

## **PROJECT REPORT**

**PROJECT TITLE :** CAR RESALE VALUE PREDICTION

**TEAM ID :** PNT2022TMID13905

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## **1. INTRODUCTION**

### **1.1 Project Overview**

To predict used cars market value can help both buyers and sellers. There are lots of individuals who are interested in the used car market at some points in their life because they wanted to sell their car or buy a used car. In this process, it's a big corner to pay too much or sell less than its market value. Due to the unprecedented number of cars being purchased and sold, used car price prediction is a topic of high interest. Because of the affordability of used cars in developing countries, people tend more purchase used cars. A primary objective of this project is to estimate used car prices by using attributes that are highly correlated with a 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, Random Forest Regression algorithm have been trained, tested, and compared against a benchmark dataset. A train-test split of 80/20 with random states was used in all experiments. This project anticipate that in the near future, 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.

### **1.2 Purpose**

The primary goal of developing a system to forecast the resale value of cars is to gain practical experience with Python and Data Science. The system that estimates a car's resale value based on the user-provided parameters is known as "car resale value prediction." The car's information is entered into the provided form by the user, and the value of the car at resale is predicted as a result.

## **2. LITERATURE SURVEY**

### **2.1 Existing Problem**

This project is to predict used cars prices in using data mining techniques, by scraping data from websites that sell used cars, and analysing the different aspects and factors that lead to the actual used car price valuation. To enable consumers to know the actual worth of their car or desired car, by simply providing the program with a set of attributes from the desired car to predict the car price. The purpose of this study is to understand and evaluate used car prices and to develop a strategy that utilizes data mining techniques to predict used car prices.

### **2.2 Reference**

[1] Ning sun, Hongxi Bai, Yuxia Geng, Huizhu Shi, "Price Evaluation Model In Second Hand Car System Based On BP Neural Network Theory"; (Hohai University Changzhou, China)

[2] Doan Van Thai, Luong Ngoc Son, Pham Vu Tien, Nguyen Nhat Anh, Nguyen Thi Ngoc Anh, “Prediction car prices using qualify qualitative data and knowledge-based system” (Hanoi National University)

[3] Sameerchand Pudaruth, “Predicting the Price of Used Cars using Machine Learning Techniques”(IJICT 2014)

[4] Nitis Monburinon, Prajak Chertchom, Thongchai Kaewkiriya, Suwat Rungpheung, Sabir Buya, Pitchayakit Boonpou, “Prediction of Prices for Used Car by using Regression Models” (ICBIR 2018)

