PROJECT REPORT

PROJECT TITLE: CAR RESALE VALUE PREDICTION
TEAM ID: PNT2022TMID14160
TEAM MEMBES:

1. VIJESH S (TEAM LEAD)
2. SAKTHIVEL K
3. SAMINATHAN A
4. SUJITH J G

1. INTRODUCTION

a. Project overview

The Car Valuation Tool is a free tool designed to help you get the estimated resale value of your car within seconds. Our automobile valuation algorithm is real-time updated, so it keeps up with the most recent modifications and market trends. However, the amounts displayed during the online assessment are only estimate s and might alter when the retailer inspects your automobile. You don't even need to register to have your automobile valued; all you need to do is provide some basic information about it, suchas its make, model, amount of miles driven, city of residence, and contactinformation.

b. Purpose

In 2019, the Indian used automobile resale industry was valued at $24.2 billion USD. There is a critical need to close this gap between sellers and buyers due to the enormous demand for used automobiles and the shortage of professionals who can evaluate the proper valuation. The goal of this research is to create a system that can impartially forecast a car's resale value based on little information such as the number of miles travelled and the year of purchase.The process of determining the current used automobile pricing in a certain location is known as used car value. By selecting the brand, model, year, trim, and the number of kilometers travelled, a user of OBV may quickly determine the used car's price. The value of a

used automobile is based on a number of variables, including its state right now, when it was bought, etc. Used automobile valuation will never have a precise price; instead, it will always fall within a reasonable price range.

2. LITERATURE SURVEY

a. Existing problem

Car Resale value prediction is one of the best to sell our in this market for an best and better price.Rather than giving our car to an less price , the customer those who uses the car will be benifitted and the seller will also be benefitted.The goal of this research is to create a system that can impartially forecast a car's resale value based on little information such as the number of miles travelled and the year of purchase.You don't even need to register to have your automobile valued; all you need to do is provide some basic information about it, such as its make, model, amount of miles driven, city of residence, and contact information.

b. References

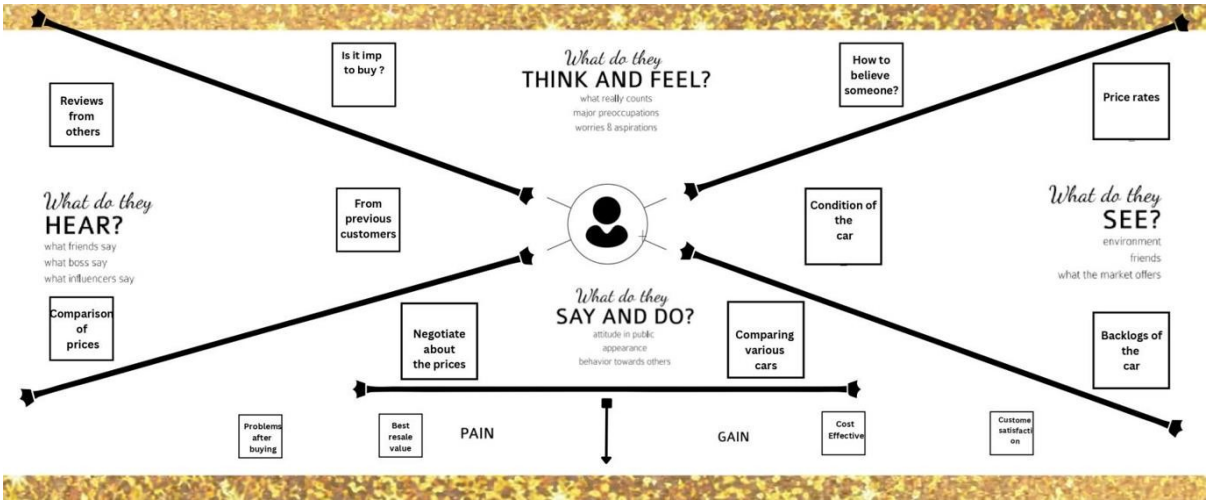
1. Pudaruth Sameerchand , Pudaruth Sameerchand , Predicting the price of Used Car Using Machine Learning Techniques
2. Enis gegic, Becir ,Isakovic, Dino Keco, ,Zerina Masetic,Jasmin Kevric Car Price Prediction Using Machine Learning
3. Ning sun,Hongxi Bai,Yuxia Geng,Huizhu Shi Price Evaluation model in second hand car system
4. 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

c. Problem Statement Definition

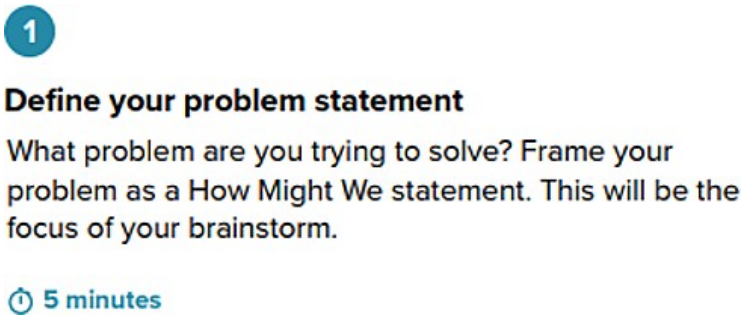
Car Resale value prediction is used to predict the value of the used cars to an reasonable price which satisfies the customer.

