

**PROFESSIONAL READINESS FOR INNOVATION
EMPLOYABILITY AND ENTREPRENEURSHIP**

PROJECT REPORT

TITLE : CAR RESALE VALUE PREDICTION

TEAM ID : PNT2022TMID28697

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Project Report Format

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1. INTRODUCTION

1.1 Project Overview

This system “Car Resale Value Prediction” aims to build a regression model to predict used cars' resale value based on multiple aspects, including vehicle mileage, year of manufacturing, fuel consumption, transmission, road tax, fuel type, and engine size. This model can benefit sellers, buyers, and car manufacturers in the used cars market. Upon completion, it can output a relatively accurate price prediction based on the information that user's input. Various regression methods, including linear regression, polynomial regression, support vector regression, decision tree regression, and random forest regression, were applied in the research to achieve the highest accuracy.

This system was implemented as a web application where the user enters the details of the car to get an estimation of the car's resale value.

1.2 Purpose

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. The purpose of this system is of commercial interest to sellers/financer to be able to predict the resale value of cars with better accuracy. The most essential elements for forecast are brand and model, period use of vehicle, mileage of vehicle, gear type and fuel type utilized in the vehicle just as fuel utilization per mile profoundly influences cost of a vehicle because of continuous changes in the cost of a fuel. In view of the differing highlights and factors, and furthermore with the assistance of master information the vehicle resale value forecast has been done precisely.

2. LITERATURE SURVEY

2.1 Existing problem

With difficult economic conditions, it is likely that sales of second-hand imported (reconditioned) cars and used cars will increase. In many developed countries, it is common to lease a car rather than buying it outright. After the lease period is over, the buyer has the possibility to buy the car at its residual value, i.e., its expected resale value. Thus, it is of commercial interest to sellers/financers to be able to predict the salvage value (residual value) of cars with accuracy.

2.2 References

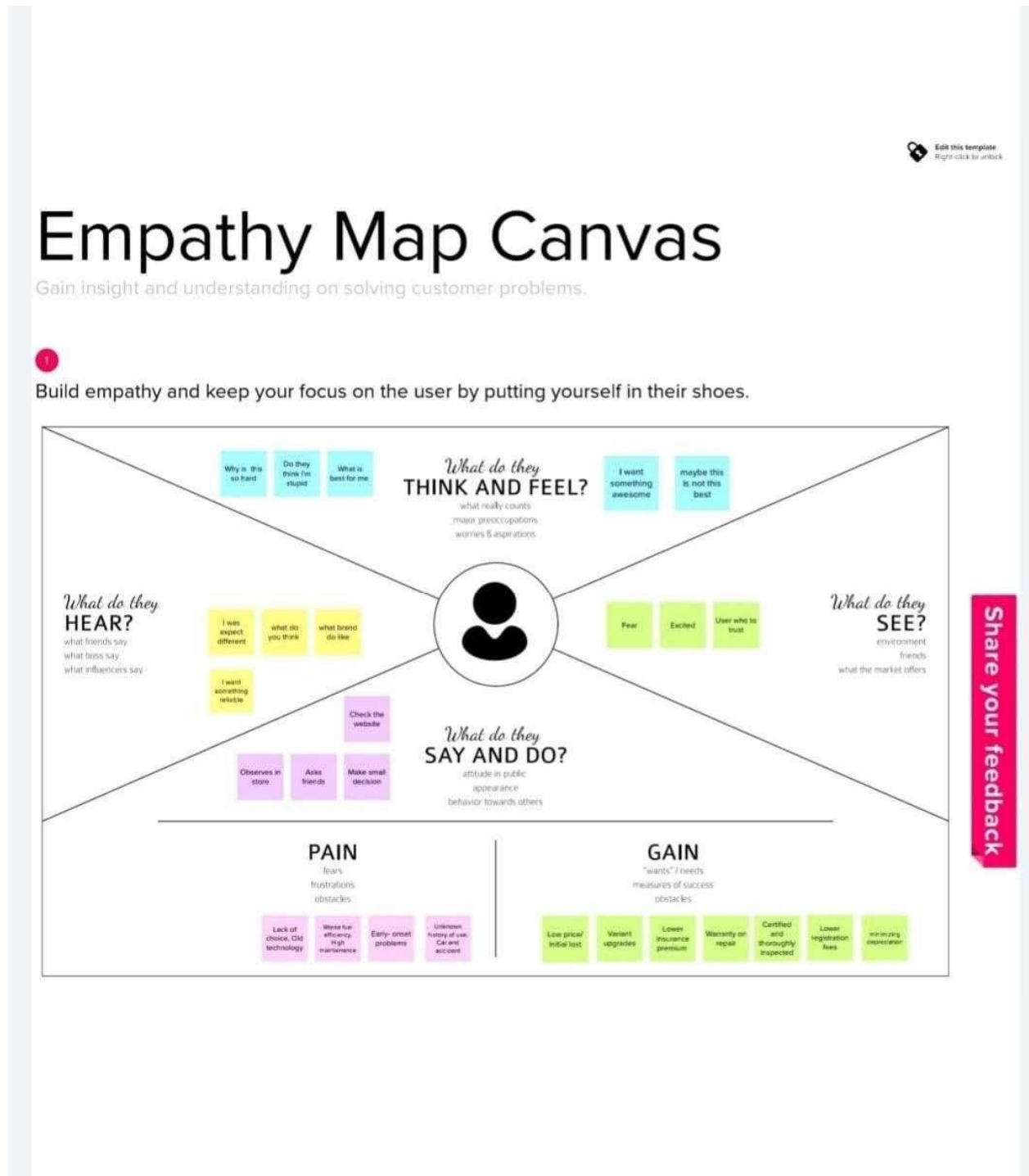
- Monburinon, N., Chertchom, P., Kaewkiriya, T., Rungpheung, S., Buya, S., & Boonpou, P. (2018). Prediction of Prices for Used Cars by Using Regression Models. 5th International Conference on Business and Industrial Research (ICBIR), (pp. 115-119). Bangkok.
- Noor, K., & Jan, S. (2017). Vehicle Price Prediction System using Machine Learning Techniques. International Journal of Computer Applications, 27-31.
- Pudaruth, S. (2014). Predicting the Price of Used Cars using Machine Learning. International Journal of Information & Computation Technology, 754-764.
- Research, F. -M. (2020, February 25). Automotive Industry in Dubai. Retrieved 10 24, 2021, from <https://www.feedbackme.com/automotive-industry-in-uae>
- Rizvi, R. (2019, April). Car Production is on the Rise in Dubai. Retrieved September 10, 2019, from <https://propakistani.pk/2019/04/08/car-production-ison-the-rise-in-dubai/>
- Used Vehicle Value Index. (2021, April). Retrieved from manheim: <https://publish.manheim.com/en/services/consulting/used-vehicle-valueindex.html>

2.3 Problem Statement Definition

It is easy for any company to price their new cars based on the manufacturing and marketing cost it involves. But when it comes to a used car it is quite difficult to define a price because it involves it is influenced by various parameters like car brand, manufactured year etc. The goal of our system is to predict the best price for a used car in the based on the previous data related to sold cars using machine learning.

3. IDEATION AND PROPOSED SOLUTION


3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming




Step-1: Team Gathering, Collaboration and Select the Problem Statement

Template




Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.


 10 minutes to prepare
 1 hour to collaborate
 2-8 people recommended

[Share template feedback](#)



Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

 10 minutes

A

Team gathering

Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B


Set the goal

Think about the problem you'll be focusing on solving in the brainstorming session.

C

Learn how to use the facilitation tools


Use the Facilitation Superpowers to run a happy and productive session.

[Open article](#) 

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


How Can We Provide An Accurate Prediction Of Car Resale Value?





Key rules of brainstorming


To run a smooth and productive session


 Stay in topic.

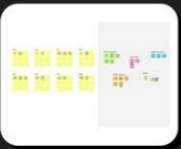
 Encourage wild ideas.

 Defer judgment.


 Listen to others.

 Go for volume.

 If possible, be visual.

**Need some inspiration?**

See a finished version of the template to kickstart your work.

[Open example](#) 

Step-2: Brainstorm, Idea Listing and Grouping

2

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

10 minutes

HARIHARAN M

What is the problem?
What are the symptoms?
What are the causes?
What are the effects?
What are the stakeholders?
What are the constraints?
What are the resources?
What are the risks?
What are the opportunities?

What is the solution?
What are the steps?
What are the benefits?
What are the challenges?
What are the risks?
What are the opportunities?

SAKTHI MUKESH D

What is the problem?
What are the symptoms?
What are the causes?
What are the effects?
What are the stakeholders?
What are the constraints?
What are the resources?
What are the risks?
What are the opportunities?

What is the solution?
What are the steps?
What are the benefits?
What are the challenges?
What are the risks?
What are the opportunities?

ANGALAPPAN P

What is the problem?
What are the symptoms?
What are the causes?
What are the effects?
What are the stakeholders?
What are the constraints?
What are the resources?
What are the risks?
What are the opportunities?

What is the solution?
What are the steps?
What are the benefits?
What are the challenges?
What are the risks?
What are the opportunities?

NAGENDRAPRASAD M

What is the problem?
What are the symptoms?
What are the causes?
What are the effects?
What are the stakeholders?
What are the constraints?
What are the resources?
What are the risks?
What are the opportunities?

What is the solution?
What are the steps?
What are the benefits?
What are the challenges?
What are the risks?
What are the opportunities?

RAJAKUMAR I

What is the problem?
What are the symptoms?
What are the causes?
What are the effects?
What are the stakeholders?
What are the constraints?
What are the resources?
What are the risks?
What are the opportunities?

What is the solution?
What are the steps?
What are the benefits?
What are the challenges?
What are the risks?
What are the opportunities?

3

Group ideas
Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

20 minutes

Group 1: Customer Interaction

What is the problem?
What are the symptoms?
What are the causes?
What are the effects?
What are the stakeholders?
What are the constraints?
What are the resources?
What are the risks?
What are the opportunities?

What is the solution?
What are the steps?
What are the benefits?
What are the challenges?
What are the risks?
What are the opportunities?

Group 2: Feature Ideas

What is the problem?
What are the symptoms?
What are the causes?
What are the effects?
What are the stakeholders?
What are the constraints?
What are the resources?
What are the risks?
What are the opportunities?

What is the solution?
What are the steps?
What are the benefits?
What are the challenges?
What are the risks?
What are the opportunities?

