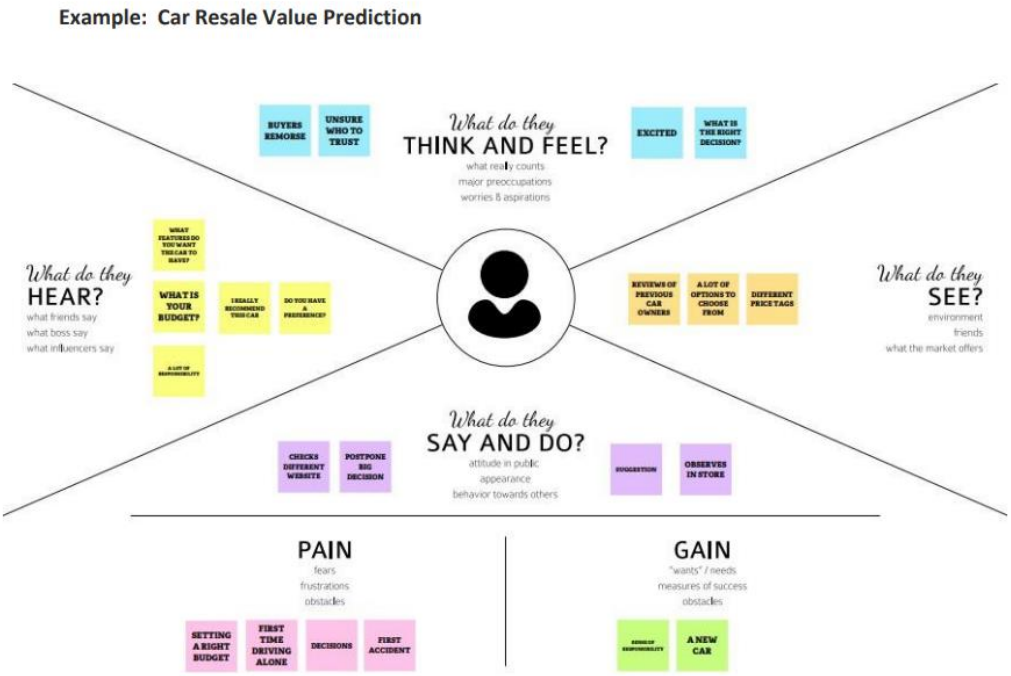
   This model reduces time and cost and is also more user friendly as a result of which there is improvement in business by selling more cars. Here we are also conducting a comparative study on performance of regression based on supervised machine learning models. Each model is trained using data of used car market collected from e-commerce website. As a result, Linear regression gives the best performance with Root mean square error (RMSE) =8902.410 . Followed by ridge, random forest regression algorithms respectively. We can also extend this project by considering more attributes like Resale history, Lic , Accidents history, image etc to the data set for getting clear and accurate analysis.

10. Value Based Pricing meets Data Science: A Concept for Automated Spare PartValuation Clemens Wickboldt1, Natalia Kliewer2 Freie Universität Berlin, Professur für Wirtschaftsinformatik, Berlin, Germany,

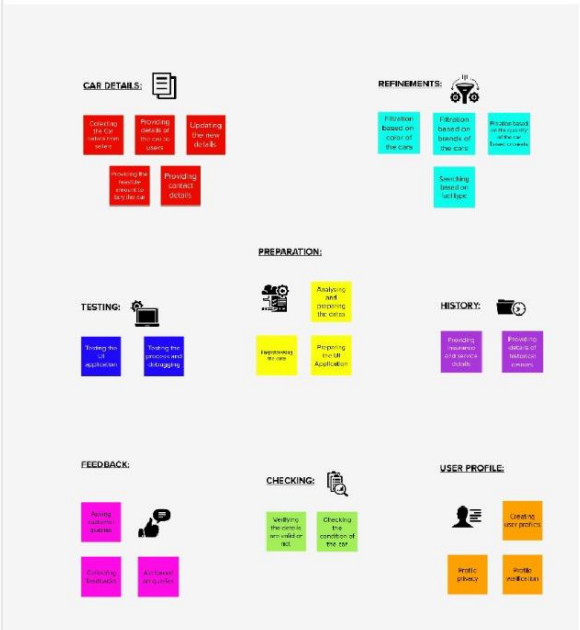
    An early-stage concept for automated spare part valuation which classifies pricing data before applying appropriate valuation methods is presented and hereby combines methods from multiple disciplines. Information from heterogeneous sources is aggregated, transformed and then supports machine learning methods to automatically determine a Fair Market Value for surplus spare parts. The concept for automated spare part valuation is a promising alternative for value determination and pricing in secondary markets and thus may serve as a foundation for building a generic surplus part trading platform to overcome market transparency issues if the obstacles of validation are overcome. Handling incomplete historical data sets as well as validating the calculated Fair Market Value are some of the challenges which become visible.