3. IDEATIOIN AND PROPOSED SOLUTION

a. Empathy Map Canvas



b. Ideation and Brainstroming

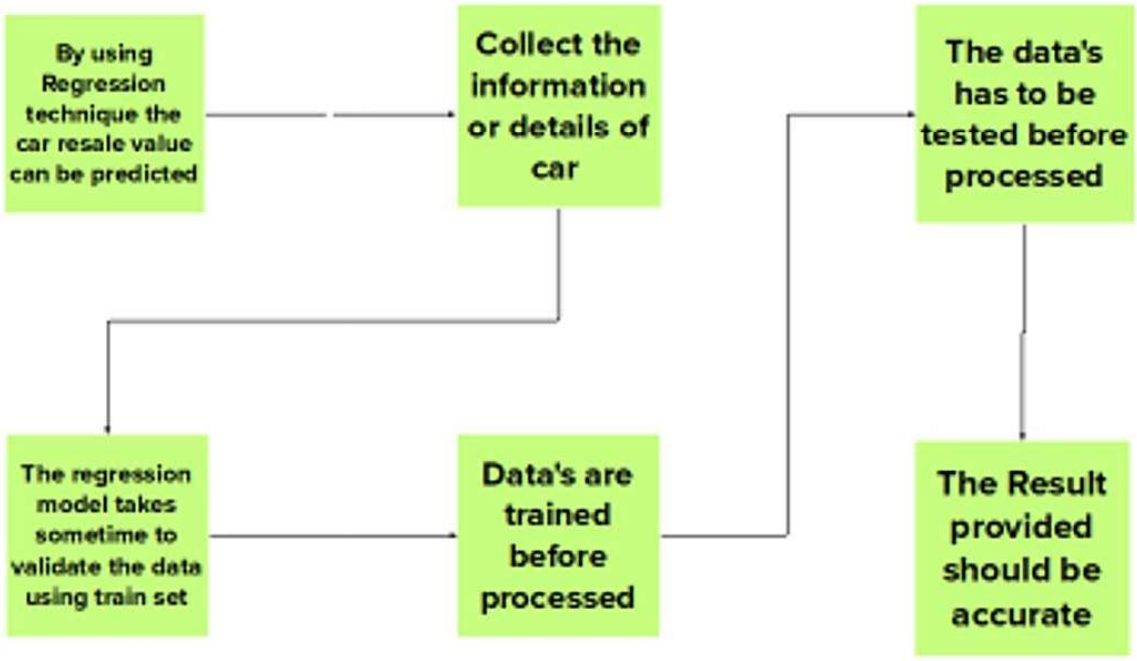


3

Group ideas

Use this space to group similar ideas from the brainstorm. Each group should have a title that describes what the ideas have in common. If a group is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

