PROJECT REPORT

PROJECT TITLE: CAR RESALE VALUE PREDICTION
TEAM ID: PNT2022TMID14010
TEAM MEMBES:

1. DARSHAN (TEAM LEAD)

2. CHAITANYA K
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4. MATHESH N

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, such as its make, model, amount of miles driven, city of residence, and contact information.

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
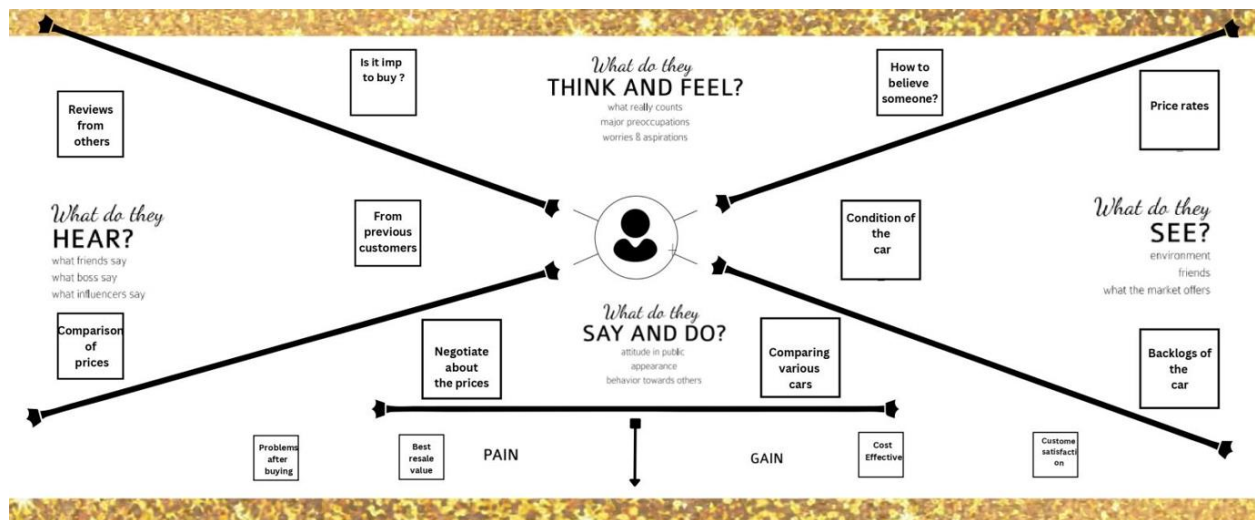
b. Ideation and Brainstroming

1

Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

⏱ 5 minutes

> **PROBLEM**
>
> The main aim of this project is to predict the price of used cars using different machine learning models

2

Brainstorm

Write down any ideas that come to mind that address your problem statement.

⏱ 10 minutes

Suganya

Need to sell the car	is the car accident free	Does the car have an ongoing Fc
is it a flooded car	Does the car have a native registration	What is the driven Km of the car
What is the depriciated price of an accident car	Does the car have a service record	Based on my budget decide whether to sell or not

Vishnu raj

which is the eficient algorithm form training the system	is the images uploaded are valid images	what are the modifcations done in the car
what is the current number of owners	how is the tyre condition of the car	does the car have any electrical issues
how is the battery condition of the vehicle	does the car have any cse charges	is the air conditioner working properly

Survesh hari

to check wheather the car is in same colur as registered	does it have any issues related with acceleration	weather the website is responsive
verify its chassis number	whether any engine work is done in the car	how is the pickup of the car
does it have customer support	does it have a mobile application	is it a cross platform application