3. IDEATION PHASE:

3.1 EMPATHY MAP:



3.2 IDEATION AND BRAINSTORMING:

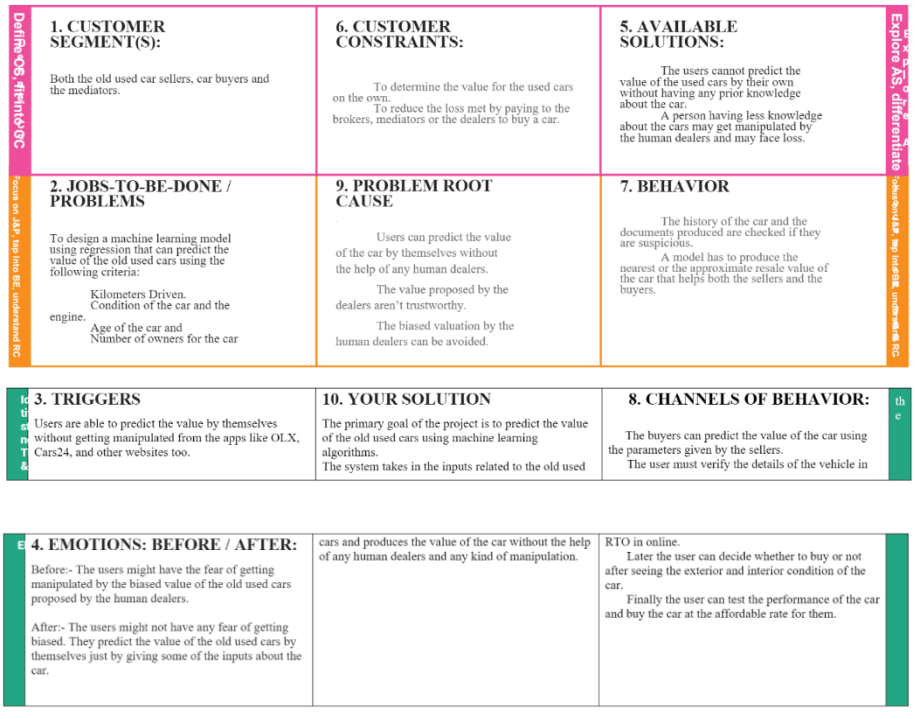



Importance
If each of these tasks could get done without any difficulty or cost, which would have the most positive impact?
Preprocessing the data
Profile privacy
Preparing the UI Application
Testing the UI application
Collecting the Car details from sellers
Providing details of the car to users
Analysing and preparing the datas
Testing the process and debugging
Creating user profiles
Verifying the details are valid or not
Providing insurance and service details
Asking customer queries
Profile verification
Checking the condition of the car
Filtrasion based on brands of the cars
Act based on queries
Updating the new details
Filtrasion based on color of the cars
Collecting feedbacks
Providing the feasible amount to buy the car
Searching based on fuel type
Providing contact details
Filtration based on the quantity of the car based on seats
Providing details of historical owners
Feasibility

3.3 PROPOSED SOLUTION:

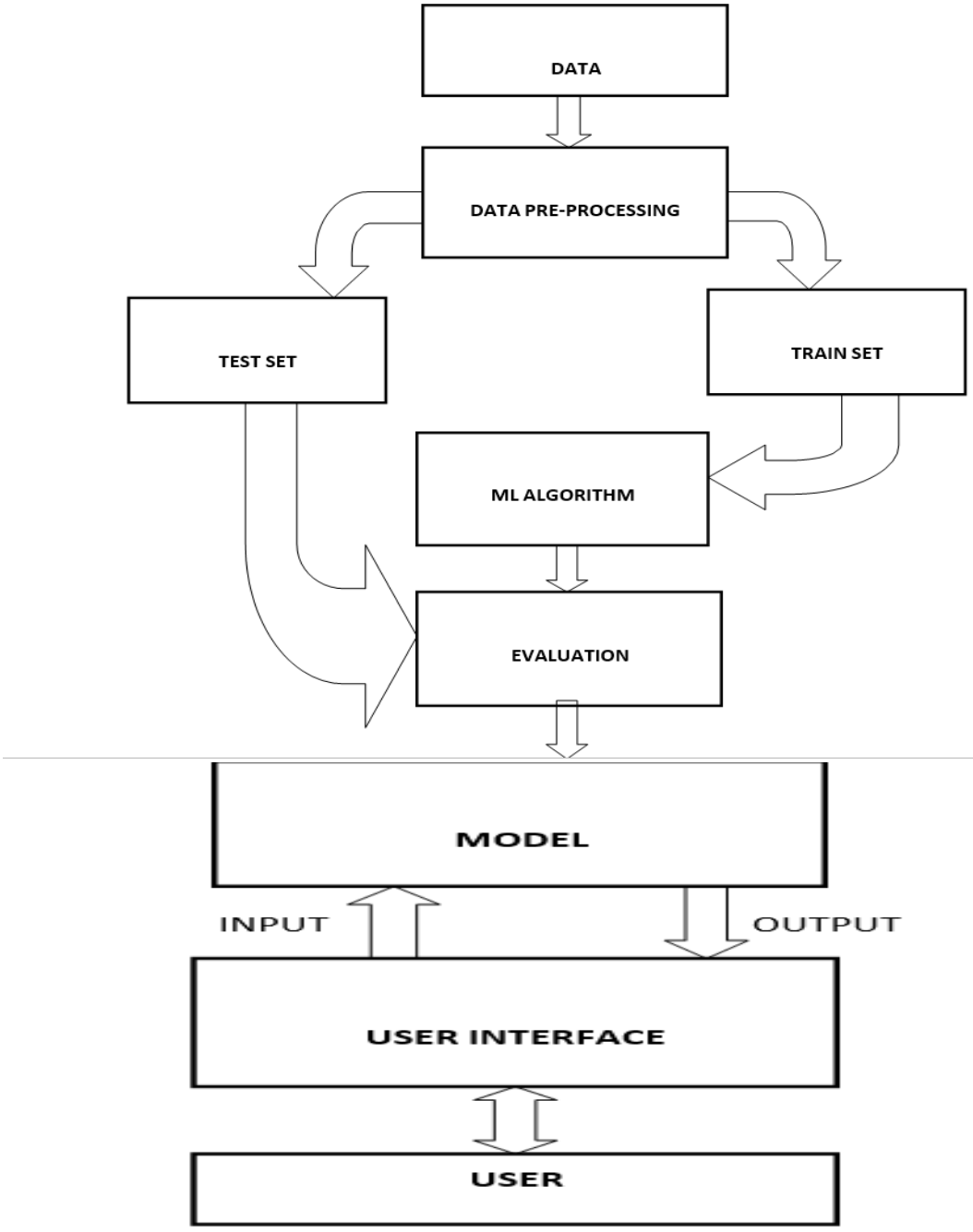
S. No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	• The main aim of this project is to predict the price of used cars using the various Machine Learning (ML) models. • The project should take parameters related to used car as inputs and enable the customers to make decisions by 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.