20 minutes

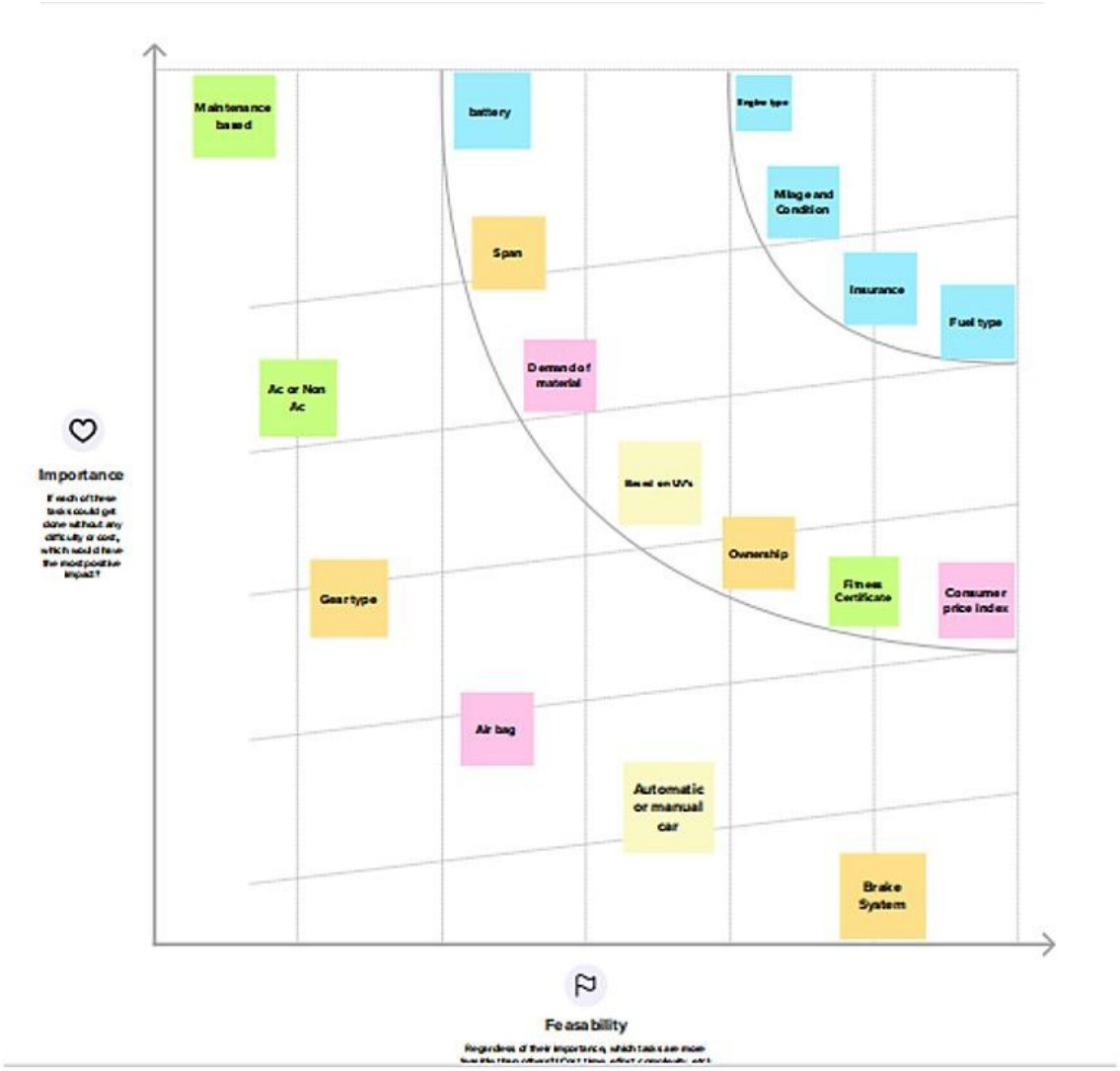


4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes



c.Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to besolved)	To develop a website, predicting the sellingprice of a second-hand car.

2.	Idea / Solution description	To train the system with the datasets using aregression model.
3.	Novelty / Uniqueness	Predicts the value of car in a less amount totime withthe accurate resale value.
4.	Social Impact/ Customer Satisfaction	Customer get to know the best price on theircars as well as canbuy cars that they dreamt for , based on their financial crisis.
5.	Business Model (Revenue Model)	Targets customer globally with competitive price and a sustainable cost. Thus fulfilclient needs and leadsto a successful business.
6.	Scalability of the Solution	This is to make the efforts of knowing the car resale value on account to market demands with timebenefit and therefore acquire more customers with expanded markets globally.

d.Problem Solution Fit

c. Problem Solution Fit

1. CUSTOMER SEGMENTS	6. CUSTOMER CONSTRAINTS CC	5. AVAILABLE SOLUTIONS
Both used car sellers and buyers	Unavailability in good product, lack of technology/ network usage, device availability.	In the past User cannot find the value of used car buy their own without prior knowledge about cars. •A person who don't know much about the car can also make predictions for used cars easily.
2. JOBS-TO-BE-DONE / PROBLEMS	9. PROBLEM ROOT CAUSE	7. BEHAVIOUR
There could be more than one; carefully verify various parameters in different field	The price predicted by the dealers Broker for used car is not trustful. • users can predict the correct Valuation the car remotely without human intervention like car dealers. • User can eliminate biased valuation predicted by the dealer.	• Directly related: fiind the right resale value • Indirectly associated: customers spend free time on giving details about car
3. TRIGGERS	10. OUR SOLUTION	8. CHANNELS of BEHAVIOUR
users can predict the correct valuation of the car by their own like olx,cars24 and other car resale value prediction webeites by using model,year,owner,etc	To predict the resale value of car based on the car detail and car status using random forest regressor in the web application	customer should predict the worth of the car byusing different parameters given by the owner. • User Should confirm the details provided about the vehicle in RTO online. • user can decide by seeing the exterior and interioroondition of the car. • User can test the performance of the car and to buyit up in a affordable price based on its condition