Group 3: Vehicle Performance

What is the problem?
What are the symptoms?
What are the causes?
What are the effects?
What are the stakeholders?
What are the constraints?
What are the resources?
What are the risks?
What are the opportunities?

What is the solution?
What are the steps?
What are the benefits?
What are the challenges?
What are the risks?
What are the opportunities?

Group 4: Legal Information

What is the problem?
What are the symptoms?
What are the causes?
What are the effects?
What are the stakeholders?
What are the constraints?
What are the resources?
What are the risks?
What are the opportunities?

What is the solution?
What are the steps?
What are the benefits?
What are the challenges?
What are the risks?
What are the opportunities?

1

2

3

1

2

3

1

2

3

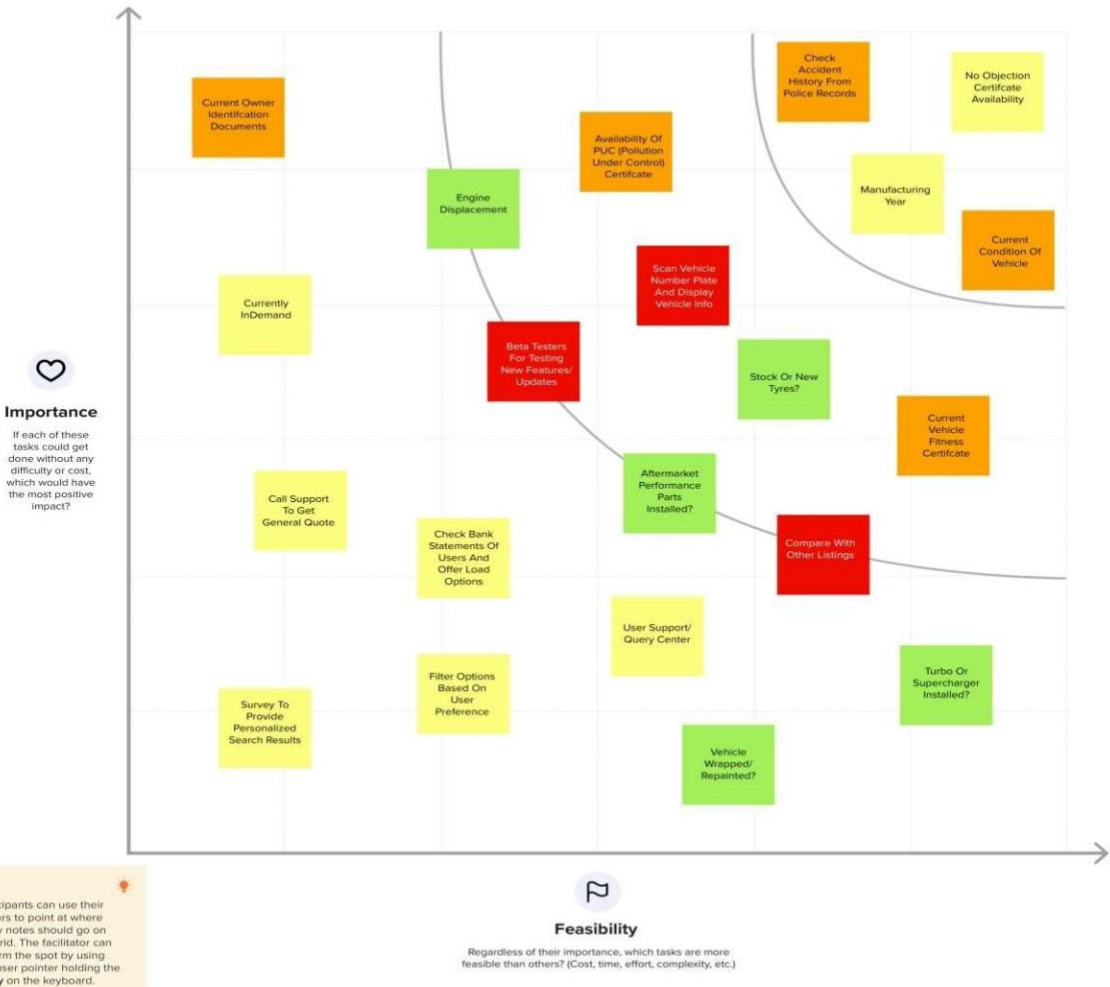
Step-3: Idea Prioritization

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



3.3 . Proposed Solution

| S.No. | Parameter | Description |
|-------|--|--|
| 1. | Problem Statement (Problem to be solved) | The main aim of the project is to predict the price of the used cars using the various Machine Learning (ML) models. The project should take parameters related to used cars as input and enable the customers to make decisions by their own. |
| 2. | Idea / Solution description | The model is to 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 cars 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 user 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 cars remotely with perfect valuation and without human intervention like car dealer 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 types of used cars present all over India. |

3.4 PROBLEM SOLUTION FIT

| | | | | |
|---|--|--|---|---------------------------|
| Define CS, fit into CC | <div>1. CUSTOMER SEGMENT(S)<div>CS</div></div> <div><ul style="list-style-type: none">Used car buyers and Seller who sale their used cars</div> | <div>6. CUST-OMER CONSTRAINTS<div>CC</div></div> <div><ul style="list-style-type: none">Anxiety-customer began to get anxious when they still no idea about what they have foundMysteries-they might Called it mysteries which they can't able to</div> | <div>5. AVAILABLE SOLUTIONS<div>AS</div></div> <div><ul style="list-style-type: none">1) By searching in online websites.2) By gathering the information from the peoples and cometounderstanding.3) Car resale value prediction system aims to exploit data mining techniques on vehicle data set to assist in the prediction of the car resale value.</div> | Explore AS, differentiate |
| | <div>2. JOBS-TO-BE-DONE / PROBLEMS<div>J&P</div></div> <div><ul style="list-style-type: none">Give the necessary information for particular thing which needs for customerTo build a model that use Regression analysis to estimate the used car prices based on some features like<ul style="list-style-type: none">Kilometers DrivenFuel TypeManufacturing yearNumber of OwnersMaintenance Record</div> | <div>9. PROBLEM ROOT CAUSE<div>RC</div></div> <div><ul style="list-style-type: none">Solution for problems: Buying for affordable price, check the car condition, predict the price through the prediction analysisLack of study in the sequence of things.New to environment</div> | <div>7. BEHAVIOUR<div>BE</div></div> <div><ul style="list-style-type: none">To develop or improve upon the strategic vision.Difficulty in predicting the values for used car prices, trusting of brokers.</div> | |
| <div>3. TRIGGERS<div>TR</div></div> <div><ul style="list-style-type: none">Engine condition, Kilometer driven, Accuracy of Datasets, Type of fuel, Information of year manufacturing, Maintenance recordTo help peoples to get extra knowledge about thing</div> | <div>10. YOUR SOLUTION<div>SL</div></div> <div><ul style="list-style-type: none">This system is built by using Machine learning and regression model. By using this system, we can predict the resale value of the car at any time any where.Buying a used car from a dealer can be unsatisfying experience. Therefore, to help consumers avoid falling under various problem with dealers, so customer have a right to guide them in their brought experiences</div> | <div>8. CHANNELS of BEHAVIOUR<div>CH</div></div> <div><ul style="list-style-type: none">Online:-<ul style="list-style-type: none">Online websitesSocial media platformsOffline:-<ul style="list-style-type: none">Buying a used car in affordable price.</div> | Extract online & offline CH of BE | |
| <div>4. EMOTIONS: BEFORE / AFTER<div>EM</div></div> <div><ul style="list-style-type: none">Before: Unease about something with an uncertain outcome (showing worry)After: Pleasure of blessedness and brightness in face.</div> | | | | |
| Identify strong TR & EM | | | | |

4.REQUIREMENT ANALYSYIS

4.1 FUCTIONAL REQUIREMENTS

Following are the functional requirements of proposed solution

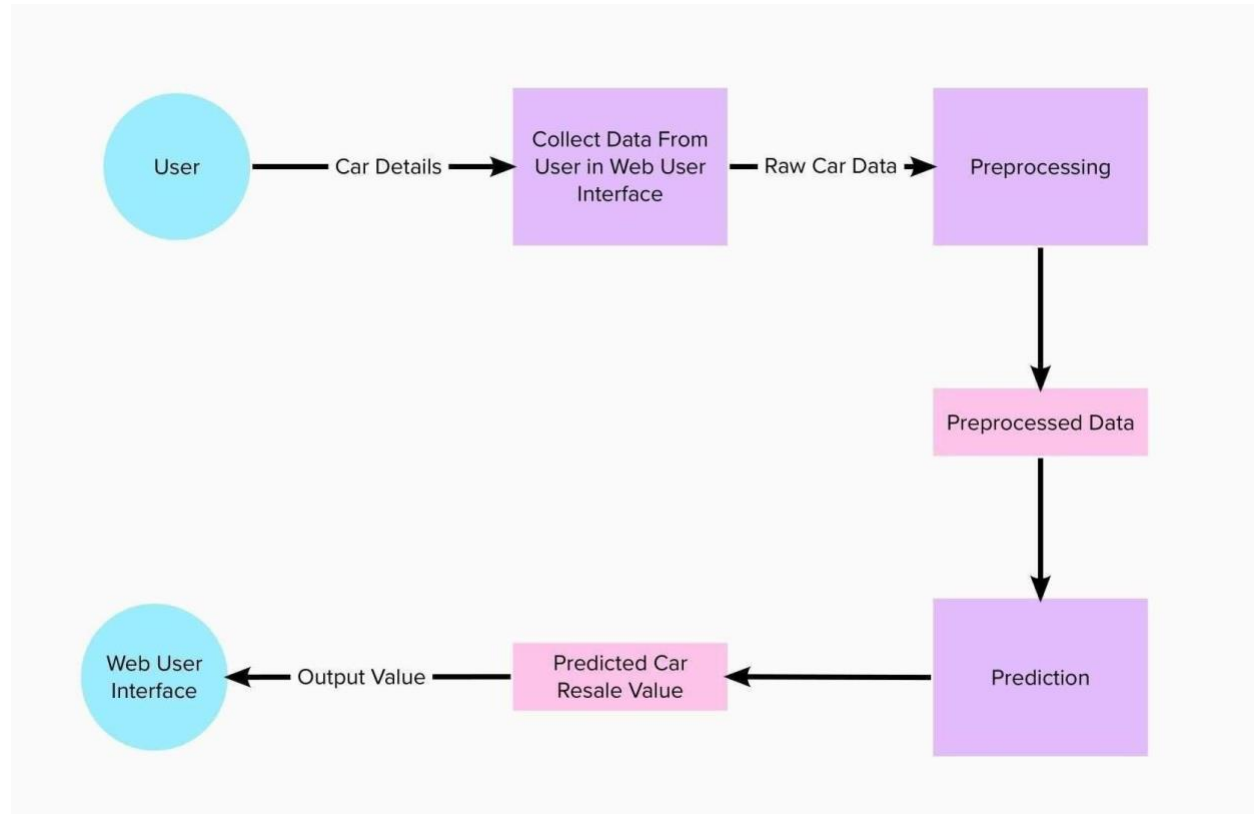
| FR No. | Functional Requirement (Epic) | Sub Requirement (Story / Sub-Task) |
|--------|---|--|
| FR-1 | User Registration to the related websites | Registration through Form Registration through Gmail Registration through LinkedIN |
| FR-2 | User Confirmation | Confirmation via Email Confirmation 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 |