3.4 PROBLEM SOLUTION FIT:



Define CS, fit into CC	**1. CUSTOMER SEGMENT(S):** Both the old used car sellers, car buyers and the mediators.	**6. CUSTOMER CONSTRAINTS:** To determine the value for the used cars on the own. To reduce the loss met by paying to the brokers, mediators or the dealers to buy a car.	**5. AVAILABLE SOLUTIONS:** The users cannot predict the value of the used cars by their own without having any prior knowledge about the car. A person having less knowledge about the cars may get manipulated by the human dealers and may face loss.
focus on J&P, tap into BE, understand RC	**2. JOBS-TO-BE-DONE / PROBLEMS** To design a machine learning model using regression that can predict the value of the old used cars using the following criteria: Kilometers Driven. Condition of the car and the engine. Age of the car and Number of owners for the car	**9. PROBLEM ROOT CAUSE** Users can predict the value of the car by themselves without the help of any human dealers. The value proposed by the dealers aren't trustworthy. The biased valuation by the human dealers can be avoided.	**7. BEHAVIOR** The history of the car and the documents produced are checked if they are suspicious. A model has to produce the nearest or the approximate resale value of the car that helps both the sellers and the buyers.
Identify strong TR &	**3. TRIGGERS** Users are able to predict the value by themselves without getting manipulated from the apps like OLX, Cars24, and other websites too.	**10. YOUR SOLUTION** The primary goal of the project is to predict the value of the old used cars using machine learning algorithms. The system takes in the inputs related to the old used	**8. CHANNELS OF BEHAVIOR:** The buyers can predict the value of the car using the parameters given by the sellers. The user must verify the details of the vehicle in
EM	**4. EMOTIONS: BEFORE / AFTER:** Before:- The users might have the fear of getting manipulated by the biased value of the old used cars proposed by the human dealers. After:- The users might not have any fear of getting biased. They predict the value of the old used cars by themselves just by giving some of the inputs about the car.	cars and produces the value of the car without the help of any human dealers and any kind of manipulation.	RTO in online. Later the user can decide whether to buy or not after seeing the exterior and interior condition of the car. Finally the user can test the performance of the car and buy the car at the affordable rate for them.

3.5 SOLUTION ARCHITECTURE



4. SOLUTION REQUIREMENTS

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration to the related websites	Registration through Form Registration through Gmail Registration through Application
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Users Profile	Personal details, Bank account ,Is He/She interested in buying a car
FR-4	Gather information about the vehicle	Through the registered websites they collect information
FR-5	Display the functionality of the vehicle	Details: Fuel type , Manufactured year , Miles Driven ,Record

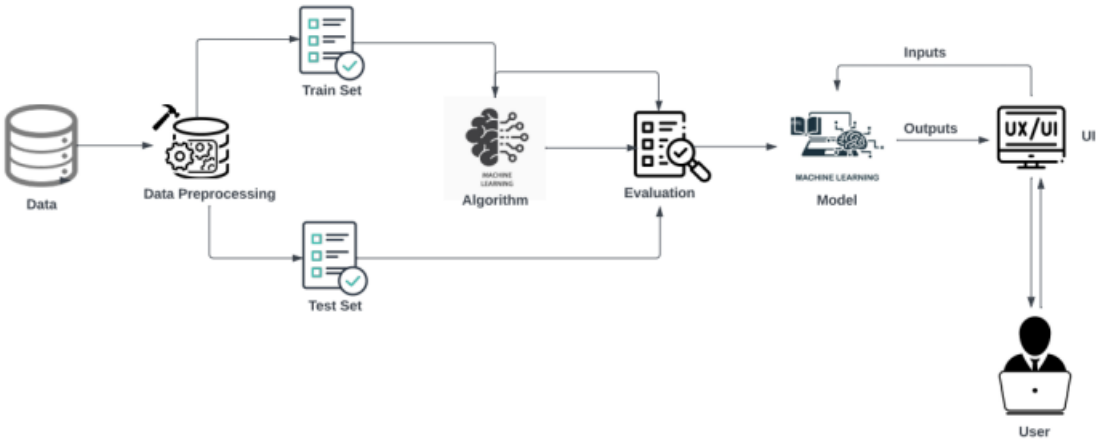
Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