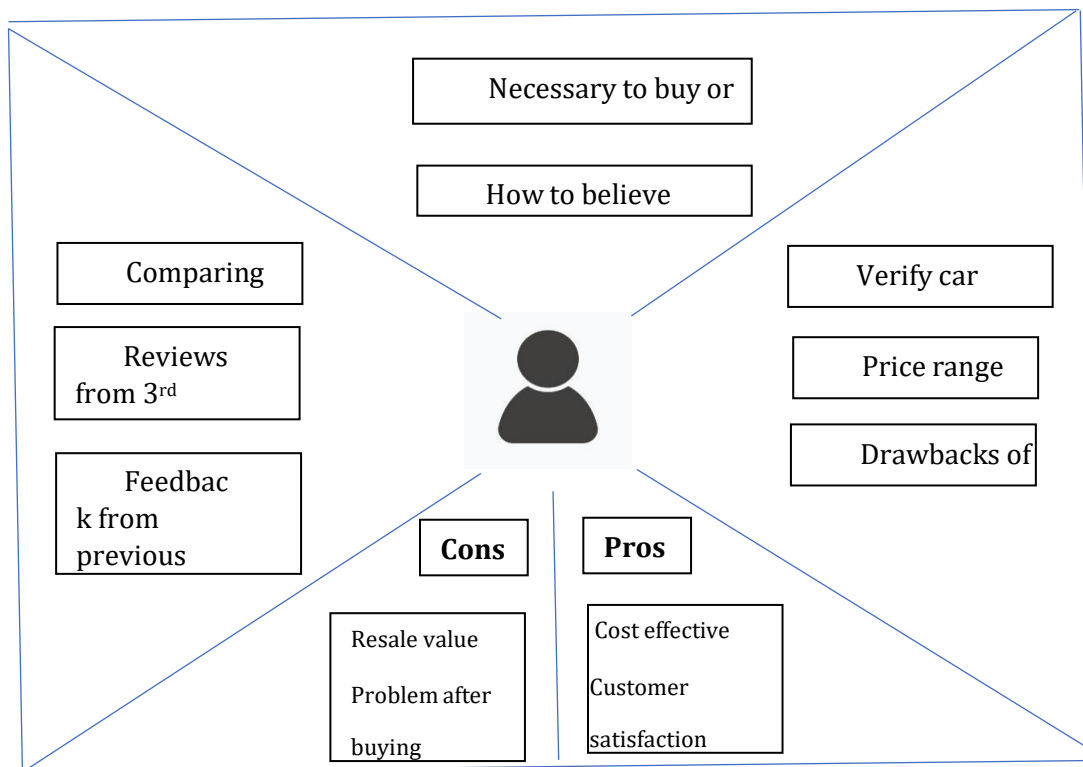
[5] Ning sun, Hongxi Bai, Yuxia Geng, Huizhu Shi, “Price Evaluation Model In Second Hand Car System Based On BP Neural Network Theory”; (Hohai University Changzhou, China)

### **2.3 Problem Statement Definition**

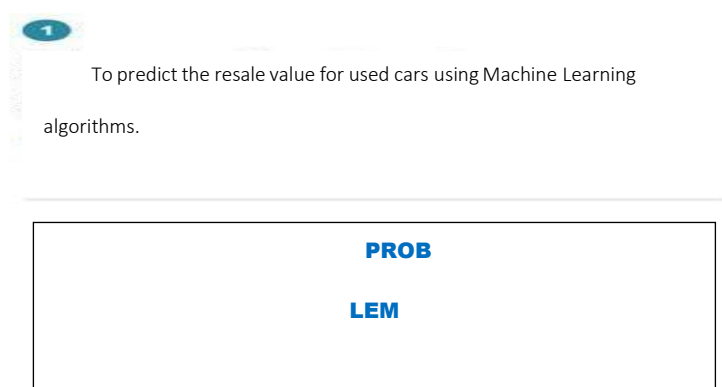
The problem is to fix the price of used cars without the involvement of third party agency. Car resale prediction is made automatically with the usage of various machine learning models which helps in determining the correct valuedeserved to pay for the vehicle after analysing its features properly. Thus, it helps in avoiding the over-priced situation for the customer.