4.2 NON-FUNCTIONAL REQUIREMENTS

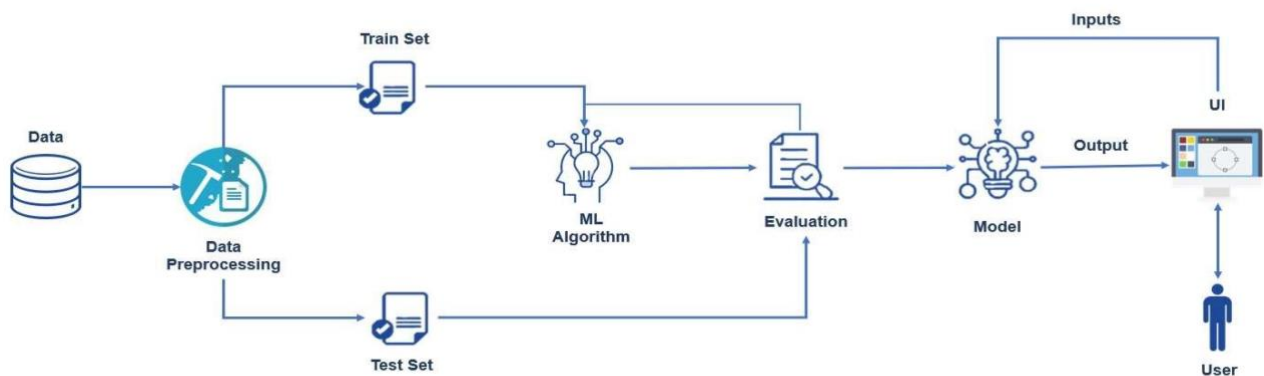
| FR No. | Functional Requirement (Epic) | Sub Requirement (Story / Sub-Task) |
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| FR-4 | Gather information about the vehicle | Through the registered websites they collect information |
| FR-5 | Display the functionality of the vehicle | Details: Fuel type , Manufactured year , Miles Driven , Record |

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 |
|------------------------|-------------------------------|-------------------|--|---|----------|
| Customer (Mobile User) | Data Entry | USN-1 | As a user, I can enter the car details in the application. | I can enter the car details | Medium |
| | Obtain output | USN-2 | As a user, I will receive car resale value in the application. | I can receive my car resale value | High |
| Customer (Web User) | Data Entry | USN-1 | As a user, I can enter the car details in the application. | I can enter the car details | Medium |
| | Obtain output | USN-2 | As a user, I will receive car resale value in the application. | I can receive my car resale value | High |
| Administrator | Landing page | USN-3 | As an admin , I will update the dataset and retrain the model if needed for accurate results . | I can check if the update is reflected or not | High |

6. PROJECT PLANNING AND SCHEDULING

6.1 Sprint Planning & Estimation

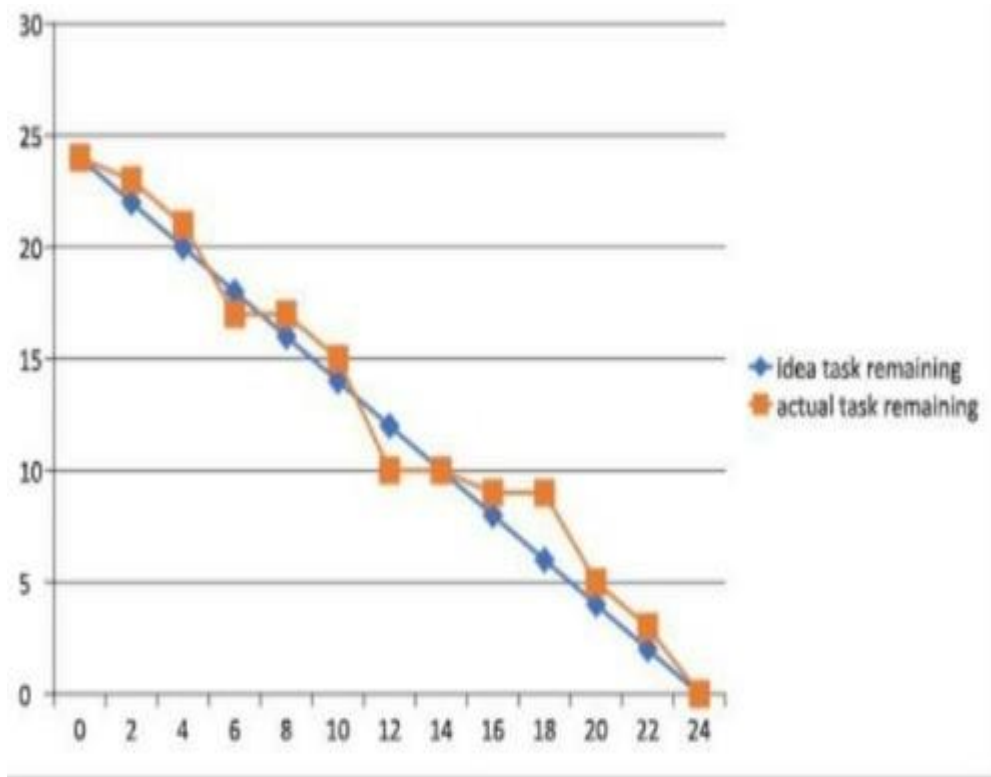
| Sprint | Functional Requirement (Epic) | User Story Number | User Story / Task | Story Points | Priority | Team Members |
|----------|---|-------------------|--|--------------|----------|------------------|
| Sprint-1 | Data visualization and data preprocessing | USN-1 | The main goal of data visualization is to make it easier to identify patterns,trends and outlier in large data setts | 10 | High | Dhivya,dinesh |
| Sprint-2 | Implementing machine learning | USN-2 | We use various kinds of algorithms to allow machines to learn the relationships within the data provided | 10 | High | Priyankka,pritha |
| sprint-3 | App building | USN-3 | Using flask deploying the ML model | 10 | High | dinesh |
| Sprint4 | Evaluate predictor | USN-4 | Evaluate the dataset details with the model which has already builded | 20 | Medium | priyankka |

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) |
|---------|--------------------|----------|-------------------|---------------------------|---|------------------------------|
| Sprint1 | 20 | 6 Days | 24 Oct 2022 | 29 Oct 2022 | 10 | 29 Oct 2022 |
| Sprint2 | 20 | 6 Days | 31 Oct 2022 | 05 Nov 2022 | 10 | 05 Nov 2022 |
| Sprint3 | 20 | 6 Days | 07 Nov 2022 | 12 Nov 2022 | 10 | 12 Nov 2022 |
| Sprint4 | 20 | 6 Days | 14 Nov 2022 | 19 Nov 2022 | 20 | 19 Nov 2022 |

6.3 Report

Burndown Chart



7.CODING AND SOLUTION

7.1 Home Page

Displays the home page of the application. Code:

1) Index.html

```
<!DOCTYPE html>
<nav lang="en" dir="ltr">
  <head>
    <style>
      body
    { background-color:#D3D3D3;
      }

      div {text-align: center;}
    </style>
    <meta charset="utf-8">
    <title>Car resale value </title>
    <link rel="stylesheet" href="../static/css/style.css">
    <link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-
awesome/4.7.0/css/font-awesome.min.css">

  </head>
  <body>

    <section class="header">
      <div class="text-box">
        <h1 style="font-size: 40px;color: purple">Car resale value Predictor</h1><br>
        <p style="font-size: 25px"> Welcome! To predict your used car price click the below
button!</p>
        <br>
```

```

        <a href="form.html">
            <form action="form.html">
                <input type="submit" value="check price">
            </form>
        </a>

        <br>
        

    </div>
</section>
</nav>
</body>
</body>
</body>
</html>