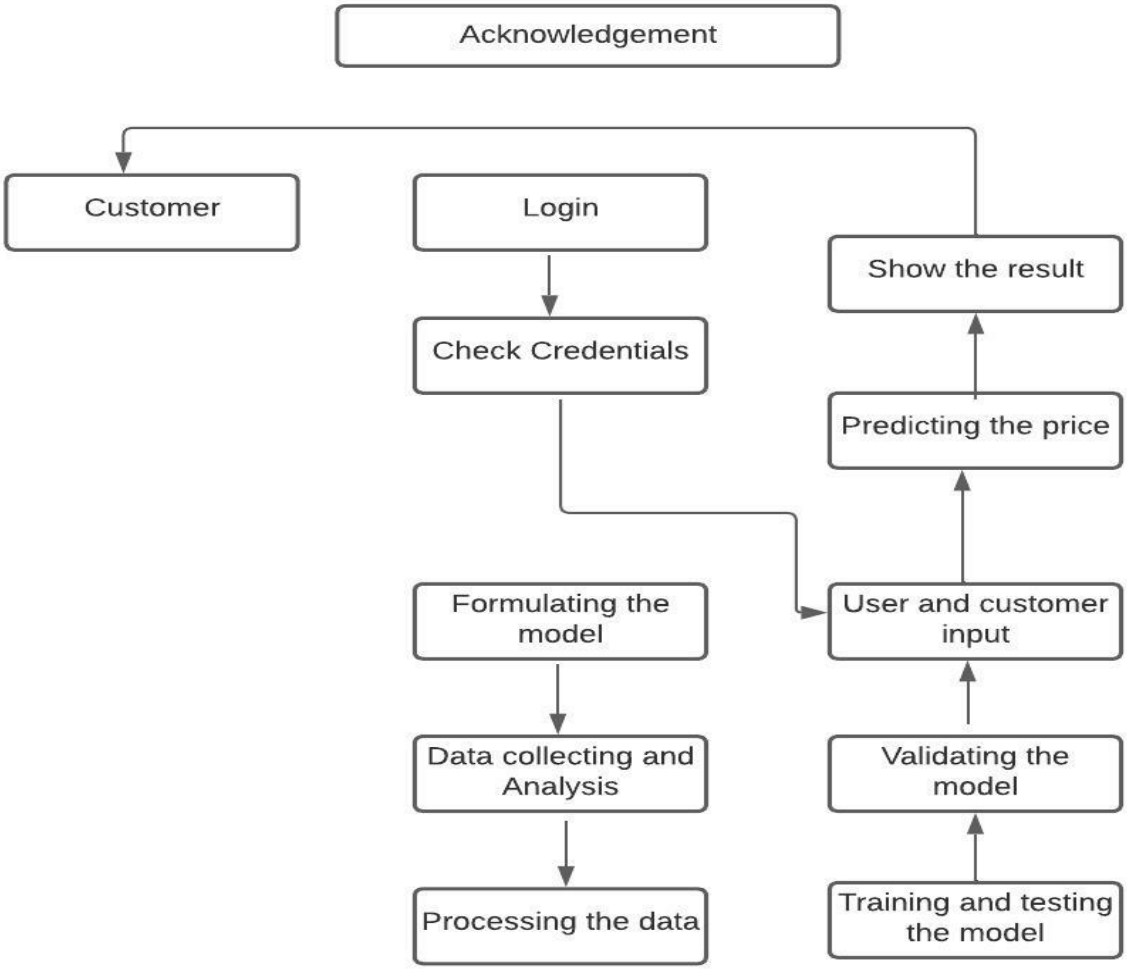
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	User friendly UI Simple and easy to Understand
NFR-2	**Security**	Aware of scams
NFR-3	**Reliability**	The system must perform without failure
NFR-4	**Performance**	The landing page must support several users must provide 5 second or less response time
NFR-5	**Availability**	Uninterrupted services must be available all time except the time of server updation.
NFR-6	**Scalability**	That can handle any amount of data and perform many computations in a cost-effective and time-saving way to instantly serve millions of users residing at global locations.

5. PROJECT DESIGN:

5.1 Solution & Technical Architecture



5.2 DATA FLOW DIAGRAMS:



5.3 USER STORIES:

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Web user)	Registration	USN-1	As a user, I can register for the application by entering my username, password, and confirming my password.	I can access my account.	High	Sprint-1
		USN-2	As a user, I will receive confirmation once I have registered for the application.	I can receive confirmation & click confirm	High	Sprint-1
	Login	USN-3	As a user, I can log into the application by entering my username & password	I can access my dashboard.	High	Sprint-1
	Dashboard	USN-4	As a user, I can view the Home page	I can access the 1st page which is the Home page.	High	Sprint-1
		USN-5	As a user, I can navigate to the page where I enter the required information regarding the car details.	I can enter the details that are asked in the page.	High	Sprint-1
		USN-6	As a user, I can click on submit button for the result.	I can view the result, the predicted price.	High	Sprint-1
Administrator	Modules	ASN-1	As an admin, I have to create modules.	I can view the created module.	High	Sprint-1
		ASN-2	As an admin, I have to create home page and other necessary pages.	I can view the created web pages	High	Sprint-1
	Database	ASN-3	As an admin, I have access to the database.	I can modify, change the database if necessary.	High	Sprint-1
		ASN-4	As an admin, I have to check the username and password. (Authentication)	I can authenticate the user.	High	Sprint-1
	Modifications /Changes	ASN-5	As an admin, I have the ability to modify the existing users in the system.	I can change the password of a user upon request.	High	Sprint-2