### **3. IDEATION & PROPOSED SOLUTION**

### 3.1 Empathy Map Canvas



### 3.2 Ideation & Brainstorming



2

### Kalaiyarasu

To compare their accuracies

To fix any discrepancies in the units

To predict the results through them using training data

### Kannika

It contains Registered Module

Login module

Resale value prediction module

### Megaranjani

We preprocess and removes entries with NA values

UI interface to get input from user using HTML, CSS, javascript

Identify important features that reflect that price

### Rajalakshme

Python language is used to predict the amount of resale value

The System works on the trained dataset of the machine learning program

To remove samples that have missing value

To predict the amount of resale value based on the user's input

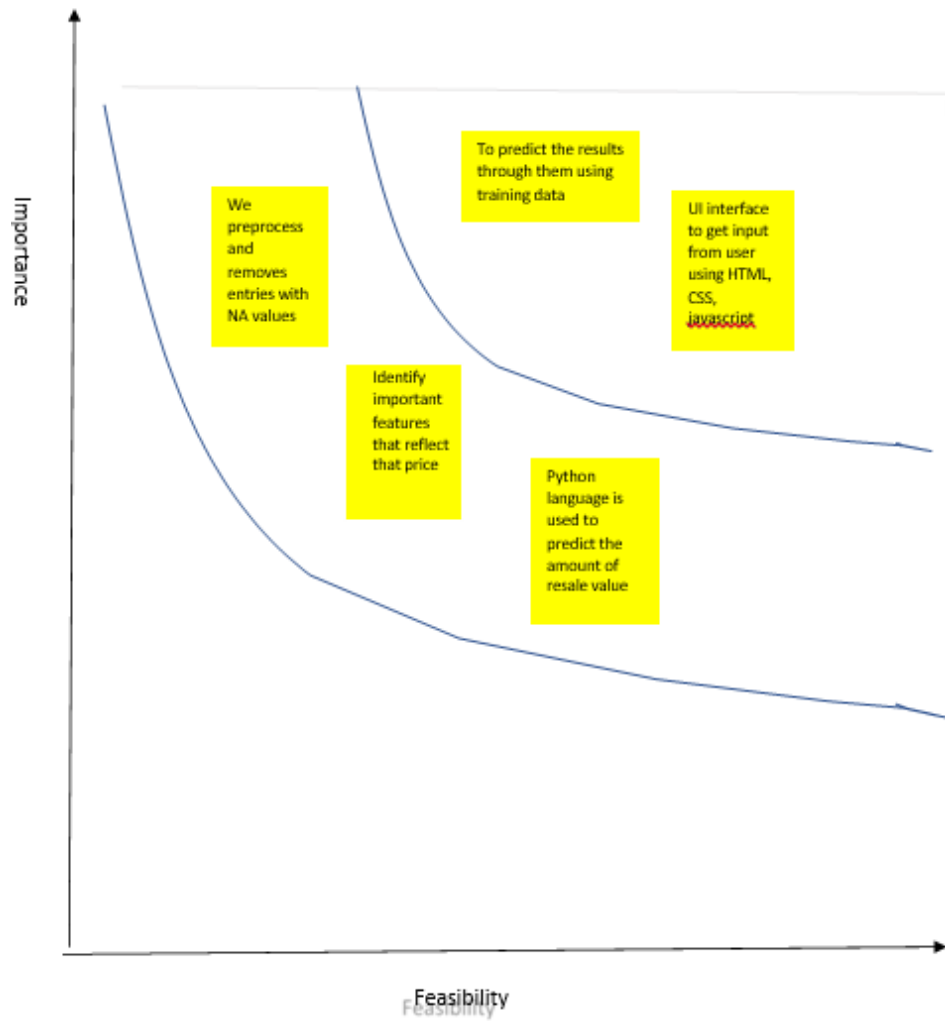
Writing python flask server

User enters the details of the car into the given form

UI interface to get input from user using HTML, CSS, javascript

User can enter details like purchase price of car, km fuel of car, year of the purchase

To display the resale value of car



### 3.3 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	The problem to be solved is to fix the prices of used vehicles, specifically cars, with the goal of eliminating the intermediary who fixes the prices of the vehicles without proper research. The primary goal of this system is to predict the resale value of a car based on user input such as kilometres, vehicle type, year of registration, and model using the random forest regressor algorithm.
2.	Idea / Solution description	Our project's goal is to create an efficient and effective model that predicts the price of a used car based on user input (data). To achieve good accuracy and to create a user-friendly user interface that takes input from the user and predicts the price using a random forest regressor.
3.	Novelty / Uniqueness	On a dataset containing the sale prices of various makes and models, we implement and evaluate various learning methods. The performance of various machine learning algorithms random Forest regressor will be compared. A user interface has also been created that takes input from any user and displays the price of a car based on the user's inputs.
4.	Social Impact / Customer Satisfaction	This project contains a large number of attributes that should be considered for an accurate prediction because it is very useful for people who are selling their car.
5.	Business Model (Revenue Model)	This project contains a large number of attributes that should be considered for an accurate prediction because it is very useful for people who are selling their car. As a result, this could be used in a small business to make money from customers.