Sanjay

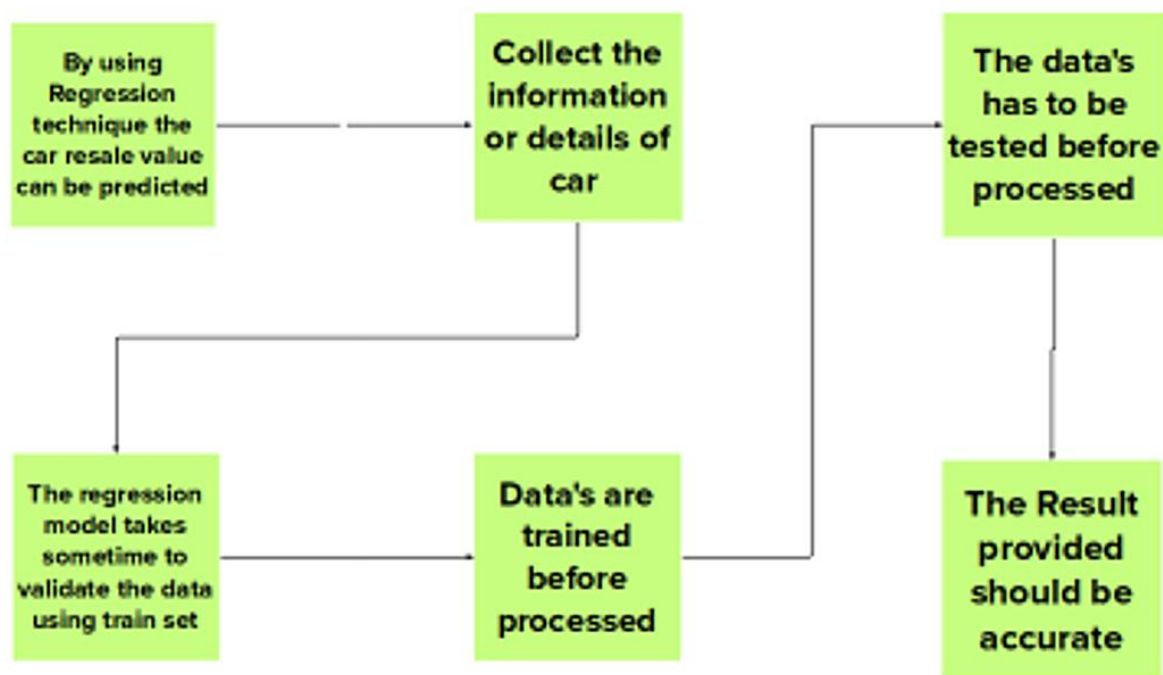|		
does the car have authorized service centers	does the car have ignition problem	does it have alignment issues
how is the mileage of the car	what will be its average service cost	what is the fuel type
what type of cooling system is used	how many seater car do u prefer	What is the type of car do you prefer