6 PROJECT PLANNING & SCHEDULING

6.1 SPRINT PLANNING AND ESTIMATION

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Pre-process data	USN-1	Collect Dataset	1	Low	Shriraaman, Shurti,Swathi, Vasanth
Sprint-1		USN-2	Import required libraries	1	Low	Shriraaman, Shurti,Swathi, Vasanth
Sprint-1		USN-3	Read and clean data sets	2	Low	Shriraaman, Shurti,Swathi, Vasanth
Sprint-2	Model building	USN-1	Split data into independent and dependent variables	3	Medium	Shriraaman, Shurti,Swathi, Vasanth
Sprint-2		USN-2	Apply using regression model	3	Medium	Shriraaman, Shurti,Swathi, Vasanth
Sprint-3	Application building	USN-1	Build python flask application and HTML page	5	High	Shriraaman, Shurti,Swathi, Vasanth
Sprint-3		USN-2	Execute and test	5	High	Shriraaman, Shurti,Swathi, Vasanth
Sprint-4	Training the model	USN-1	Train machine learning model	5	High	Shriraaman, Shurti,Swathi, Vasanth
Sprint-4		USN-2	Integrate flask	5	High	Shriraaman, Shurti,Swathi, Vasanth

6.2 Sprint Delivery Schedule

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	22 Oct 2022	27 Oct 2022	20	27 Oct 2022
Sprint-2	20	6 Days	29 Oct 2022	03 Nov 2022	20	03 Nov 2022
Sprint-3	20	6 Days	05 Nov 2022	10 Nov 2022	20	10 Nov 2022
Sprint-4	20	6 Days	12 Nov 2022	17 Nov 2022	20	17 Nov 2022

7 CODING & SOLUTIONING (Explain the features added in the project along with code)

7.1 Feature 1

style.css

```
.{
        margin: 0;
        padding: 0;
        box-sizing: border-box;
    }
    .bg-dark{
            background-color: #75767B;
    }


    .mt-50{
            margin-top: 50px;
    }
    #canvas{
        border: 2px solid black;
    }
```