### 3.4 Problem Solution fit

Define CS, fit into CC	1. CUSTOMER SEGMENT(S) <b>CS</b> Person who sells their car	6. CUSTOMER CONSTRAINTS <b>CC</b> Notwithstanding the strong demand, the low inventory levels across dealerships  Unavailability in good product, lack of technology/ network usage, device availability	5. AVAILABLE SOLUTIONS <b>AS</b> Best selling price, through brokers, pros: less efforts needed, cons: less accuracy.	Explore AS, differentiate
	2. JOBS-TO-BE-DONE / PROBLEMS <b>J&amp;P</b> There could be more than one carefully verify various parameters in different field	9. PROBLEM ROOT CAUSE <b>RC</b> Less accuracy in predicting the rate by humans, need to do this job is to resale their car.	7. BEHAVIOUR <b>BE</b> Directly related: find the right resale value Indirectly associated: customers spend free time on giving details about car	
Focus on J&P, tap into BE, understand RC	buy a new car, Need money in urgent	To predict the resale value of car based on the car detail and car status using random forest regressor in the web application.	according to the predicted value. 8.2 OFFLINE Car's current status.	Focus on J&P, tap into BE, understand RC
Identify strong TR & EM	4. EMOTIONS: BEFORE / AFTER <b>EM</b> Happy, Satisfied, in gaining knowledge - use it Car's current status in your resale strategy & sale			Identify strong TR & E

## 4. REQUIREMENT ANALYSIS

### 4.1 Functional Requirements

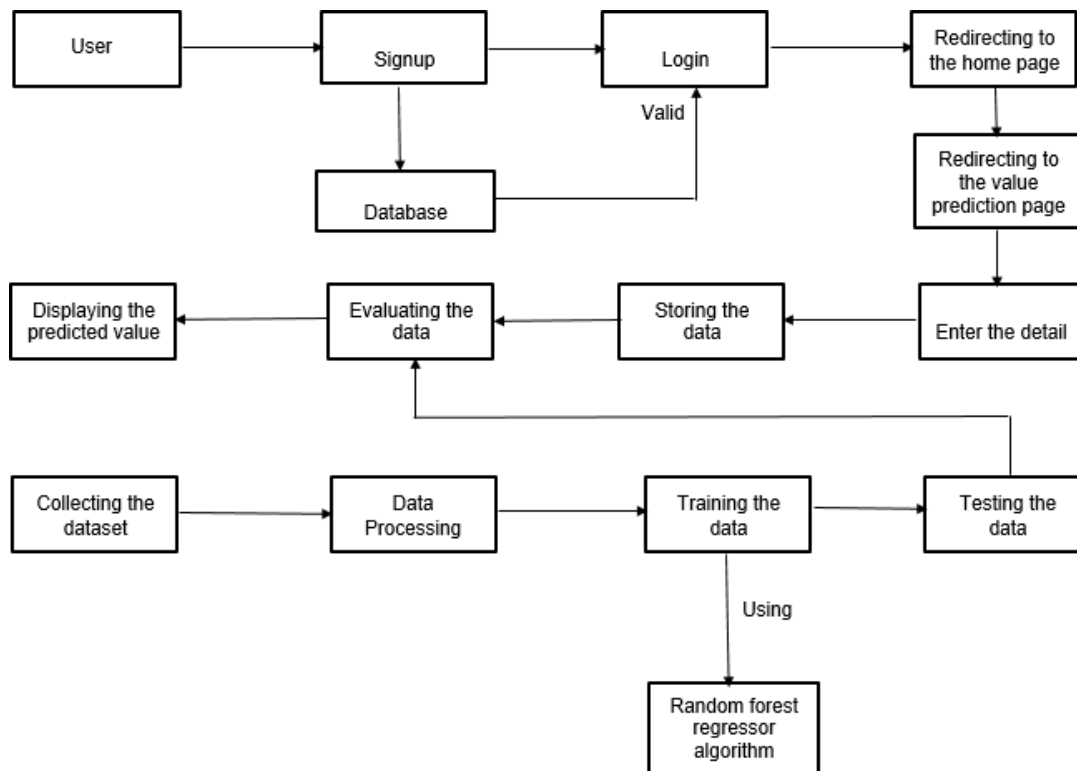
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Using Email ID and setting up password.
FR-2	User Confirmation	Confirmation via Email.
FR-3	User login	Using the registered Email ID and password.
FR-4	Dashboard	Viewing the profile, pages navigation.
FR-5	Value Prediction	Predicting the car resale value using the details given by the user
FR-6	Feedback	Collecting feedback against the accuracy of the prediction for further improvement