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

```
┌──────────────┐          ┌──────────────┐          ┌──────────────┐
│ By using     │          │ Collect the  │          │ The data's   │
│ Regression   │─────────▶│ information  │          │ has to be    │
│ technique the│          │ or details of│          │ tested before│
│ car resale   │          │ car          │          │ processed    │
│ value can be │          └──────────────┘          └──────────────┘
│ predicted    │
└──────────────┘

┌──────────────┐          ┌──────────────┐          ┌──────────────┐
│ The regression│         │ Data's are   │          │ The Result   │
│ model takes  │─────────▶│ trained      │─────────▶│ provided     │
│ sometime to  │          │ before       │          │ should be    │
│ validate the │          │ processed    │          │ accurate     │
│ data using   │          └──────────────┘          └──────────────┘
│ train set    │
└──────────────┘
```
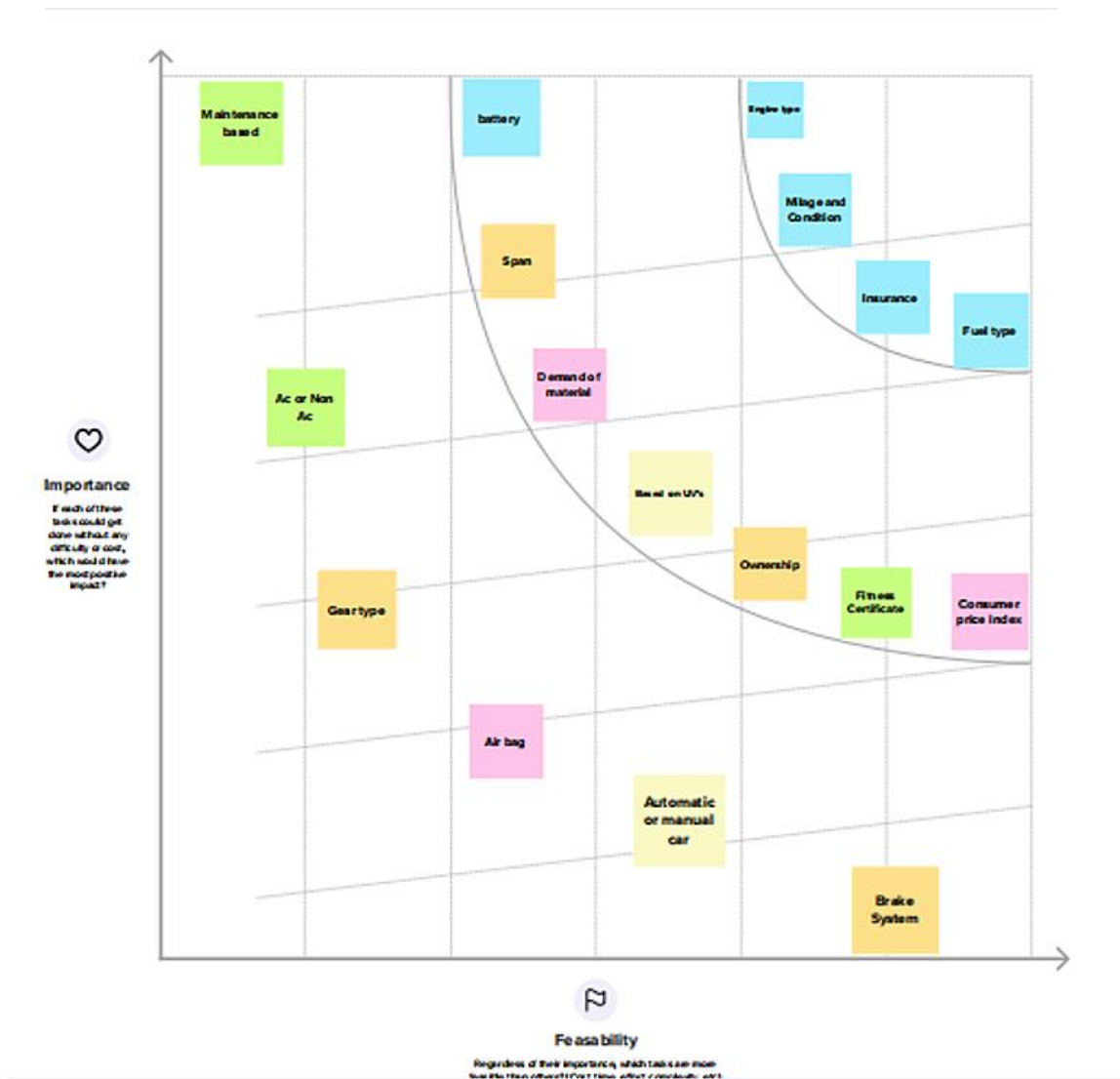
4

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

Maintenance based

battery

Engine type

Milage and Condition

Span

Insurance

Fuel type

Demand of material

Ac or Non Ac

Based on UV's

Ownership

Gear type

Fitness Certificate

Consumer price index

Air bag

Automatic or manual car

Brake System

♡
Importance
If each of these tasks could get done without any difficulty or cost, which would have the most positive impact?

⚐
Feasability
Regardless of their importance, which tasks are more feasible than others? (Cost, time, effort, complexity, etc.)