S

4. EMOTIONS: BEFORE / AFTER		8.2 OFFLINE
Happy, Satisfied, in gaining knowledge - use it in your resale strategy & sale.		**Car's current status**

4. REQUIREMENT ANALYSIS

a. Functional requirement

FR No.	Functional Requirement(Epic)	Sub Requirement (Story/ Sub-Task)
FR-1	User Registration	Registration throughwebsite or application Registration through Social mediasRegistration through LinkedIN
FR-2	User Confirmation	Verification via Emailor OTP
FR-3	User Login	Login through website or App usingthe respective username and password
FR-4	User Access	Access the app requirements
FR-5	User Upload	User should be able to upload the data
FR-6	User Solution	Data report should be generated anddelivered to user for every 24 hours
FR-7	User Data Sync	API interface to increase to invoice system

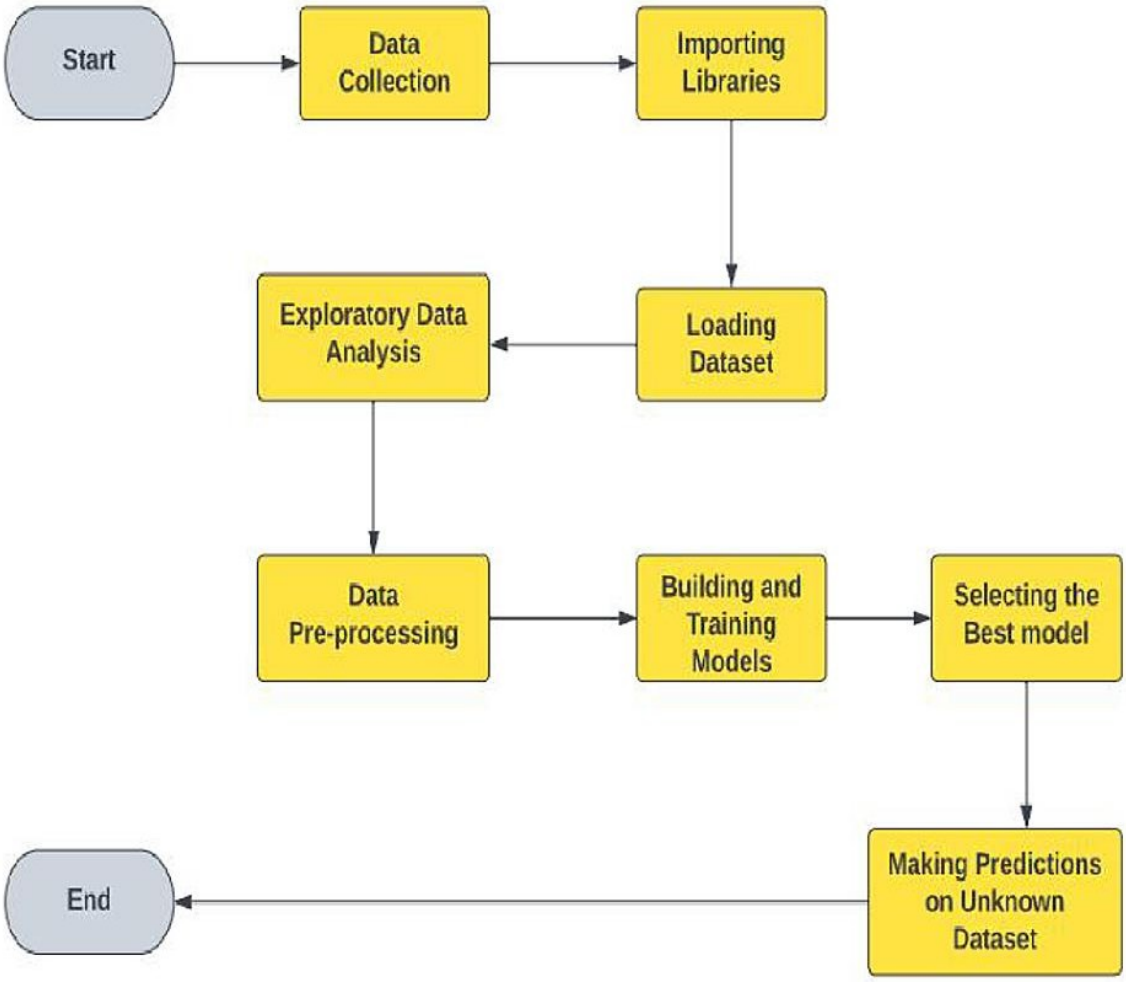
b. Non-Functional requirement

FR No.	Non-Functional Requirement	Description

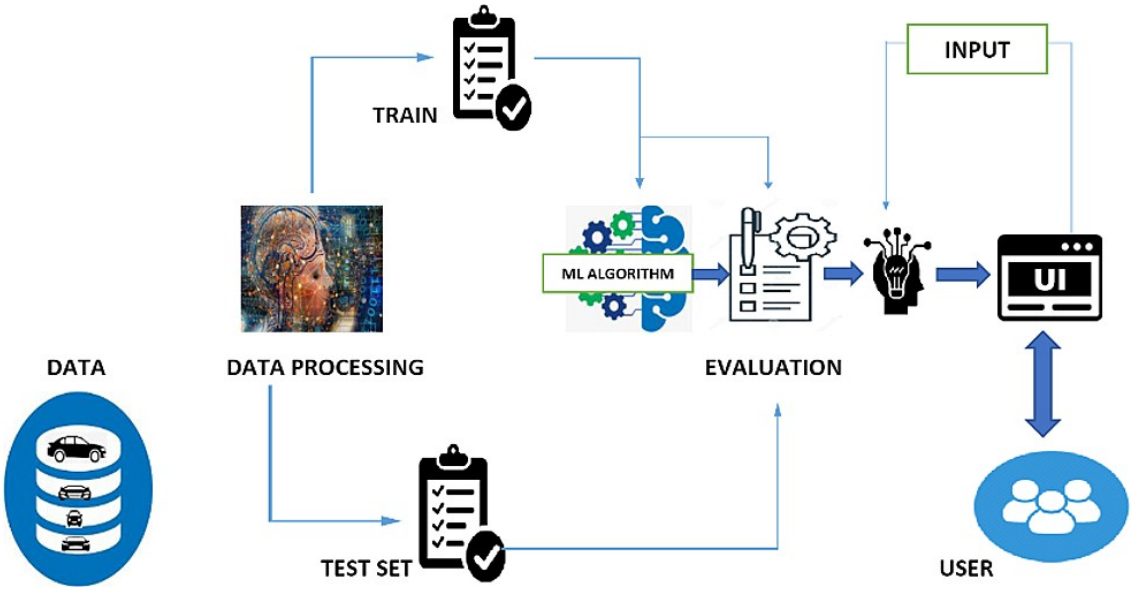
NFR-1	**Usability**	Usability requirements includes language barriers and localization tasks. Usability can be assessed by Efficiency of use.
NFR-2	**Security**	Access permissions for the particular system information mayonly be changed by the system' s data administrator.
NFR-3	**Reliability**	The database update process must roll backall related updates when any updatefails.
NFR-4	**Performance**	The front-page load time mustbe no morethan 4 seconds for usersthat access thewebsite using anVoLTE mobile connection.