Index.html:

```
<!DOCTY
PE html>
            <html lang="en">
            <head xmlns="http://www.w3.org/1999/xhtml">
                <meta charset="UTF-8">
                <title>Car Price Predictor</title>
                <link rel="stylesheet" href="static/css/style.css">
                <link rel="stylesheet" type="text/css"
                    href="https://cdnjs.cloudflare.com/ajax/libs/font-
            awesome/5.11.2/css/all.css">
                <script
            src="https://ajax.googleapis.com/ajax/libs/jquery/3.4.1/jquery.min.js"></scr
            ipt>
                <script
            src="https://cdn.jsdelivr.net/npm/popper.js@1.16.0/dist/umd/popper.min.js
            "
```

```
        integrity="sha384-
Q6E9RHvbIyZFJoft+2mJbHaEWldlvI9IOYy5n3zV9zzTtmI3UksdQRVvo
xMfooAo"
        crossorigin="anonymous"></script>

    <!-- Bootstrap CSS -->
    <link rel="stylesheet"
href="https://stackpath.bootstrapcdn.com/bootstrap/4.5.0/css/bootstrap.min.
css"
        integrity="sha384-
9aIt2nRpC12Uk9gS9baDl411NQApFmC26EwAOH8WgZl5MYYxFfc+N
cPb1dKGj7Sk" crossorigin="anonymous">
    <script
src="https://cdn.jsdelivr.net/npm/@tensorflow/tfjs@2.0.0/dist/tf.min.js"></
script>

</head>
<body class="bg-dark">

<div class="container">
    <div class="row">
        <div class="card mt-50" style="width: 100%; height: 100%">
            <div class="card-header" style="text-align: center">
                <h1>Welcome to Car Price Predictor</h1>
            </div>
            <div class="card-body">
                <div class="col-12" style="text-align: center">
                    <h5>This app predicts the price of a car you want to sell. Try
filling the details below: </h5>
                </div>
                <br>
                <form method="post" accept-charset="utf-8"
name="Modelform">
                    <div class="col-md-10 form-group" style="text-align: center">
                        <label><b>Select the company:</b> </label><br>
                        <select class="selectpicker form-control" id="company"
name="company" required="1"
                            onchange="load_car_models(this.id,'car_models')">
                        {% for company in companies %}
                        <option value="{{ company }}">{{ company
}}</option>
                        {% endfor %}
                        </select>
                    </div>
                    <div class="col-md-10 form-group" style="text-align: center">
                        <label><b>Select the model:</b> </label><br>
```

```
                    <select class="selectpicker form-control" id="car_models"
name="car_models" required="1">
                    </select>
                </div>
                <div class="col-md-10 form-group" style="text-align: center">
                    <label><b>Select Year of Purchase:</b> </label><br>
                    <select class="selectpicker form-control" id="year"
name="year" required="1">
                        {% for year in years %}
                        <option value="{{ year }}">{{ year }}</option>
                        {% endfor %}
                    </select>
                </div>
                <div class="col-md-10 form-group" style="text-align: center">
                    <label><b>Select the Fuel Type:</b> </label><br>
                    <select class="selectpicker form-control" id="fuel_type"
name="fuel_type" required="1">
                        {% for fuel in fuel_types %}
                        <option value="{{ fuel }}">{{ fuel }}</option>
                        {% endfor %}
                    </select>
                </div>
                <div class="col-md-10 form-group" style="text-align: center">