## 4.2 Non Functional Requirements

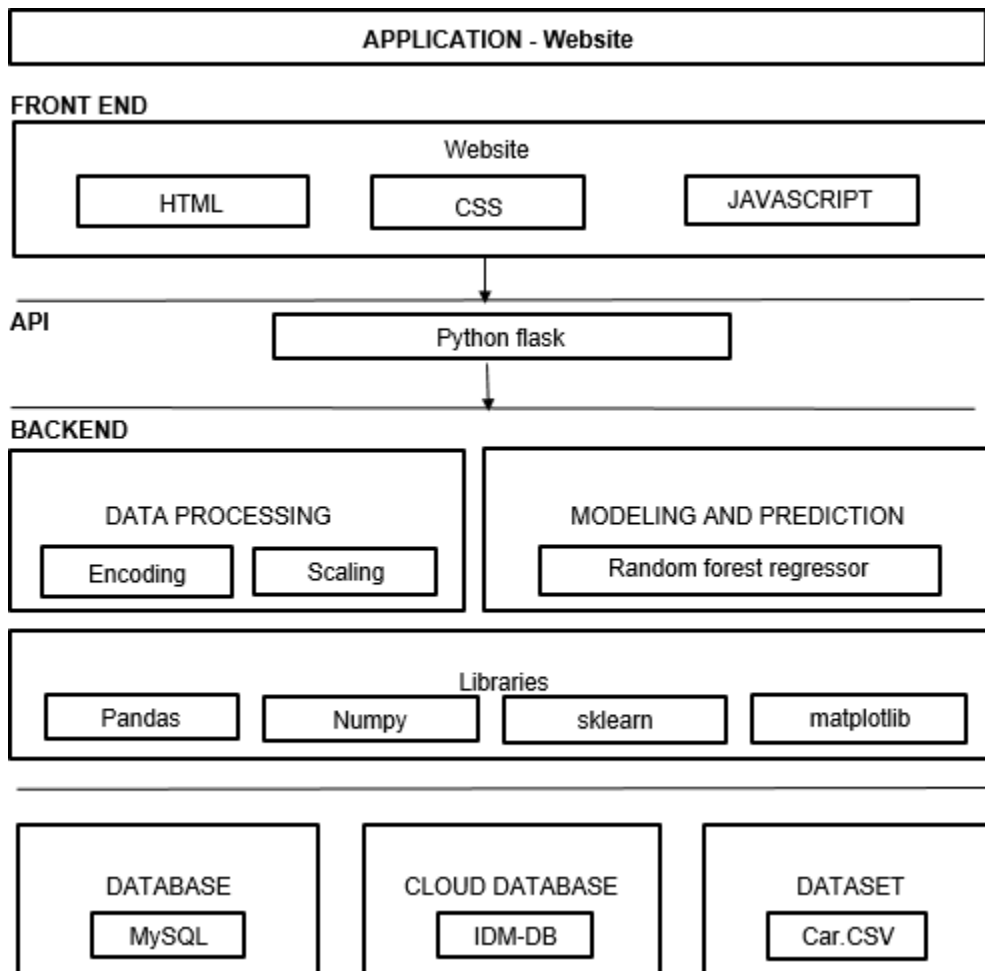
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Predicting the used car resale value.
NFR-2	Security	Providing security to the website.
NFR-3	Reliability	Providing better reliability by gathering information about the car from the user and predicting values for various types of cars.
NFR-4	Performance	Using machine learning techniques such as random forest regressor to provide excellent performance and accuracy.
NFR-5	Availability	It is used for all types of cars
NFR-6	Scalability	Predicting values for different types of cars