```

2) style.css

```

*{
    margin: 0;
    padding: 0;
}

body{
    font-family : 'Franklin Gothic Medium';
    margin: 0;
}

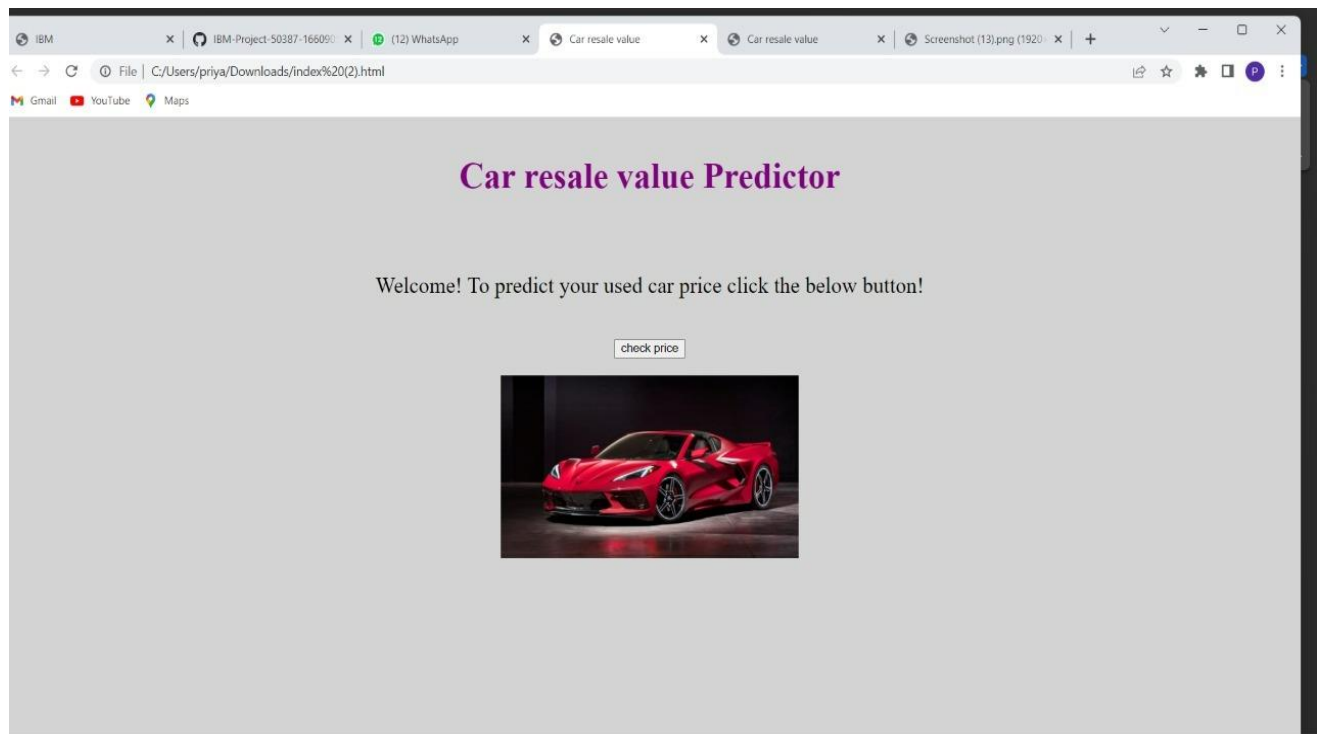
.header{
    min-height: 100vh;
    width: 100%;
    background-image: linear-
gradient(rgba(25,30,30,0.7),rgba(25,30,30,0.7)),url(../Images/car1.jpg);
    background-position: center;
    background-size: cover;
    position :absolute;
}

.text-box{
    text-align: center;

```

```
position: relative;
color: #FFE4C4;
top:50%;
}
.text-box h1{
margin-top: 50px;
font-size: 55px;
}
.text-box p{
margin: 10px 0 40px;
font-size: 15px;
}

.text-box a.visit-btn{
text-align: center;
padding: 10px 20px;
font-weight: 700;
white-space: inherit;
vertical-align: middle;
border: 2px solid transparent;
display: inline-block;
margin: 10px 10px 0 0;
border-radius: 50px;
overflow: hidden;
background-color: #FFE4C4;
border: 0;
line-height: 50px;
box-shadow: 0 3px 6px 0 rgba(0,0,0,0.16);
font-size: 20px;
text-decoration:none;
position: relative;
}
.text-box a.visit-btn:hover{
background-image: linear-gradient(to left,#FFE4C4,#a147e4);
background-position: left center;
}
```



7.2 Data Entry Page

Allows user to enter the details about the car for which the resale value is to be predicted.

Code:

1. form.html

```
<!DOCTYPE html>
<html lang="en" dir="ltr">
<head>
<link rel="stylesheet" href="../static/css/value.css">
<title>Car resale value</title>
```

```
</head>
<body style="background-color:Lightblue;">
  <section class="form">
    <form action="/predict" method="GET">
      <table border="0" align="center">
        <tbody>
          <tr>
            <td colspan="2"><h1>Get the Accurate Resale Value of Your Car</h1>
          </td>
        </tr>
        <tr>
          <td><label for="year" padding:10px>Registration year : </label></td>
          <td><input id="year" maxlength="50" name="regyear" type="text" />
          <br>
          <br>
        </td>
        </tr>
        <tr>
          <td><label for="month">Registration Month : </label></td>
          <td><input id="month" maxlength="50" name="regmonth" type="text" />
          <br>
          <br>
        </td>
        </tr>
        <tr>
          <td><label for="power">Power of car in PS: </label></td>
          <td><input id="power" maxlength="50" name="powerps" type="text" />
          <br>
          <br>
        </td>
        </tr>
        <tr>
          <td><label for="kilometer">Kilometers that car have driven : </label></td>
          <td><input id="kilometer" maxlength="50" name="kms" type="text" />
          <br>
          <br>
        </td>
        </tr>
        <tr>
          <td><label for="geartype">Gear type : </label></td>
          <td><input type="radio" name="geartype" value="manual"/> Manual
          <input type="radio" name="geartype" value="automatic"/> Automatic
          <input type="radio" name="geartype" value="not-declared"/> Not declared
          <br>
        </td>
        </tr>
      </tbody>
    </table>
  </form>
</body>
```

```

<br>
</td>
</tr>

<tr>
<td><label for="damage">Your car is repaired or damaged : </label></td>
<td><input type="radio" name="damage" value="yes"/> Yes
<input type="radio" name="damage" value="no"/> No
<input type="radio" name="damage" value="not-declared"/> Not declared
<br>
<br>
</td>
</tr>

<tr>
<td><label for="model">Model Type : </label></td>
<td>
<select name="model" id="model">
<option value="" disabled selected hidden>Choose Model Name...</option>
<option value="golf">Golf </option>
<option value="grand">Grand </option>
<option value="fabia">Fabia </option>
<option value="3er">3er </option>
<option value="2_reihe">2 Reihe </option>
<option value="andere">Andere </option>
<option value="c_max">C Max </option>
<option value="3_reihe">3 Reihe </option>
<option value="passat">Passat </option>
<option value="navara">Navara </option>
<option value="ka">Ka </option>
<option value="polo">Polo </option>
<option value="twingo">Twingo </option>
<option value="a_klasse">A klasse </option>
<option value="scirocco">Scirocco </option>
<option value="5er">5er </option>
<option value="meriva">Meriva </option>
<option value="arosa">Arosa </option>
<option value="c4">C4 </option>
<option value="civic">Civic </option>
<option value="transporter">Transporter </option>
<option value="punto">Punto </option>
<option value="e_klasse">E Klasse </option>
<option value="clio">Clio </option>
<option value="kadett">Kadett </option>
<option value="kangoo">Kangoo </option>