NFR-5	**Availability**	New module deployment must not impact frontpage,product pages, and check out pages availability and mustn't take longer than one hour.
NFR-6	**Scalability**	We can increase scalability by adding memory, servers, or disk space.On the other hand,we can compress data,use optimizing algorithms.

5. PROJECT DESIGN

a. Data Flow Diagram



b. Solution Architecture



c. User Stories

User Type	Functional requirement	User story number	User story/task	Acceptance criteria	Priority	Release
Customer (Mobile user, Web user, Care executive, Administrator)	Registration	USN-1	As a user, I can register for the application by entering my mail, password, and confirming my password	I can access my account / dashboard	High	Sprint-1

		USN-2	As a user, I will receive confirmation email once I have registered forthe application	I can receive confirmation email & click confirm	High	Sprint-1
	Dashboard	USN-3	As a user, I can register for the application through internet	I can register & access the dashboard with Internet login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can confirm the registration in Gmail	Medium	Sprint-1

	Login	USN-5	As a user, I can log into the application by entering email & password	I can login with my id and password	High	Sprint-1

6. PROJECT PLANNING&SCHEDULING

a. Sprint Planning& Estimation

Sprint	Functional Requirement (Epic)	User Story/ Task	StoryPoints	Priority	Team Members
Sprint-1	Resources Initialization	We haveto create and initialize accounts in various public APIs like OpenWeatherMap API.	1	LOW	Sakthivel K Saminathan A Sujith J G Vijesh S