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: fifind 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 websites 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 interiorcondition 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

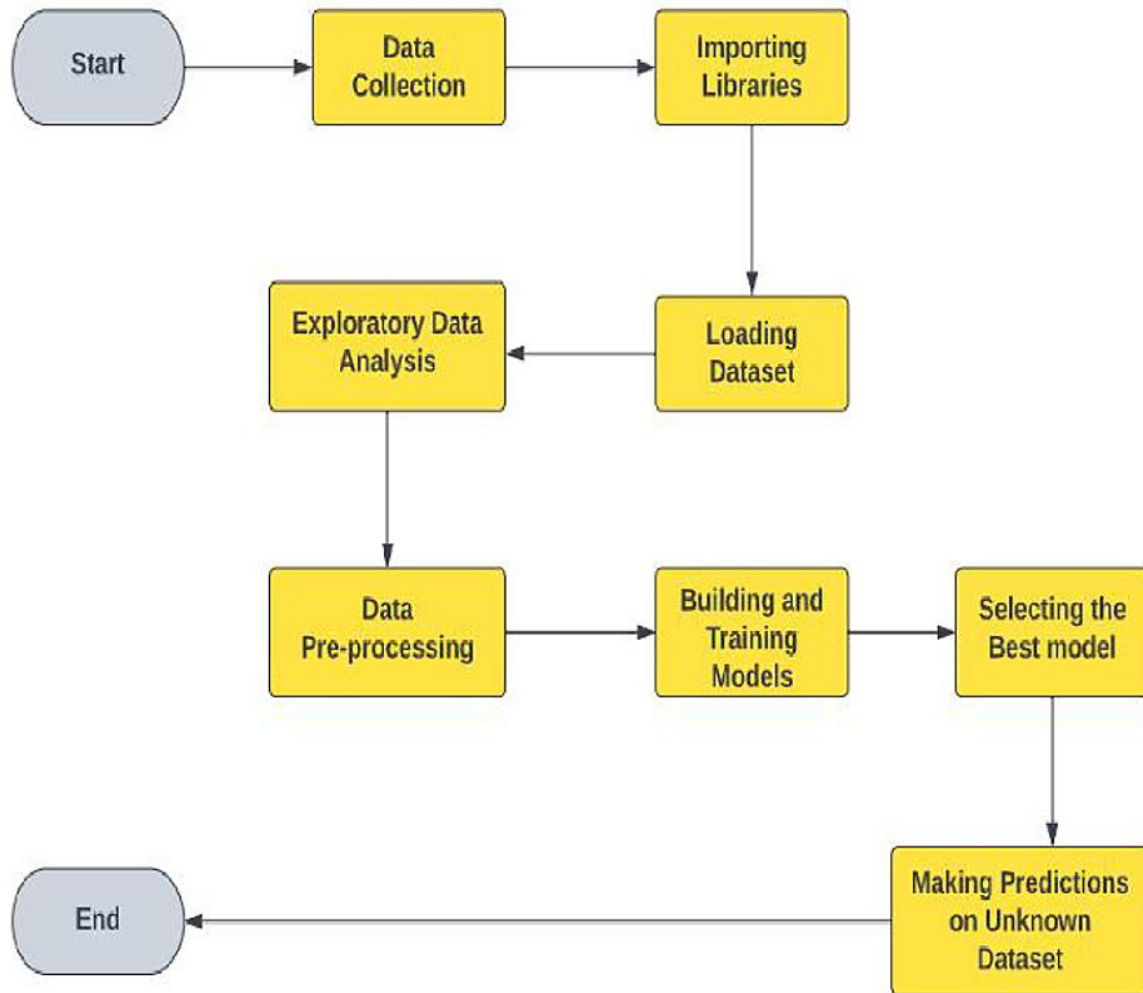| FR No.	Functional Requirement(Epic)	Sub Requirement (Story/ Sub-Task)
FR-1	User Registration	Registration throughwebsite or application Registration through Social mediasRegistration through LinkedIN
FR-2	User Confirmation	Verification via Emailor OTP
FR-3	User Login	Login through website or App usingthe 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
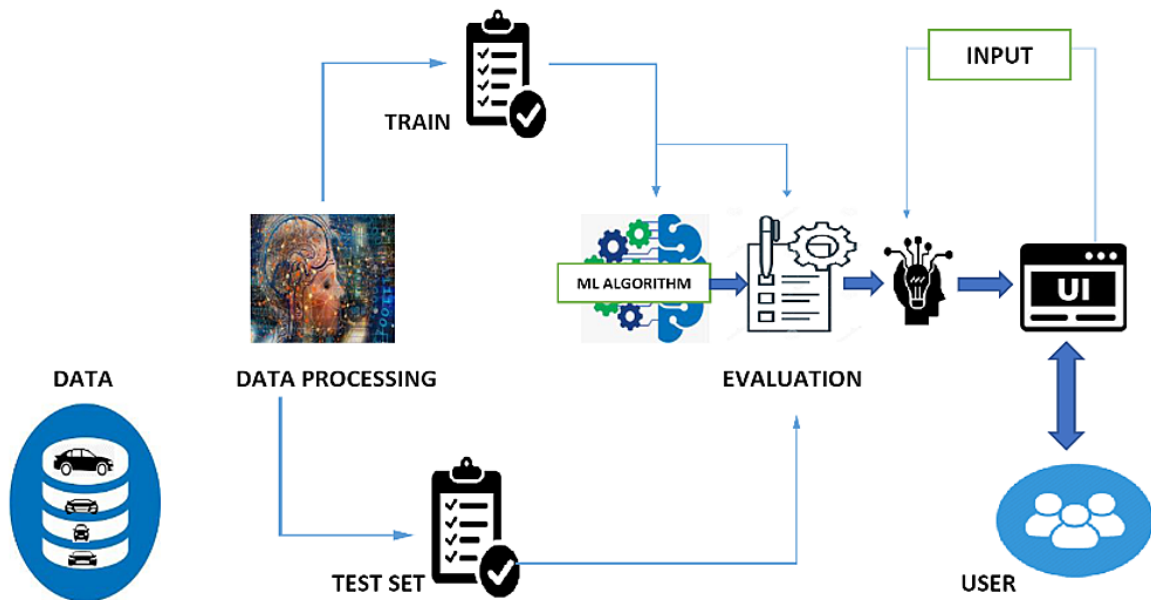
c. User Stories