```



```
<option value="corsa">Corsa </option>
<option value="one">One </option>
<option value="fortwo">Fortwo </option>
<option value="1er">1er </option>
<option value="b_klasse">B Klasse </option>
<option value="signum">Signum </option>
<option value="astra">Astra </option>
<option value="a8">A8 </option>
<option value="jetta">Jetta </option>
<option value="fiesta">Fiesta </option>
<option value="c_klasse">C Klasse </option>
<option value="micra">Micra </option>
<option value="vito">Vito </option>
<option value="sprinter">Sprinter </option>
<option value="156">156 </option>
<option value="escort">Escort </option>
<option value="forester">Forester </option>
<option value="xc_reihe">Xc Reihe </option>
<option value="scenic">Scenic </option>
<option value="a4">A4 </option>
<option value="a1">A1 </option>
<option value="insignia">Insignia </option>
<option value="combo">Combo </option>
<option value="focus">Focus </option>
<option value="tt">Tt </option>
<option value="a6">A6 </option>
<option value="jazz">Jazz </option>
<option value="omega">Omega </option>
<option value="slk">Slk </option>
<option value="7er">7er </option>
<option value="80">80 </option>
<option value="147">147 </option>
<option value="glk">Glk </option>
<option value="100">100 </option>
<option value="z_reihe">Z Reihe </option>
<option value="sportage">Sportage </option>
<option value="sorento">Sorento </option>
<option value="v40">V40 </option>
<option value="5er">5er </option>
<option value="ibiza">Ibiza </option>
<option value="3er">3er </option>
<option value="mustang">Mustang </option>
<option value="eos">Eos </option>
<option value="touran">Touran </option>
<option value="getz">Getz </option>
```

```
<option value="a3">A3 </option>
<option value="almera">Almera </option>
<option value="megane">Megane </option>
<option value="7er">7er </option>
<option value="1er">1er </option>
<option value="lupo">Lupo </option>
<option value="r19">R19 </option>
<option value="zafira">Zafira </option>
<option value="caddy">Caddy </option>
<option value="2_reihe">2 Reihe </option>
<option value="mondeo">Mondeo </option>
<option value="cordoba">Cordoba </option>
<option value="colt">Colt </option>
<option value="impreza">Impreza </option>
<option value="vectra">Vectra </option>
<option value="berlingo">Berlingo </option>
<option value="80">80 </option>
<option value="m_klasse">M Klasse </option>
<option value="tiguan">Tiguan </option>
<option value="i_reihe">I Reihe </option>
<option value="espace">Espace </option>
<option value="sharan">Sharan </option>
<option value="6_reihe">6 Reihe </option>
<option value="panda">Panda </option>
<option value="up">Up </option>
<option value="seicento">Seicento </option>
<option value="ceed">Ceed </option>
<option value="5_reihe">5 Reihe </option>
<option value="yeti">Yeti </option>
<option value="octavia">Octavia </option>
<option value="mii">Mii </option>
<option value="rx_reihe">Rx Reihe </option>
<option value="6er">6er </option>
<option value="modus">Modus </option>
<option value="fox">Fox </option>
<option value="matiz">Matiz </option>
<option value="beetle">Beetle </option>
<option value="c1">C1 </option>
<option value="rio">Rio </option>
<option value="touareg">Touareg </option>
<option value="logan">Logan </option>
<option value="spider">Spider </option>
<option value="cuore">Cuore </option>
<option value="s_max">S Max </option>
<option value="a2">A2 </option>
```

```
<option value="x_reihe">X Reihe </option>
<option value="a5">A5 </option>
<option value="galaxy">Galaxy </option>
<option value="c3">C3 </option>
<option value="viano">Viano </option>
<option value="s_klasse">S Klasse </option>
<option value="1_reihe">1 Reihe </option>
<option value="avensis">Avensis </option>
<option value="s1">S1 </option>
<option value="roomster">Roomster </option>
<option value="q5">Q5 </option>
<option value="kaefer">Kaefer </option>
<option value="santa">Santa </option>
<option value="cooper">Cooper </option>
<option value="leon">Leon </option>
<option value="4_reihe">4 Reihe </option>
<option value="500">500 </option>
<option value="laguna">Laguna </option>
<option value="ptcruiser">Ptcruiser </option>
<option value="clk">Clk </option>
<option value="primera">Primera </option>
<option value="exeo">Exeo </option>
<option value="159">159 </option>
<option value="transit">Transit </option>
<option value="juke">Juke </option>
<option value="qashqai">Qashqai </option>
<option value="carisma">Carisma </option>
<option value="accord">Accord </option>
<option value="corolla">Corolla </option>
<option value="lanos">Lanos </option>
<option value="phaeton">Phaeton </option>
<option value="boxster">Boxster </option>
<option value="verso">Verso </option>
<option value="swift">Swift </option>
<option value="rav">Rav </option>
<option value="kuga">Kuga </option>
<option value="picanto">Picanto </option>
<option value="kalos">Kalos </option>
<option value="superb">Superb </option>
<option value="stilo">Stilo </option>
<option value="alhambra">Alhambra </option>
<option value="911">911 </option>
<option value="mx_reihe">Mx Reihe </option>
<option value="m_reihe">M Reihe </option>
<option value="roadster">Roadster </option>
```

```
<option value="ypsilon">Ypsilon </option>
<option value="cayenne">Cayenne </option>
<option value="galant">Galant </option>
<option value="justy">Justy </option>
<option value="90">90 </option>
<option value="sirion">Sirion </option>
<option value="crossfire">Crossfire </option>
<option value="6_reihe">6 Reihe </option>
<option value="agila">Agila </option>
<option value="duster">Duster </option>
<option value="cr_reihe">Cr Reihe </option>
<option value="v50">V50 </option>
<option value="discovery">Discovery </option>
<option value="c_reihe">C Reihe </option>
<option value="v_klasse">V Klasse </option>
<option value="yaris">Yaris </option>
<option value="c5">C5 </option>
<option value="aygo">Aygo </option>
<option value="cc">Cc </option>
<option value="carnival">Carnival </option>
<option value="fusion">Fusion </option>
<option value="bora">Bora </option>
<option value="forfour">Forfour </option>
<option value="100">100 </option>
<option value="cl">Cl </option>
<option value="tigra">Tigra </option>
<option value="156">156 </option>
<option value="300c">300c </option>
<option value="100">100 </option>
<option value="147">147 </option>
<option value="q3">Q3 </option>
<option value="spark">Spark </option>
<option value="v70">V70 </option>
<option value="x_type">X Type </option>
<option value="5_reihe">5 Reihe </option>
<option value="ducato">Ducato </option>
<option value="s_type">S Type </option>
<option value="x_trail">X Trail </option>
<option value="toledo">Toledo </option>
<option value="altea">Altea </option>
<option value="7er">7er </option>
<option value="voyager">Voyager </option>
<option value="calibra">Calibra </option>
<option value="bravo">Bravo </option>
<option value="range_rover">Range Rover </option>
```

```
<option value="antara">Antara </option>
<option value="tucson">Tucson </option>
<option value="q7">Q7 </option>
<option value="citigo">Citigo </option>
<option value="jimny">Jimny </option>
<option value="cx_reihe">Cx Reihe </option>
<option value="wrangler">Wrangler </option>
<option value="lybra">Lybra </option>
<option value="range_rover_sport">Range Rover Sport </option>
<option value="lancer">Lancer </option>
<option value="159">159 </option>
<option value="freelander">Freelander </option>
<option value="captiva">Captiva </option>
<option value="c2">C2 </option>
<option value="500">500 </option>
<option value="range_rover_evoque">Range Rover Evoque </option>
<option value="sander0">Sander0 </option>
<option value="note">Note </option>
<option value="900">900 </option>
<option value="147">147 </option>
<option value="defender">Defender </option>
<option value="cherokee">Cherokee </option>
<option value="clubman">Clubman </option>
<option value="samara">Samara </option>
<option value="2_reihe">2 Reihe </option>
<option value="1er">1er </option>
<option value="3er">3er </option>
<option value="601">601 </option>
<option value="3_reihe">3 Reihe </option>
<option value="4_reihe">4 Reihe </option>
<option value="5er">5er </option>
<option value="6_reihe">6 Reihe </option>
<option value="legacy">Legacy </option>
<option value="pajero">Pajero </option>
<option value="auris">Auris </option>
<option value="niva">Niva </option>
<option value="5_reihe">5 Reihe </option>
<option value="s60">S60 </option>
<option value="nubira">Nubira </option>
<option value="vivaro">Vivaro </option>
<option value="g_klasse">G Klasse </option>
<option value="lodgy">Lodgy </option>
<option value="850">850 </option>
<option value="serie_2">Serie 2 </option>
<option value="6er">6er </option>
```

```

<option value="charade">Charade </option>
<option value="croma">Croma </option>
<option value="outlander">Outlander </option>
<option value="gl">Gl </option>
<option value="doblo">Doblo </option>
<option value="musa">Musa </option>
<option value="amarok">Amarok </option>
<option value="156">156 </option>
<option value="move">Move </option>
<option value="9000">9000 </option>
<option value="v60">V60 </option>
<option value="145">145 </option>
<option value="aveo">Aveo </option>
<option value="200">200 </option>
<option value="300c">300c </option>
<option value="b_max">B Max </option>
<option value="delta">Delta </option>
<option value="terios">Terios </option>
<option value="rangerover">RangeRover </option>
<option value="90">90 </option>
<option value="materia">Materia </option>
<option value="kalina">Kalina </option>
<option value="elefantino">Elefantino </option>
<option value="i3">I3 </option>
<option value="kappa">Kappa </option>
<option value="serie_3">Serie 3 </option>
<option value="48429">48429 </option>
<option value="serie_1">Serie 1 </option>
<option value="discovery_sport">Discovery Sport </option>

</select>
<br>
<br>
</td>
</tr>

<tr>
<td><label for="brand">Brand :</label></td>
<td>
<select name="brand" id="brand">
<option value="" disabled selected hidden>Choose Brand Name...</option>
<option value="volkswagen">Volkswagen </option>
<option value="audi">Audi </option>
<option value="jeep">Jeep </option>
<option value="skoda">Skoda </option>

```

```
<option value="bmw">Bmw </option>
<option value="peugeot">Peugeot </option>
<option value="ford">Ford </option>
<option value="mazda">Mazda </option>
<option value="nissan">Nissan </option>
<option value="renault">Renault </option>
<option value="mercedes_benz">Mercedes Benz </option>
<option value="opel">Opel </option>
<option value="seat">Seat </option>
<option value="citroen">Citroen </option>
<option value="honda">Honda </option>
<option value="fiat">Fiat </option>
<option value="mini">Mini </option>
<option value="smart">Smart </option>
<option value="hyundai">Hyundai </option>
<option value="sonstige_autos">Sonstige Autos </option>
<option value="alfa_romeo">Alfa Romeo </option>
<option value="subaru">Subaru </option>
<option value="volvo">Volvo </option>
<option value="mitsubishi">Mitsubishi </option>
<option value="kia">Kia </option>
<option value="suzuki">Suzuki </option>
<option value="lancia">Lancia </option>
<option value="porsche">Porsche </option>
<option value="toyota">Toyota </option>
<option value="chevrolet">Chevrolet </option>
<option value="dacia">Dacia </option>
<option value="daihatsu">Daihatsu </option>
<option value="trabant">Trabant </option>
<option value="saab">Saab </option>
<option value="chrysler">Chrysler </option>
<option value="jaguar">Jaguar </option>
<option value="daewoo">Daewoo </option>
<option value="rover">Rover </option>
<option value="land_rover">Land Rover </option>
<option value="lada">Lada </option>
</select>
<br>
<br>
</td>
</tr>

<tr>
<td><label for="fuelType">Fuel Type :</label></td>
<td>
```

```

<select name="fuelType" id="brand">
<option value="" disabled selected hidden>Choose Fuel Type...</option>
<option value="petrol"> Petrol </option>
<option value="diesel"> Diesel </option>
<option value="not-declared"> Not Declared </option>
<option value="lpg">LPG </option>
<option value="cng">CNG </option>
<option value="hybrid">Hybrid </option>
<option value="others">Others </option>
<option value="electric">Electric </option>
</select>
<br>
<br>
</td>
</tr>

<tr>
<td><label for="vehicletype">Vehicle type:</label></td>
<td>
<select name="vehicletype" id="vehicle" >
<option value="" disabled selected hidden>Choose Vehicle Type...</option>
<option value="coupe">Coupe </option>
<option value="suv">SUV </option>
<option value="kleinwagen">Kleinwagen </option>
<option value="limousine">Limousine </option>
<option value="cabrio">Cabrio </option>
<option value="bus">Bus </option>
<option value="kombi">Kombi </option>
<option value="andere">Andere </option>
<option value="volkswagen">Volkswagen </option>
</select>
<br>
<br>
</td>
</tr>
</tbody>
</table><center>

<a href="predict.html" style="font-size:30px;">submit</a>

</center>
</form>

```



```
</section>

</body>
</html>
```

2. form.css

```
.header{
  width: 100%;
  text-align: center;
  padding-top: 20px;
  font-size: 20px;
  font-family: 'Franklin Gothic Medium';
  background-color: #43FFB6;
  border: 0%;
  top: 0px;
  bottom: 0px;
  right: 0px;
  left: 0px;
  overflow-y: auto;
}
body{
  margin: 0;
  font-family: 'Franklin Gothic Medium';
}
.form{
  background-image: linear-
gradient(rgba(25,30,30,0.7),rgba(25,30,30,0.7)),url(../Images/car2.jpg);
  background-position: center;
  background-size: cover;
  position: relative;
  text-align: center;
  padding: 20px;
  display: flex;
  flex-direction: column;
  align-items: center;
  font-size: 22px;
}
input[type=text] {
  width: 100%;
  padding: 12px 20px;
  margin: 8px 0;
```

```
display: inline-block;
border: 1px solid #ccc;
border-radius: 4px;
box-sizing: border-box;
}
select {
width: 100%;
padding: 16px 20px;
border: none;
border-radius: 4px;
background-color: #f1f1f1;
}
input[type=submit] {
font-family : 'Franklin Gothic Medium';
font-weight: 700;
width: 40%;
background-color: #4CAF50;
color: black;
font-size: 20px;
padding: 20px 20px;
margin: 8px 0;
border: none;
border-radius: 4px;
cursor: pointer;
}
input[type=submit]:hover {
background-color: #37853b;
}
*{
color:black;
}
```

← → ↻ File | C:/Users/priya/Downloads/form.html

Gmail YouTube Maps

Get the Accurate Resale Value of Your Car

Registration year :