Sprint-1	Local Server/SoftwareRun	Write a Python programthat outputs results given the inputs like weatherand location throughthe software	1	MEDIUM	Sakthivel K Saminathan A Sujith J G Vijesh S
Sprint-2	Push the server/software to cloud	Push the codefrom Sprint 1 tocloud so it can be accessed from anywhere	2	MEDIUM	Sakthivel K Saminathan A Sujith J G Vijesh S
Sprint-3	Hardware initialization	Integrate the hardware to be able to accessthe cloud functions and provide inputs to the same.	2	HIGH	Sakthivel K Saminathan A Sujith J G Vijesh S
Sprint-4	UI/UX Optimization &Debugging	Optimize all theshortcomings and provide better user experience.	2	LOW	Sakthivel K Saminathan A Sujith J G Vijesh S

7. CODING &SOLUTIONING

a. Feature 1

1. IoT device
2. IBM Watson Platform
3. Node red
4. Cloudant DB
5. Web UI
6. MIT App Inventor
7. Python code

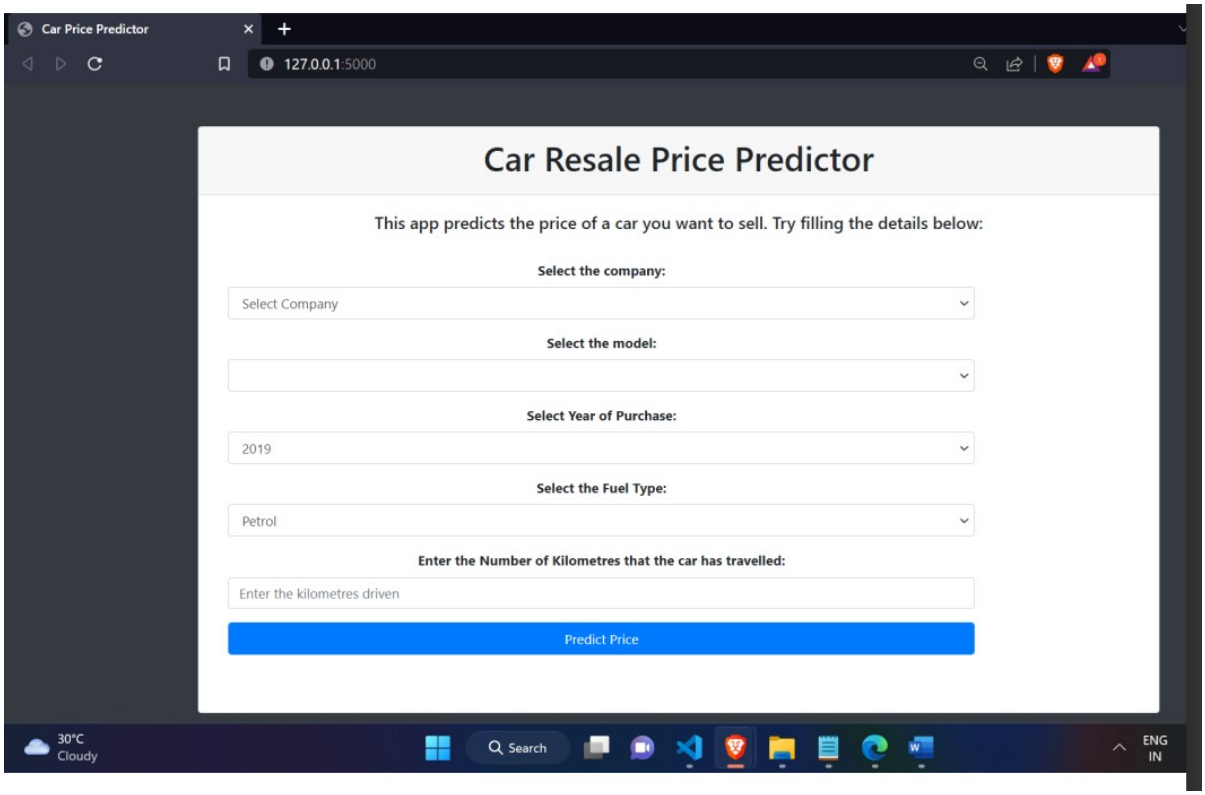
b. Feature 2

1. Login
2. Wokwi

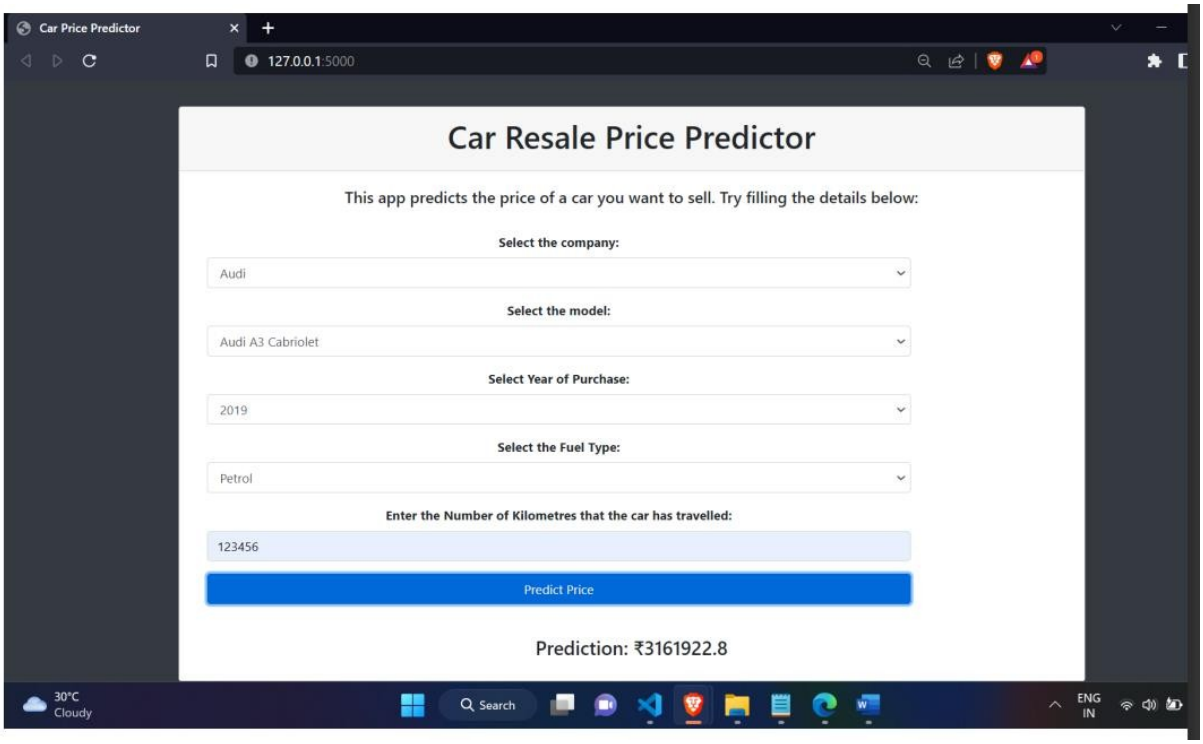
8. TESTING AND RESULTS

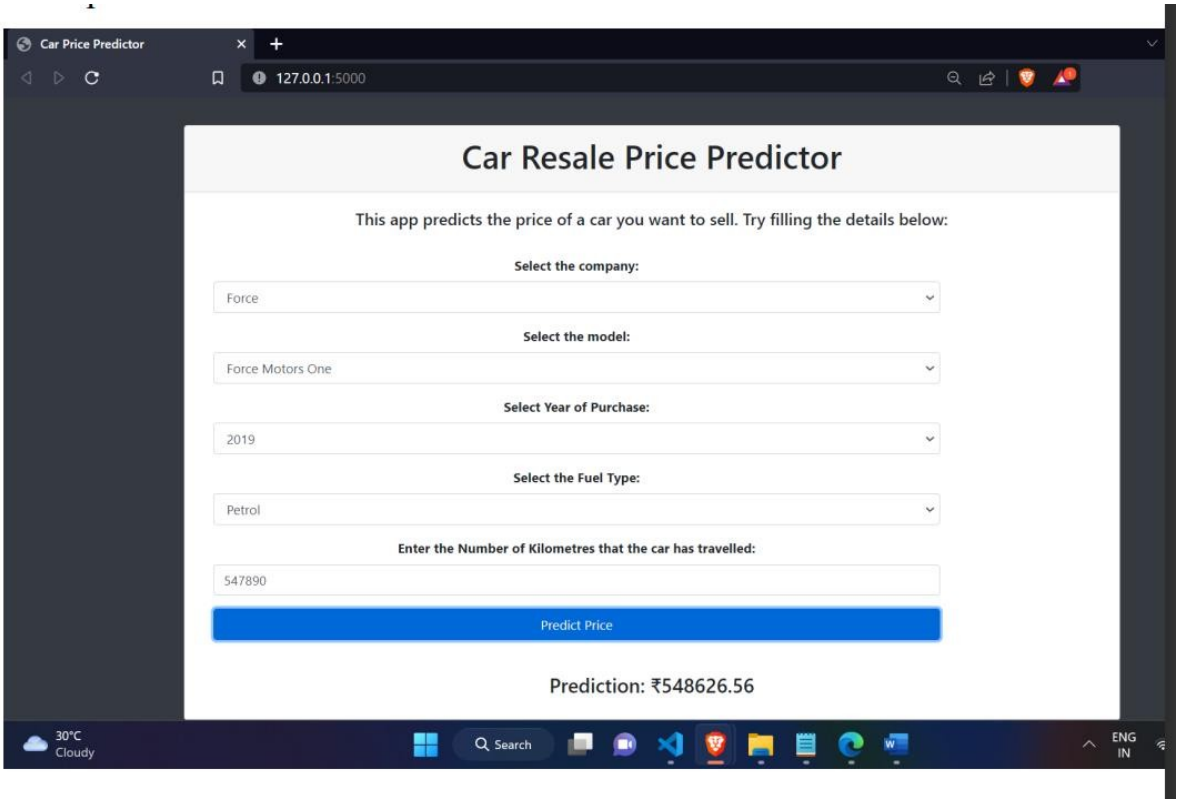
TESTCASES

TESTCASE 1:


Car Price Predictor
127.0.0.1:5000
Car Resale Price Predictor
This app predicts the price of a car you want to sell. Try filling the details below:
Select the company:
Select Company
Select the model:
Select Year of Purchase:
2019
Select the Fuel Type:
Petrol
Enter the Number of Kilometres that the car has travelled:
Enter the kilometres driven
Predict Price
30°C
Cloudy
Search
ENG
IN

Test case 2:


Car Price Predictor
127.0.0.1:5000
Car Resale Price Predictor
This app predicts the price of a car you want to sell. Try filling the details below:
Select the company:
Audi
Select the model:
Audi A3 Cabriolet
Select Year of Purchase:
2019
Select the Fuel Type:
Petrol
Enter the Number of Kilometres that the car has travelled:
123456
Predict Price
Prediction: ₹3161922.8
30°C
Cloudy
Search
ENG
IN


Car Price Predictor
127.0.0.1:5000
Car Resale Price Predictor
This app predicts the price of a car you want to sell. Try filling the details below:
Select the company:
Force
Select the model:
Force Motors One
Select Year of Purchase:
2019
Select the Fuel Type:
Petrol
Enter the Number of Kilometres that the car has travelled:
547890
Predict Price
Prediction: ₹548626.56
30°C
Cloudy
Search
ENG
IN

Result:

After entering the details in the form we will see that predtiction price for the given car.

9. ADVANTAGES

1. This will reducedinstallation cost.
2. It will monitor24/7.
3. Very useful to sale the car for reasonable price

10. DISADVANTAGES

1. Car Resale value can not be used by the person who doesn't have access to the internet.
2. Very hard to use for targeted range of people

11. CONCLUSION

Price prediction analyses a good or service based on its attributes, demand, and current market trends using an algorithm. The pricing is then adjusted by the programme at a level that it believes would both draw people and optimise sales. The method is known as price forecasting or predictive pricing in some quarters.

12. FUTURE SCOPE