## 5. PROJECT DESIGN

### 5.1 Data Flow Diagrams



## 5.2 Solution & Technical Architecture



## 5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
User in website	Registration	USN-1	User can sign up for the application by providing username, email address, password and confirmation password, Phone number.	Account specific tasks and action can be performed	High	Sprint-1
		USN-2	Once a user registers for the application, they will receive a confirmation email.	Verify the registered account.	High	Sprint-1
		USN-3	Gmail can be used to validate the user directly.	Account validated and got access to dashboard	Medium	Sprint-1
	Login	USN-4	To log into the application, enter the username and password.	Right account credentials should be entered	High	Sprint-1
	Dashboard	USN-5	User can view the website details.		Medium	Sprint-2
		USN-6	User can view the account details and history	User should be verified.	High	Sprint-2
		USN-7	User can give the feedback on the user interface and the prediction's accuracy.		High	Sprint-2
Core development team	Core function	USN-8	The optimal user interface should be used to design and develop the application, and maintenance should be considered carefully.	Easy and self-understandable user interface.	High	Sprint-3
		USN-9	The website should be responsive to all devices and screen sizes.	User experience should be good responsive of the device.	Medium	Sprint-3
		USN-10	Collect the dataset and process the data		High	Sprint-3
User in website	Enter the detail about car	USN-8	User should enter the car's information.	Entered data should be correct	High	Sprint-4
		USN-11	User can view the prediction value.		High	Sprint-4

## 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	Kannika A
Sprint-1		USN-2	Import required libraries	1	Low	Kannika A
Sprint-1		USN-3	Read and clean data sets	2	Low	Kalaiyarasu D
Sprint-2	Model building	USN-1	Split data into independent and dependent variables	3	Medium	Rajalakshme R S
Sprint-2		USN-2	Apply using regression model	3	Medium	Megaranjani C
Sprint-3	Application building	USN-1	Build python flask application and HTML page	5	High	Rajalakshme R S
Sprint-3		USN-2	Execute and test	5	High	Kannika A
Sprint-4	Training the model	USN-1	Train machine learning model	5	High	Megaranjani C
Sprint-4		USN-2	Integrate flask	5	High	Kalaiyarasu D