Kilometers that car have driven :

Gear type : ☐ Manual ☐ Automatic ☐ Not declared

Model Type :

Brand :

Fuel Type :

[submit](#)

27°C Partly cloudy

21:05 24-11-2022

7.3 Output Display Page

The predicted resale car value is displayed in this page. [Code](#)

1. predict.html

```
2. <!DOCTYPE html>
3. <html lang="en">
4. <head>
5.     <meta charset="UTF-8">
6.     <meta http-equiv="X-UA-Compatible" content="IE=edge">
7.     <meta name="viewport" content="width=device-width, initial-scale=1.0">
8.     <link rel="stylesheet" href="../static/css/predict.css">
9.     <title>Car Resale Predicted Value</title>
10.</head>
11.<body>
12.     <section class="header">
13.     <nav></nav>
```

```

14.         <div class="text-box">
15.             <h1>The Predicted Car Resale Value is </h1>
16.                 <h1>{{predict}}</h1>
17.         </div>
18.     </section>
19.
20.
21.</body>
22.</html>

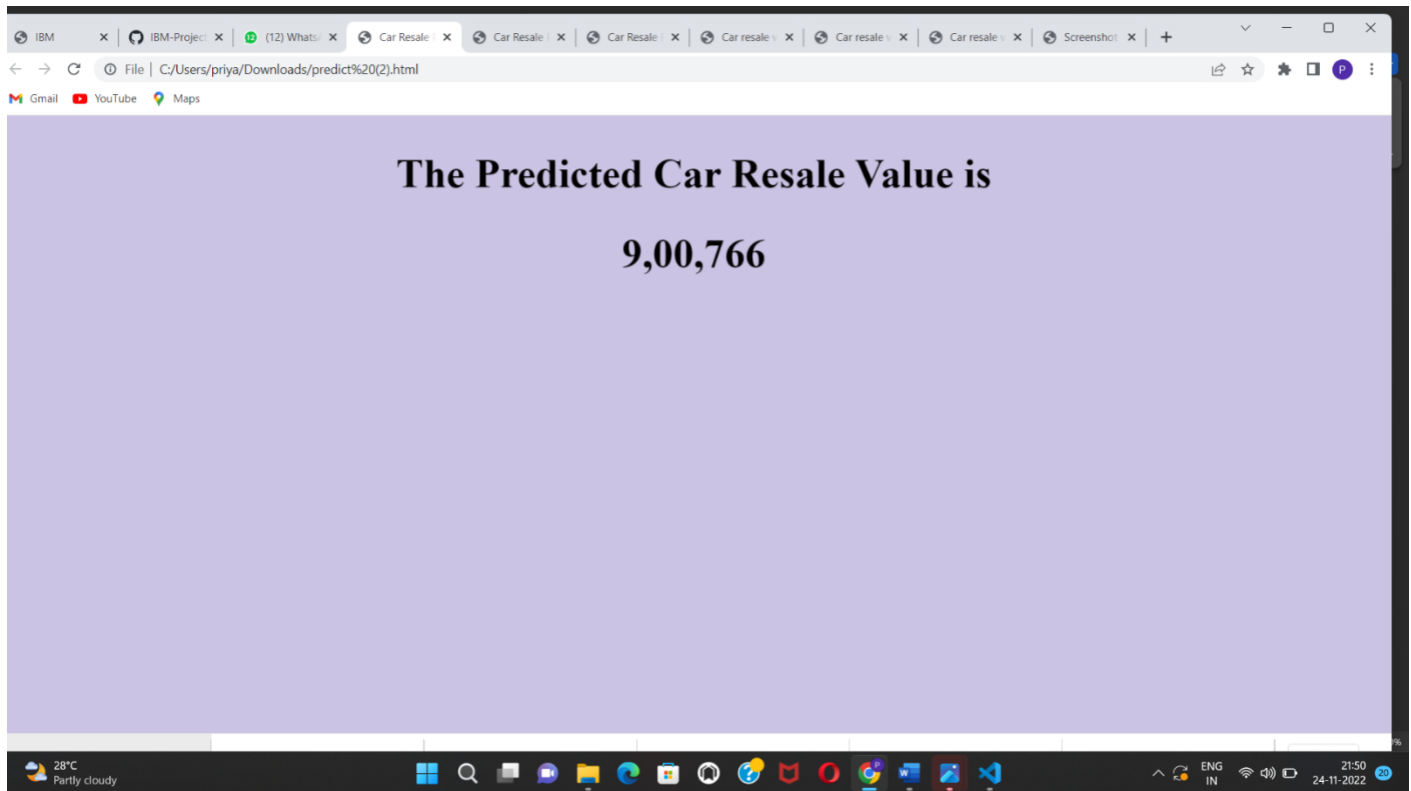
```

2. predict.css

```

.header{
    min-height: 100vh;
    width: 100%;
    background-image: linear-
gradient(rgba(25,30,30,0.7),rgba(25,30,30,0.7)),url(../Images/car3.jpg);
    background-position: center;
    background-size: cover;
    position: relative;
}
nav{
    display: flex;
    padding: 2% 6%;
    justify-content: space-between;
    align-items: center;
}
.text-box{
    text-align: center;
    position: relative;
    color: #cfbba3;
    top: 50%;
}
.text-box h1{
    margin-top: 50px;
    font-size: 55px;
}
body{
    margin: 0;
    font-family : 'Franklin Gothic Medium';
}

```



7.4 Preprocessing data and Model Selection

```
from flask import Flask, render_template, request

import requests
import pickle
import numpy as np
import sklearn
from sklearn.preprocessing import StandardScaler

# NOTE: you must manually set API_KEY below using information retrieved from your IBM Cloud
account.
API_KEY = "<your API key>"
token_response = requests.post('https://iam.cloud.ibm.com/identity/token', data={"apikey":
  API_KEY, "grant_type": 'urn:ibm:params:oauth:grant-type:apikey'})
mltoken = token_response.json()["access_token"]

header = {'Content-Type': 'application/json', 'Authorization': 'Bearer ' + mltoken}

app = Flask(__name__)
model = pickle.load(open('random_forest_regression_model.pkl', 'rb'))
```

```

@app.route('/')
def index():
    return render_template('index.html')

@app.route('/hai')
def Hai():
    return render_template('form.html')

@app.route('/hello',methods=['GET'])
def Home():
    return render_template('form.html')

standard_to = StandardScaler()
@app.route("/predict", methods=['POST'])
def predict():
    Fuel_Type_Diesel=0
    if request.method == 'POST':
        Year = int(request.form['Year'])
        Present_Price=float(request.form['Present_Price'])
        Kms_Driven=int(request.form['Kms_Driven'])
        Kms_Driven2=np.log(Kms_Driven)
        Owner=int(request.form['Owner'])
        Fuel_Type_Petrol=request.form['Fuel_Type_Petrol']
        if(Fuel_Type_Petrol=='Petrol'):
            Fuel_Type_Petrol=1
            Fuel_Type_Diesel=0
        else:
            Fuel_Type_Petrol=0
            Fuel_Type_Diesel=1
        Year=2020-Year
        Seller_Type_Individual=request.form['Seller_Type_Individual']
        if(Seller_Type_Individual=='Individual'):
            Seller_Type_Individual=1
        else:
            Seller_Type_Individual=0
        Transmission_Mannual=request.form['Transmission_Mannual']
        if(Transmission_Mannual=='Mannual'):
            Transmission_Mannual=1
        else:
            Transmission_Mannual=0
        prediction=model.predict([[Present_Price,Kms_Driven2,Owner,Year,Fuel_Type_Diesel,Fuel_Type_Petrol,Seller_Type_Individual,Transmission_Mannual]])
        output=round(prediction[0],2)
        if output<0:

```

```
        return render_template('predict.html',prediction_texts="Sorry you cannot sell
this car")
    else:
        return render_template('predict.html',prediction_text="You Can Sell The Car at
{}".format(output))
    else:
        return render_template('predict.html')

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

8. TESTING

8.1 Test Cases Scenarios

| | |
|---|---|
| 1 | Verify user is able to see home page? |
| 2 | Verify user is able to navigate to data entry page? |
| 3 | Verify user is able to see data entry page? |
| 4 | Verify user is able to enter values in the fields? |
| 5 | Verify user is able to navigate to output display page? |
| 6 | Verify user is able to view the output display page? |
| 7 | Verify user is able to view the car resale value output in the output display page? |

8.2 User Acceptance Testing

Team ID : PNT2022TMID28697

Project Name: Car Resale Value Prediction

| Test Case ID | Feature Type | Component | Test Scenario | Steps To Execute | Test data | Expected Result | Actual Result | Status | TC for Automation(Y/N) | Executed By |
|----------------------|--------------|-----------------|---|--|-----------|--|---------------------|--------|------------------------|---------------|
| HomePage_TC_001 | UI | Home Page | Verify all the UI elements in home page rendered properly | 1. Enter URL and click go 2. Verify all the UI elements displayed or not | | All the UI elements rendered properly | Working as expected | Pass | N | Pritha K |
| HomePage_TC_002 | Functional | Home Page | Verify the Data Entry page can be reachable. | 1. Enter URL and click go 2. Verify all the UI elements displayed or not. 3. Press the Check Price button. | | User should navigate to Data Entry Page | Working as expected | Pass | N | Dhivya Dinesh |
| DataEntryPage_TC_001 | UI | Data Entry Page | Verify all the UI elements in Data Entry page rendered properly | 1. Enter URL and click go 2. Verify all the UI elements displayed or not. 3. Press the Check Price button in the home page 4. Verify all the UI elements displayed or not | | All the UI elements rendered properly | Working as expected | Pass | N | Dhivya |
| DataEntryPage_TC_002 | Functional | Data Entry Page | Verify user is able to enter all values | 1. Enter URL and click go 2. Verify all the UI elements displayed or not. 3. Press the Check Price button in the home page 4. Verify all the UI elements displayed or not 5. Verify if all values can be entered | | User should be able to enter all values in data entry page | Working as expected | Pass | N | Priyanka |
| DataEntryPage_TC_003 | Functional | Data Entry Page | Verify the Output Display page can be reachable. | 1. Enter URL and click go 2. Verify all the UI elements displayed or not. 3. Press the Check Price button in the home page | | User should navigate to Output | Working as expected | Pass | N | Pritha |

| | | | | | | | | | |
|--------------------------|------------|---------------------|---|--|---|---------------------|------|---|-----------------|
| OutputDisplayPage_TC_001 | UI | Output Display Page | Verify all the UI elements in Output Display page rendered properly | 1.Enter URL and click go 2.Verify all the UI elements displayed or not. 3.Press the Check Price button in the home page 4.Verify all the UI elements displayed or not 5.Verify if all values can be entered 6.Press the submit Button Verify all the UI elements displayed or not | All the UI elements rendered properly | Working as expected | Pass | N | Dinesh Priyanka |
| OutputDisplayPage_TC_002 | Functional | Output Display Page | Verify user is able to get predicted result | 1.Enter URL and click go 2.Verify all the UI elements displayed or not. 3.Press the Check Price button in the home page 4.Verify all the UI elements displayed or not 5.Verify if all values can be entered 6.Press the submit Button 7.Verify all the UI elements displayed or not 8.Verify if the predicted value is displayed or not | Predicted Car Resale Value is displayed on the page | Working as expected | Pass | N | Pritha |

8.3.1 Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

| Resolution | Severity 1 | Severity 2 | Severity 3 | Severity 4 | Subtotal |
|------------|------------|------------|------------|------------|----------|
| By Design | 2 | 3 | 1 | 1 | 7 |
| Duplicate | 1 | 0 | 3 | 0 | 4 |

| | | | | | |
|----------------|---|---|---|---|----|
| External | 2 | 0 | 0 | 1 | 3 |
| Fixed | 2 | 2 | 1 | 2 | 7 |
| Not Reproduced | 0 | 0 | 1 | 0 | 1 |
| Skipped | 0 | 0 | 1 | 1 | 2 |
| Won't Fix | 0 | 2 | 2 | 1 | 5 |
| Totals | 7 | 7 | 9 | 6 | 29 |

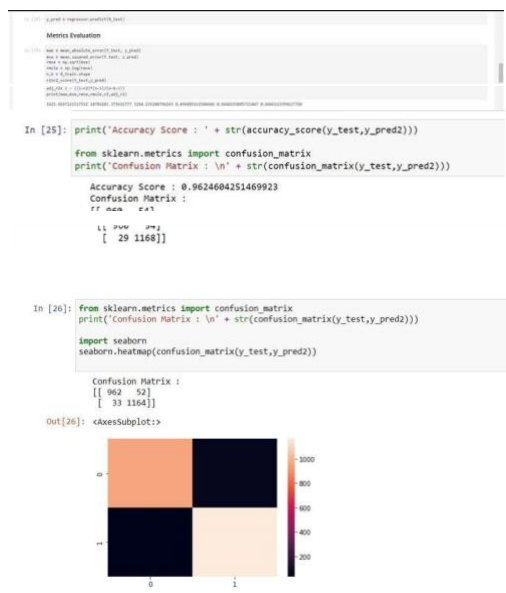

8.3.2 Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested

| Section | Total Cases | Not Tested | Fail | Pass |
|------------------------|-------------|------------|------|------|
| Home Page | 5 | 0 | 0 | 5 |
| Data Entry Page | 15 | 0 | 0 | 15 |
| Output Page | 4 | 0 | 0 | 4 |
| Hyper Parameter Tuning | 3 | 0 | 0 | 3 |
| Final Model Building | 2 | 0 | 0 | 2 |
| Flask Application | 10 | 0 | 0 | 10 |
| Train Model on IBM | 3 | 0 | 0 | 3 |
| Final Report Output | 4 | 0 | 0 | 4 |

9. RESULTS

9.1 Performance Metrics

| S.No. | Parameter | Values | Screenshot |
|-------|----------------|---|---|
| 1. | Metrics | <p>Regression Model: MAE -1625.969 , MSE – 10786201.379, RMSE -3284.235 , R2 score – 0.8446</p> <p>Classification Model: Confusion Matrix - , Accuracy Score- & Classification Report -</p> |  <p>The screenshot displays a Jupyter Notebook interface. It shows the import of necessary libraries (sklearn, numpy, pandas, matplotlib) and the calculation of accuracy score and confusion matrix for a classification model. The output shows an accuracy score of 0.9624604251469923 and a confusion matrix with values [[962, 52], [33, 1164]]. A heatmap visualization of the confusion matrix is also shown.</p> |
| 2. | Tune the Model | Hyperparameter Tuning Validation Method - |  <p>The screenshot shows a Jupyter Notebook with code for hyperparameter tuning using GridSearchCV. The code defines a list of parameters to search over (penalty, C) and performs a grid search to find the best parameters. The output shows the best parameters (penalty: 'l1', C: 0.0001) and the corresponding accuracy score (0.9185808738127544).</p> |

10. ADVANTAGES AND DISADVANTAGES

Advantages :

- Application is easy to use
- User Friendly
- No Cost
- No need to commission any agent to get car resale value estimate

Disadvantages :

- User needs to fill every asked detail of the car
- Doesn't work for cars from different distributions
- Not always accurate

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 Car Resale Value Prediction system which effectively determines the worthiness of the car in terms of cost. The proposed system is a web application that will help users to determine the accurate price of used cars.

12. FUTURE SCOPE

In future, large historical data of car price can be used to train the model, and which can help improve the estimation of the machine learning model. Moreover, we can build an application for mobile phone platforms like android, iOS for interacting with users. For better performance, we plan to judiciously design deep learning neural networks.

13. APPENDIX

Source Code

User Interface

index.html

```
<!DOCTYPE html>
<nav lang="en" dir="ltr">
  <head>
    <style>
      body
{ background-color:#D3D3D3;
  }

  div {text-align: center;}
</style>
  <meta charset="utf-8">
  <title>Car resale value </title>
  <link rel="stylesheet" href="../static/css/style.css">
  <link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-
awesome/4.7.0/css/font-awesome.min.css">

</head>
<body>

  <section class="header">
    <div class="text-box">
      <h1 style="font-size: 40px;color: purple">Car resale value Predictor</h1><br>
      <p style="font-size: 25px"> Welcome! To predict your used car price click the below
button!</p>
      <br>

      <a href="form.html">
        <form action="form.html">
          <input type="submit" value="check price">
        </form>
      </a>
```

```

        <br>
        

    </div>
</section>
</nav>
</body>
</body>
</body>
</html>

```

Index.css

```

*{
    margin: 0;
    padding: 0;
}

body{
    font-family : 'Franklin Gothic Medium';
    margin: 0;
}

.header{
    min-height: 100vh;
    width: 100%;
    background-image: linear-
gradient(rgba(25,30,30,0.7),rgba(25,30,30,0.7)),url(../Images/car1.jpg);
    background-position: center;
    background-size: cover;
    position :absolute;
}

.text-box{
    text-align: center;
    position: relative;
    color: #FFE4C4;
    top:50%;
}

.text-box h1{
    margin-top: 50px;
    font-size: 55px;
}

.text-box p{

```

```

margin: 10px 0 40px;
font-size: 15px;

.text-box a.visit-btn{
  text-align: center;
  padding: 10px 20px;
  font-weight: 700;
  white-space: inherit;
  vertical-align: middle;
  border: 2px solid transparent;
  display: inline-block;
  margin: 10px 10px 0 0;
  border-radius: 50px;
  overflow: hidden;
  background-color: #FFE4C4;
  border: 0;
  line-height: 50px;
  box-shadow: 0 3px 6px 0 rgba(0,0,0,0.16);
  font-size: 20px;
  text-decoration:none;
  position: relative;
}
.text-box a.visit-btn:hover{
  background-image: linear-gradient(to left,#FFE4C4,#a147e4);
  background-position: left center;
}

```

Form.html

```

<!DOCTYPE html>
<html lang="en" dir="ltr">
<head>
<link rel="stylesheet" href="../static/css/value.css">
<title>Car resale value</title>

</head>
<body style="background-color:Lightblue;">
  <section class="form">
    <form action="/predict" method="GET">
      <table border="0" align="center">
        <tbody>
          <tr>
            <td>
              <h1>Get the Accurate Resale Value of Your Car</h1>
            </td>
          </tr>
        </tbody>
      </table>
    </form>
  </section>

```



```
<td><label for="year" padding:10px>Registration year : </label></td>
<td><input id="year" maxlength="50" name="regyear" type="text" />
<br>
<br>
</td>
</tr>

<tr>
<td><label for="month">Registration Month : </label></td>
<td><input id="month" maxlength="50" name="regmonth" type="text" />
<br>
<br>
</td>
</tr>

<tr>
<td><label for="power">Power of car in PS: </label></td>
<td><input id="power" maxlength="50" name="powerps" type="text" />
<br>
<br>
</td>
</tr>

<tr>
<td><label for="kilometer">Kilometers that car have driven : </label></td>
<td><input id="kilometer" maxlength="50" name="kms" type="text" />
<br>
<br>
</td>
</tr>

<tr>
<td><label for="geartype">Gear type : </label></td>
<td><input type="radio" name="geartype" value="manual"/> Manual
<input type="radio" name="geartype" value="automatic"/> Automatic
<input type="radio" name="geartype" value="not-declared"/> Not declared
<br>
<br>
</td>
</tr>

<tr>
<td><label for="damage">Your car is repaired or damaged : </label></td>
<td><input type="radio" name="damage" value="yes"/> Yes
<input type="radio" name="damage" value="no"/> No
```

```

<input type="radio" name="damage" value="not-declared"/> Not declared
<br>
<br>
</td>
</tr>

<tr>
<td><label for="model">Model Type : </label></td>
<td>
<select name="model" id="model">
<option value="" disabled selected hidden>Choose Model Name...</option>
<option value="golf">Golf </option>
<option value="grand">Grand </option>
<option value="fabia">Fabia </option>
<option value="3er">3er </option>
<option value="2_reihe">2 Reihe </option>
<option value="andere">Andere </option>
<option value="c_max">C Max </option>
<option value="3_reihe">3 Reihe </option>
<option value="passat">Passat </option>
<option value="navara">Navara </option>
<option value="ka">Ka </option>
<option value="polo">Polo </option>
<option value="twingo">Twingo </option>
<option value="a_klasse">A klasse </option>
<option value="scirocco">Scirocco </option>
<option value="5er">5er </option>
<option value="meriva">Meriva </option>
<option value="arosa">Arosa </option>
<option value="c4">C4 </option>
<option value="civic">Civic </option>
<option value="transporter">Transporter </option>
<option value="punto">Punto </option>
<option value="e_klasse">E Klasse </option>
<option value="clio">Clio </option>
<option value="kadett">Kadett </option>
<option value="kangoo">Kangoo </option>
<option value="corsa">Corsa </option>
<option value="one">One </option>
<option value="fortwo">Fortwo </option>
<option value="1er">1er </option>
<option value="b_klasse">B Klasse </option>
<option value="signum">Signum </option>
<option value="astra">Astra </option>
<option value="a8">A8 </option>

```