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 throug h interne t	I can register & access the dashboard with Internet logi n	Lo w	Sprint-2
		USN-4	As a user, I can register for the applicatio n through Gmail	I can confirm the registration in Gmail	Medium	Sprint-1

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

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	Porala Darshan Deep Nithyanarayanan B PSNV Krishna Chaitanya Mathesh N

Sprint-1	Local Server/SoftwareRun	Write a Python programthat outputs results given the inputs like weatherand location throughthe software	1	MEDIUM	Porala Darshan Deep Nithyanarayanan B PSNV Krishna Chaitanya Mathesh N
Sprint-2	Push the server/software to cloud	Push the codefrom Sprint 1 tocloud so it can be accessed from anywhere	2	MEDIUM	Porala Darshan Deep Nithyanarayanan B PSNV Krishna Chaitanya Mathesh N
Sprint-3	Hardware initialization	Integrate the hardware to be able to accessthe cloud functions and provide inputs to the same.	2	HIGH	Porala Darshan Deep Nithyanarayanan B PSNV Krishna Chaitanya Mathesh N
Sprint-4	UI/UX Optimization &Debugging	Optimize all theshortcomings and provide better user experience.	2	LOW	Porala Darshan Deep Nithyanarayanan B PSNV Krishna Chaitanya Mathesh N