                    <label><b>Enter the Number of Kilometres that the car has
travelled:</b> </label><br>
                    <input type="text" class="form-control" id="kilo_driven"
name="kilo_driven"
                           placeholder="Enter the kilometres driven ">
                </div>
                <div class="col-md-10 form-group" style="text-align: center">
                    <button  class="btn btn-primary form-control"
onclick="send_data()">Predict Price</button>
                </div>
            </form>
            <br>
            <div class="row">
                <div class="col-12" style="text-align: center">
                    <h4><span id="prediction"></span></h4>
                </div>
            </div>
        </div>
    </div>
</div>

<script>
```

```
    function load_car_models(company_id,car_model_id)
    {
        var company=document.getElementById(company_id);
        var car_model= document.getElementById(car_model_id);
        console.log(company.value);
        car_model.value="";
        car_model.innerHTML="";
        {% for company in companies %}
            if( company.value == "{{ company }}")
            {
                {% for model in car_models %}
                    {% if company in model %}

                        var newOption= document.createElement("option");
                        newOption.value="{{ model }}";
                        newOption.innerHTML="{{ model }}";
                        car_model.options.add(newOption);
                    {% endif %}
                {% endfor %}
            }
        {% endfor %}
    }

    function form_handler(event) {
        event.preventDefault(); // Don't submit the form normally
    }
    function send_data()
    {

document.querySelector('form').addEventListener("submit",form_handler);

        var fd=new FormData(document.querySelector('form'));

        var xhr= new XMLHttpRequest({mozSystem: true});

        xhr.open('POST','/predict',true);
        document.getElementById('prediction').innerHTML="Wait!
Predicting Price.....";
        xhr.onreadystatechange = function(){
            if(xhr.readyState == XMLHttpRequest.DONE){
                document.getElementById('prediction').innerHTML="Prediction:
₹"+xhr.responseText;

            }
        };
```

```
        xhr.onload= function(){};

        xhr.send(fd);
    }
</script>


<!-- jQuery first, then Popper.js, then Bootstrap JS -->
<script src="https://code.jquery.com/jquery-3.5.1.slim.min.js"
        integrity="sha384-
DfXdz2htPH0lsSSs5nCTpuj/zy4C+OGpamoFVy38MVBnE+IbbVYUew+
OrCXaRkfj"
        crossorigin="anonymous"></script>
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"
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Bh/kR0JKI"
        crossorigin="anonymous"></script>
</body>
</html>
```
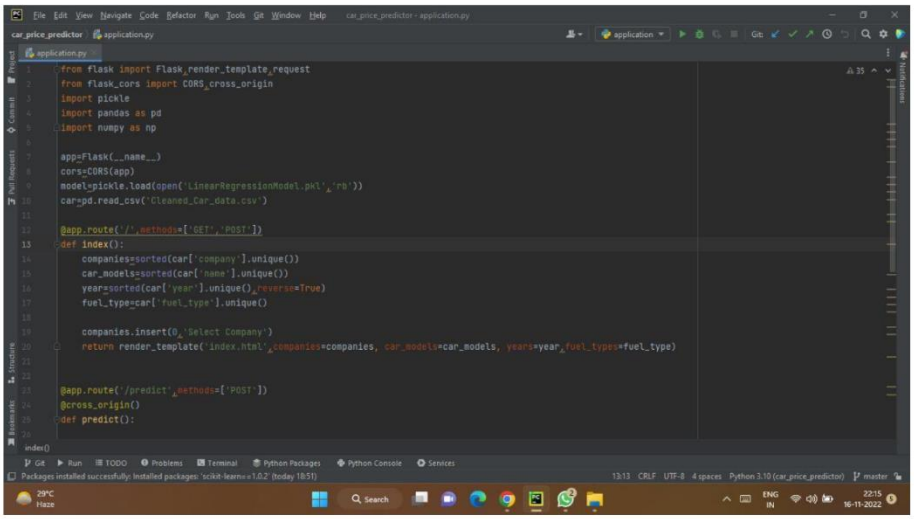
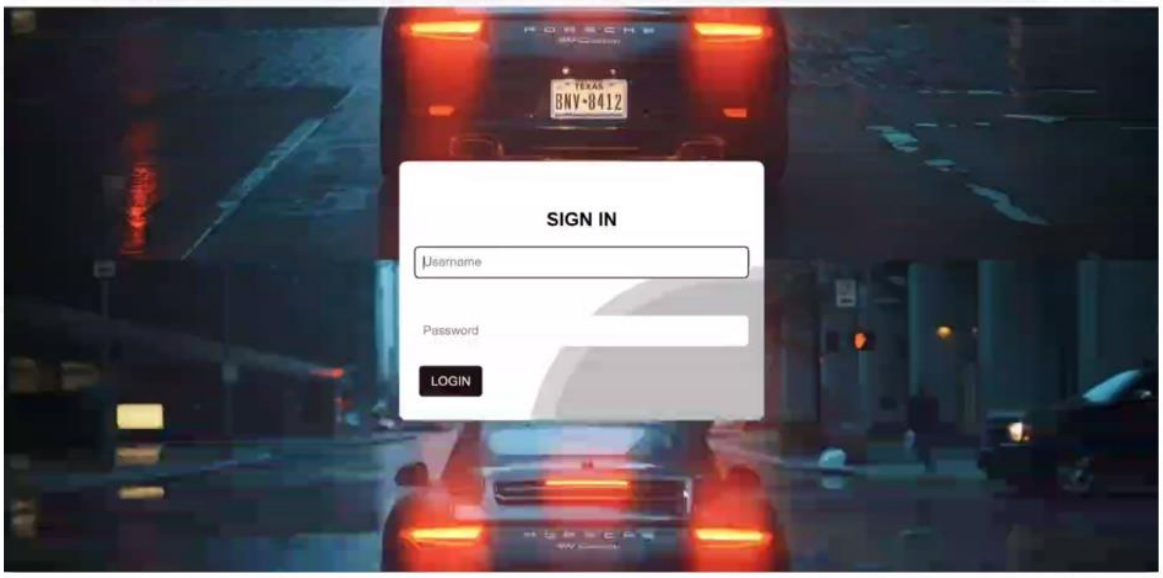
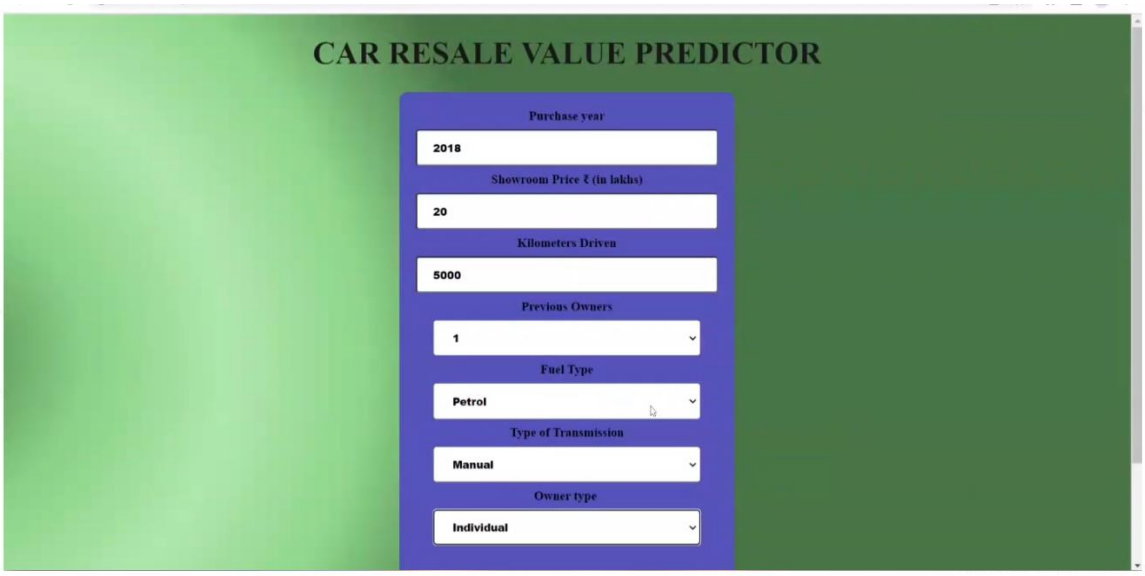
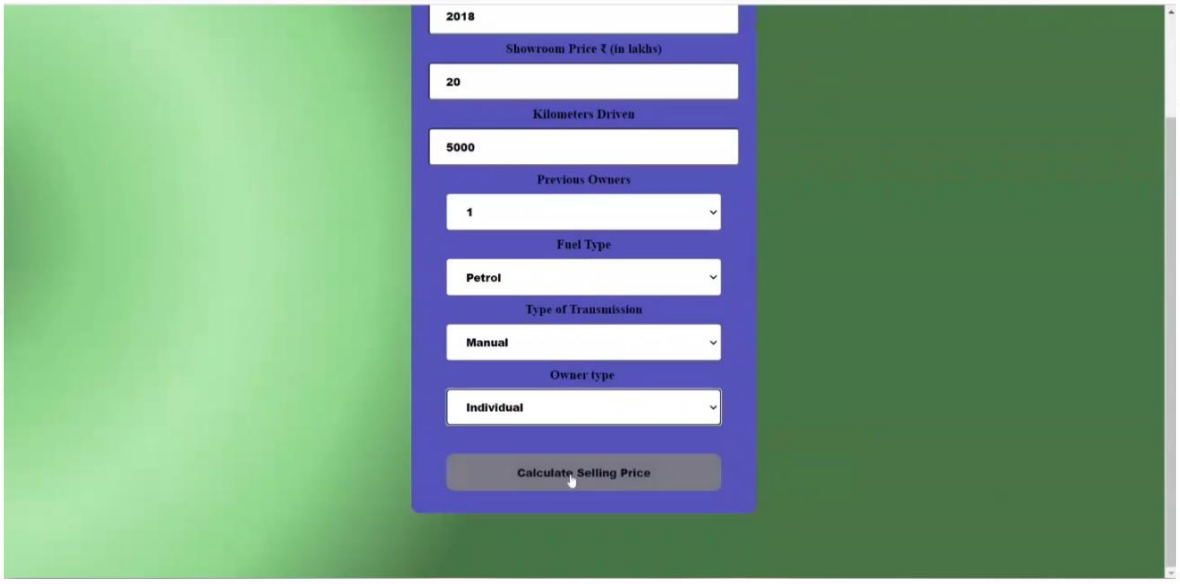

```
from flask import Flask,render_template,request
from flask_cors import CORS,cross_origin
import pickle
import pandas as pd
import numpy as np

app=Flask(__name__)
cors=CORS(app)
model=pickle.load(open('LinearRegressionModel.pkl','rb'))
car=pd.read_csv('Cleaned_Car_data.csv')

@app.route('/',methods=['GET','POST'])
def index():
    companies=sorted(car['company'].unique())
    car_models=sorted(car['name'].unique())
    year=sorted(car['year'].unique(),reverse=True)
    fuel_type=car['fuel_type'].unique()

    companies.insert(0,'Select Company')
    return render_template('index.html',companies=companies, car_models=car_models, years=year,fuel_types=fuel_type)


@app.route('/predict',methods=['POST'])
@cross_origin()
def predict():
```