When compared to February 2020, average prices were up 42.5% in September 2022. While it's possible that used vehicle prices have peaked, new car prices are expected to be high through the end of 2022. Prices are anticipated to drop for both new and used automobiles in 2023, by 2.5% to 5% for new cars and 10% to 20% for used cars.

APPENDIX

a. Source Code

STYLE

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


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

INDEX

```
<!DOCTYPE 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"></s
cript>
   <script
src="https://cdn.jsdelivr.net/npm/popper.js@1.16.0/dist/umd/popper.min.j
s"
        integrity="sha384-
Q6E9RHvbIyZFJoft+2mJbHaEWldlvI9IOYy5n3zV9zzTtmI3UksdQRVvoxMfo
oAo"
        crossorigin="anonymous"></script>

   <!-- Bootstrap CSS -->
   <link rel="stylesheet"
href="https://stackpath.bootstrapcdn.com/bootstrap/4.5.0/css/bootstrap.
min.css"
       integrity="sha384-
9aIt2nRpC12Uk9gS9baDl411NQApFmC26EwAOH8WgZl5MYYxFfc+NcPb1
dKGj7Sk" 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>Car Resale 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>
</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>
<script src="https://cdn.jsdelivr.net/npm/popper.js@1.16.0/dist/umd/popper.min.js"
      integrity="sha384-Q6E9RHvbIyZFJoft+2mJbHaEWldlvI9IOYy5n3zV9zzTtmI3UksdQRVvoxMfooAo"
      crossorigin="anonymous"></script>
<script src="https://stackpath.bootstrapcdn.com/bootstrap/4.5.0/js/bootstrap.min.js"
      integrity="sha384-OgVRvuATP1z7JjHLkuOU7Xw704+h835Lr+6QL9UvYjZE3Ipu6Tp75j7Bh/kR0JKI"
      crossorigin="anonymous"></script>
</body>
</html>
```

GITHUB LINK:

https://github.com/IBM-EPBL/IBM-Project-6257-1658825260