7. CODING &SOLUTIONING

a. Feature 1

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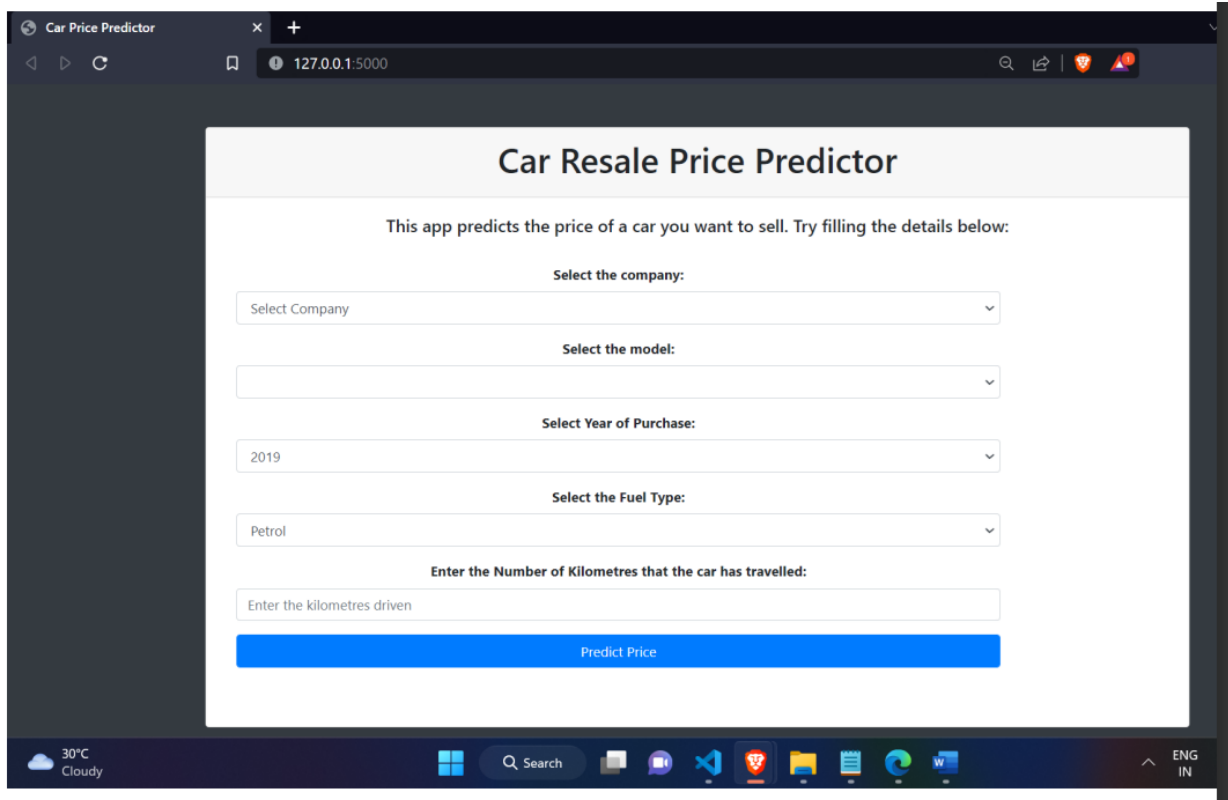6. MIT App Inventor
7. Python code

b. Feature 2

1. Login
2. Wokwi

8.   TESTING AND RESULTS

TESTCASES

TESTCASE 1:

Test case 2:

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

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

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">
```

```html
<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>
```

```html
            </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+OrCX
aRkfj"
    crossorigin="anonymous"></script>
<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>
<script
src="https://stackpath.bootstrapcdn.com/bootstrap/4.5.0/js/bootstrap.mi
n.js"
    integrity="sha384-
OgVRvuATP1z7JjHLkuOU7Xw704+h835Lr+6QL9UvYjZE3Ipu6Tp75j7Bh/kR
0JKI"
    crossorigin="anonymous"></script>
</body>
</html>
```

GITHUB LINK:

[Click here](https://github.com/IBM-EPBL/IBM-Project-32566-1660210795)

https://github.com/IBM-EPBL/IBM-Project-32566-1660210795