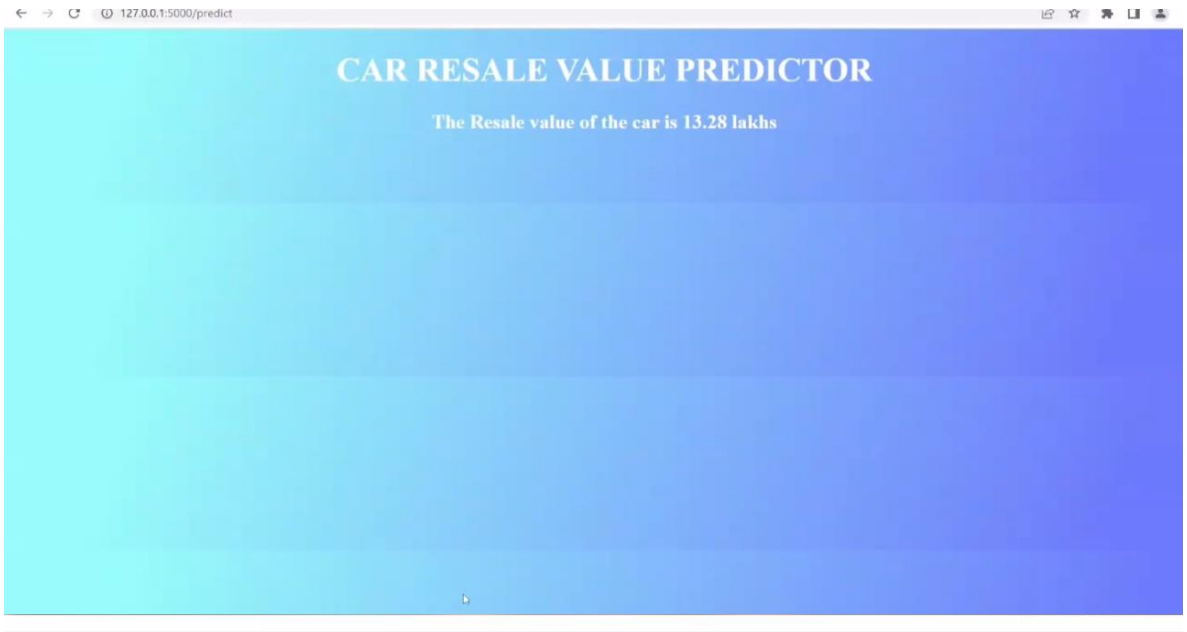


OUTPUT:




CAR RESALE VALUE PREDICTOR
Purchase year
2018
Showroom Price ₹ (in lakhs)
20
Kilometers Driven
5000
Previous Owners
1
Fuel Type
Petrol
Type of Transmission
Manual
Owner type
Individual


2018
Showroom Price ₹ (in lakhs)
20
Kilometers Driven
5000
Previous Owners
1
Fuel Type
Petrol
Type of Transmission
Manual
Owner type
Individual
Calculate Selling Price


127.0.0.1:5000/predict
CAR RESALE VALUE PREDICTOR
The Resale value of the car is 13.28 lakhs

8 ADVANTAGES & DISADVANTAGES

ADVANTAGES:

- Good at learning complex and non- linear relationships
- Highly explainable and easy to interpret
- Robust to outliers
- No feature scaling is required

DISADVANTAGES:

- Consumes more time
- Requires high computational power

9 CONCLUSION

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.

10 FUTURE SCOPE

Currently, system can only deal with Swift Dzire cars due to lack of data. Also, data has been collected of only 5 cities of India. This can be extended to multiple car models and cities so as to improve accuracy and usability. Efficient use of deep learning such as LSTM (Long shortterm memory) or RNN (Recurrent Neural networks) can be implemented once enough data is collected. This can improve accuracy and decrease RMSE drastically. Currently, only few features are used to predict resale value of the car. This can be extended to more features. One can also implement CNN to determine physical condition of the car from images like identifying dents, scratches etc. and thus predicting more relevant resale value of a car.

11 APPENDIX

Source Code

GitHub & Project Demo Link