## 7. CODING & SOLUTIONING

### 7.1 Feature 1

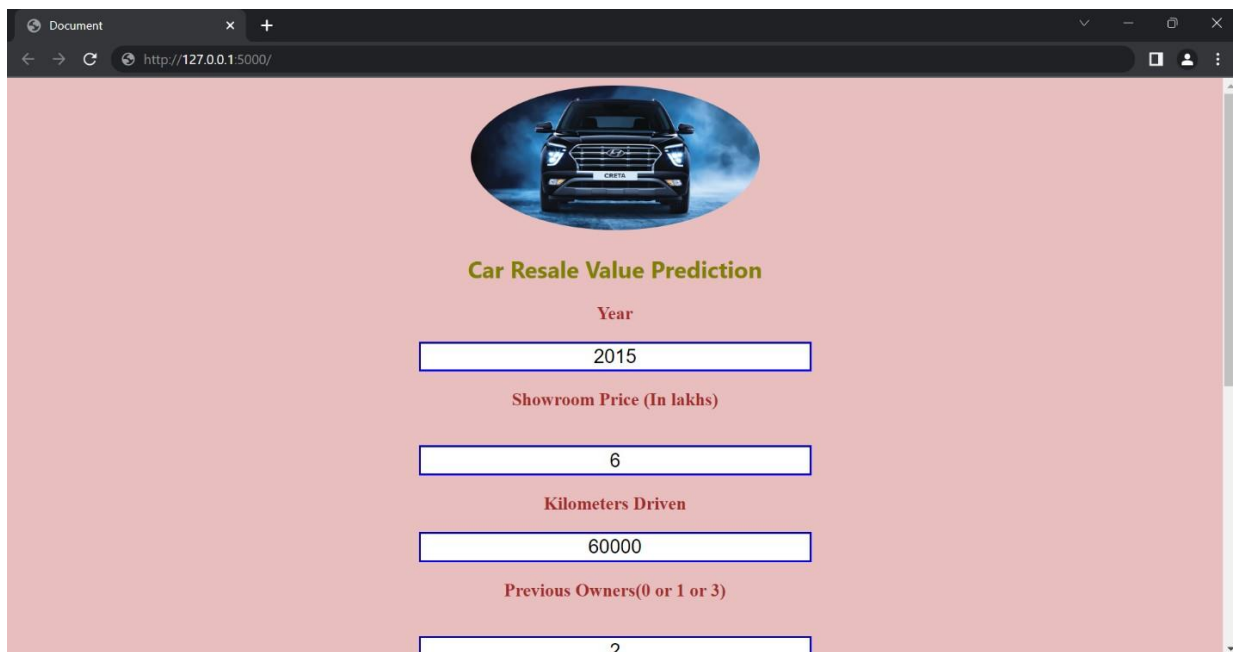
- IoT device
- IBM Watson Platform
- Node red
- Cloudant DB
- Web UI
- MIT App Inventor
- Python code

### 7.2 Feature 2

- Login
- Wokwi


## 8. TESTING

### 8.1 Test Cases



Document x +

http://127.0.0.1:5000/



**Car Resale Value Prediction**

Year

2015

Showroom Price (In lakhs)

6

Kilometers Driven

60000

Previous Owners(0 or 1 or 3)

2

Document x +

← → ↻ http://127.0.0.1:5000/

60000

Previous Owners(0 or 1 or 3)

2

Fuel type

Petrol

Dealer or Owner

Individual

Transmission type

Manual Car

Calculate the Selling Price

## 9. RESULTS

Document x +

← → ↻ 127.0.0.1:5000/predict

Previous Owners(0 or 1 or 3)

Fuel type

Petrol

Dealer or Owner

Dealer

Transmission type

Manual Car

Calculate the Selling Price

You Can Sell The Car at 4.37

## 10. ADVANTAGES

This car resale value prediction will reduced installation cost and it will monitor 24/7. It is very useful to sale the car for reasonable price.

## **DISADVANTAGES**

The research objective of this study is to predict used cars prices in Dubai using data mining techniques, by scraping data from websites that sell used cars, and analysing the different aspects and factors that lead to the actual used car price valuation. To enable consumers to know the actual worth of their car or desired car, by simply providing the program with a set of attributes from the desired car to predict the car price. The purpose of this study is to understand and evaluate used car prices in the UAE, and to develop a strategy that utilizes data mining techniques to predict used car prices.

## **11. 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 using random forest algorithm.

## **12. FUTURE SCOPE**

In the future, more data will be collected using different web-scraping techniques, and deep learning classifiers will be tested. Algorithms like Quantile Regression, ANN and SVM will be tested. Afterwards, the intelligent model will be integrated with web and mobile-based applications for public use. Moreover, after the data collection phase Semiconductor shortages have incurred after the pandemic which led to an increase in car prices, and greatly affected the secondhand market. Hence having a regular Data collection and analysis is required periodically, ideally, we would be having a real time processing program.

## **13. APPENDIX**

### **Source Code**

```
<!DOCTYPE html>
<html lang="en">
<head> <meta charset="UTF-8">
<meta      name="viewport"      content="width=device-width,      initial-scale=1.0">
<title>Document</title>
</head>
<body> <div style="color:brown;">
```

```

<form action="{{ url_for('predict')}}" method="post">
<h2>Car Resale Value Prediction</h2></img>
<h3>Year</h3>
<input id="first" name="Year" type="number ">
<h3>Showroom Price (In lakhs)</h3><br>
<input id="second" name="Present_Price" required="required">
<h3> Kilometers Driven</h3>
<input id="third" name="Kms_Driven" required="required">
<h3>Previous Owners(0 or 1 or 3) </h3><br>
<input id="fourth" name="Owner" required="required">
<h3>Fuel type</h3><br>
<select name="Fuel_Type_Petrol" id="fuel" required="required">
<option value="Petrol">Petrol</option>
<option value="Diesel">Diesel</option>
<option value="Diesel">CNG</option> </select>
<h3>Dealer or Owner</h3><br>
<select name="Seller_Type_Individual" id="resea" required="required">
<option value="Dealer">Dealer</option>
<option value="Owner">Individual</option>
</select>
<h3>Transmission type</h3><br>
<select name="Transmission_Mannual" id="research" required="required">
<option value="Mannual">Manual Car</option>
<option value="Automatic">Automatic Car</option> </select> <br><br>
<button id="sub" type="submit ">Calculate the Selling Price</button> <br>
</form> <br><br><h3>{{ prediction_text }}</h3> </div>
<style>
img{
  align-items:center;
  border-radius: 50%;
  border-color: black;
  height:150px; width:300px;
}

```



```
h2{
color:olive;
font-family: 'Segoe UI', Tahoma, Geneva, Verdana, sans-serif;
}
body {
background-color:rgb(179, 43, 43,0.3);
text-align: center;
padding: 0px;
}
#research {
font-size: 18px;
width: 400px;
height: 25px;
top: 23px;
}
#box {
/* border-radius: 30px; */
border-color: 45px;
border-style: outset;
font-family: cursive;
text-align: center;
background-color: rgb(168, 131, 61);
font-size: medium;
position: absolute;
width: 400px;
bottom: 9%;
height: 850px;
right: 30%;
padding: 0px;
margin: 0px;
font-size: 14px;
}
#fuel {
```

```
width: 400px;
height: 43px;
text-align: center;
border-radius: 14px;
font-size: 20px;
}
#fuel:hover { background-color: coral; }
#research {
width: 400px;
height: 43px;
text-align: center;
border-radius: 14px;
font-size: 18px;
}
#research:hover {
background-color: coral;
}
#resea {
width: 400px;
height: 43px;
text-align: center;
border-radius: 14px;
font-size: 18px;
}
#resea:hover { background-color: coral; }
#sub {
width: 400px;
height: 43px;
text-align: center;
border-radius: 14px;
font-size: 18px;
}
#sub:hover {
```

```
background-color: darkcyan;
}
#first {
height: 25px;
font-size: 20px;
text-align: center;
width: 400px;
border-color:blue;
}
#second {
/*border-radius: 14px;*/
height: 25px;
font-size: 20px;
text-align: center;
width: 400px;
border-color:blue;
}
#third {
/*border-radius: 14px;*/
height: 25px;
font-size: 20px;
text-align: center;
width: 400px;
border-color:blue;
}
#fourth {
/*border-radius: 14px;*/
height: 25px;
font-size: 20px;
text-align: center;
width: 400px;
border-color: blue;
}
```

</style>

</body>

</html>

**GitHub & Project Demo Link**

**<https://github.com/IBM-EPBL/IBM-Project-32923-1660212998>**