```
<option value="jetta">Jetta </option>
<option value="fiesta">Fiesta </option>
<option value="c_klasse">C Klasse </option>
<option value="micra">Micra </option>
<option value="vito">Vito </option>
<option value="sprinter">Sprinter </option>
<option value="156">156 </option>
<option value="escort">Escort </option>
<option value="forester">Forester </option>
<option value="xc_reihe">Xc Reihe </option>
<option value="scenic">Scenic </option>
<option value="a4">A4 </option>
<option value="a1">A1 </option>
<option value="insignia">Insignia </option>
<option value="combo">Combo </option>
<option value="focus">Focus </option>
<option value="tt">Tt </option>
<option value="a6">A6 </option>
<option value="jazz">Jazz </option>
<option value="omega">Omega </option>
<option value="slk">Slk </option>
<option value="7er">7er </option>
<option value="80">80 </option>
<option value="147">147 </option>
<option value="glk">Glk </option>
<option value="100">100 </option>
<option value="z_reihe">Z Reihe </option>
<option value="sportage">Sportage </option>
<option value="sorento">Sorento </option>
<option value="v40">V40 </option>
<option value="5er">5er </option>
<option value="ibiza">Ibiza </option>
<option value="3er">3er </option>
<option value="mustang">Mustang </option>
<option value="eos">Eos </option>
<option value="touran">Touran </option>
<option value="getz">Getz </option>
<option value="a3">A3 </option>
<option value="almera">Almera </option>
<option value="megane">Megane </option>
<option value="7er">7er </option>
<option value="1er">1er </option>
<option value="lupo">Lupo </option>
<option value="r19">R19 </option>
<option value="zafira">Zafira </option>
```

```
<option value="caddy">Caddy </option>
<option value="2_reihe">2 Reihe </option>
<option value="mondeo">Mondeo </option>
<option value="cordoba">Cordoba </option>
<option value="colt">Colt </option>
<option value="impieza">Impieza </option>
<option value="vectra">Vectra </option>
<option value="berlingo">Berlingo </option>
<option value="80">80 </option>
<option value="m_klasse">M Klasse </option>
<option value="tiguan">Tiguan </option>
<option value="i_reihe">I Reihe </option>
<option value="espace">Espace </option>
<option value="sharan">Sharan </option>
<option value="6_reihe">6 Reihe </option>
<option value="panda">Panda </option>
<option value="up">Up </option>
<option value="seicento">Seicento </option>
<option value="ceed">Ceed </option>
<option value="5_reihe">5 Reihe </option>
<option value="yeti">Yeti </option>
<option value="octavia">Octavia </option>
<option value="mii">Mii </option>
<option value="rx_reihe">Rx Reihe </option>
<option value="6er">6er </option>
<option value="modus">Modus </option>
<option value="fox">Fox </option>
<option value="matiz">Matiz </option>
<option value="beetle">Beetle </option>
<option value="c1">C1 </option>
<option value="rio">Rio </option>
<option value="touareg">Touareg </option>
<option value="logan">Logan </option>
<option value="spider">Spider </option>
<option value="cuore">Cuore </option>
<option value="s_max">S Max </option>
<option value="a2">A2 </option>
<option value="x_reihe">X Reihe </option>
<option value="a5">A5 </option>
<option value="galaxy">Galaxy </option>
<option value="c3">C3 </option>
<option value="viano">Viano </option>
<option value="s_klasse">S Klasse </option>
<option value="1_reihe">1 Reihe </option>
<option value="avensis">Avensis </option>
```

```
<option value="s1">S1 </option>
<option value="roomster">Roomster </option>
<option value="q5">Q5 </option>
<option value="kaefer">Kaefer </option>
<option value="santa">Santa </option>
<option value="cooper">Cooper </option>
<option value="leon">Leon </option>
<option value="4_reihe">4 Reihe </option>
<option value="500">500 </option>
<option value="laguna">Laguna </option>
<option value="ptcruiser">Ptcruiser </option>
<option value="clk">Clk </option>
<option value="primera">Primera </option>
<option value="exeo">Exeo </option>
<option value="159">159 </option>
<option value="transit">Transit </option>
<option value="juke">Juke </option>
<option value="qashqai">Qashqai </option>
<option value="carisma">Carisma </option>
<option value="accord">Accord </option>
<option value="corolla">Corolla </option>
<option value="lanos">Lanos </option>
<option value="phaeton">Phaeton </option>
<option value="boxster">Boxster </option>
<option value="verso">Verso </option>
<option value="swift">Swift </option>
<option value="rav">Rav </option>
<option value="kuga">Kuga </option>
<option value="picanto">Picanto </option>
<option value="kalos">Kalos </option>
<option value="superb">Superb </option>
<option value="stilo">Stilo </option>
<option value="alhambra">Alhambra </option>
<option value="911">911 </option>
<option value="mx_reihe">Mx Reihe </option>
<option value="m_reihe">M Reihe </option>
<option value="roadster">Roadster </option>
<option value="ypsilon">Ypsilon </option>
<option value="cayenne">Cayenne </option>
<option value="galant">Galant </option>
<option value="justy">Justy </option>
<option value="90">90 </option>
<option value="sirion">Sirion </option>
<option value="crossfire">Crossfire </option>
<option value="6_reihe">6 Reihe </option>
```

```
<option value="agila">Agila </option>
<option value="duster">Duster </option>
<option value="cr_reihe">Cr Reihe </option>
<option value="v50">V50 </option>
<option value="discovery">Discovery </option>
<option value="c_reihe">C Reihe </option>
<option value="v_klasse">V Klasse </option>
<option value="yaris">Yaris </option>
<option value="c5">C5 </option>
<option value="aygo">Aygo </option>
<option value="cc">Cc </option>
<option value="carnival">Carnival </option>
<option value="fusion">Fusion </option>
<option value="bora">Bora </option>
<option value="forfour">Forfour </option>
<option value="100">100 </option>
<option value="cl">Cl </option>
<option value="tigra">Tigra </option>
<option value="156">156 </option>
<option value="300c">300c </option>
<option value="100">100 </option>
<option value="147">147 </option>
<option value="q3">Q3 </option>
<option value="spark">Spark </option>
<option value="v70">V70 </option>
<option value="x_type">X Type </option>
<option value="5_reihe">5 Reihe </option>
<option value="ducato">Ducato </option>
<option value="s_type">S Type </option>
<option value="x_trail">X Trail </option>
<option value="toledo">Toledo </option>
<option value="altea">Altea </option>
<option value="7er">7er </option>
<option value="voyager">Voyager </option>
<option value="calibra">Calibra </option>
<option value="bravo">Bravo </option>
<option value="range_rover">Range Rover </option>
<option value="antara">Antara </option>
<option value="tucson">Tucson </option>
<option value="q7">Q7 </option>
<option value="citigo">Citigo </option>
<option value="jimny">Jimny </option>
<option value="cx_reihe">Cx Reihe </option>
<option value="wrangler">Wrangler </option>
<option value="lybra">Lybra </option>
```

```
<option value="range_rover_sport">Range Rover Sport </option>
<option value="lancer">Lancer </option>
<option value="159">159 </option>
<option value="freelander">Freelander </option>
<option value="captiva">Captiva </option>
<option value="c2">C2 </option>
<option value="500">500 </option>
<option value="range_rover_evoque">Range Rover Evoque </option>
<option value="sander0">Sander0 </option>
<option value="note">Note </option>
<option value="900">900 </option>
<option value="147">147 </option>
<option value="defender">Defender </option>
<option value="cherokee">Cherokee </option>
<option value="clubman">Clubman </option>
<option value="samara">Samara </option>
<option value="2_reihe">2 Reihe </option>
<option value="1er">1er </option>
<option value="3er">3er </option>
<option value="601">601 </option>
<option value="3_reihe">3 Reihe </option>
<option value="4_reihe">4 Reihe </option>
<option value="5er">5er </option>
<option value="6_reihe">6 Reihe </option>
<option value="legacy">Legacy </option>
<option value="pajero">Pajero </option>
<option value="auris">Auris </option>
<option value="niva">Niva </option>
<option value="5_reihe">5 Reihe </option>
<option value="s60">S60 </option>
<option value="nubira">Nubira </option>
<option value="vivaro">Vivaro </option>
<option value="g_klasse">G Klasse </option>
<option value="lodgy">Lodgy </option>
<option value="850">850 </option>
<option value="serie_2">Serie 2 </option>
<option value="6er">6er </option>
<option value="charade">Charade </option>
<option value="croma">Croma </option>
<option value="outlander">Outlander </option>
<option value="gl">Gl </option>
<option value="doblo">Doblo </option>
<option value="musa">Musa </option>
<option value="amarok">Amarok </option>
<option value="156">156 </option>
```

```

<option value="move">Move </option>
<option value="9000">9000 </option>
<option value="v60">V60 </option>
<option value="145">145 </option>
<option value="aveo">Aveo </option>
<option value="200">200 </option>
<option value="300c">300c </option>
<option value="b_max">B Max </option>
<option value="delta">Delta </option>
<option value="terios">Terios </option>
<option value="rangerover">RangeRover </option>
<option value="90">90 </option>
<option value="materia">Materia </option>
<option value="kalina">Kalina </option>
<option value="elefantino">Elefantino </option>
<option value="i3">I3 </option>
<option value="kappa">Kappa </option>
<option value="serie_3">Serie 3 </option>
<option value="48429">48429 </option>
<option value="serie_1">Serie 1 </option>
<option value="discovery_sport">Discovery Sport </option>

</select>
<br>
<br>
</td>
</tr>

<tr>
<td><label for="brand">Brand :</label></td>
<td>
<select name="brand" id="brand">
<option value="" disabled selected hidden>Choose Brand Name...</option>
<option value="volkswagen">Volkswagen </option>
<option value="audi">Audi </option>
<option value="jeep">Jeep </option>
<option value="skoda">Skoda </option>
<option value="bmw">Bmw </option>
<option value="peugeot">Peugeot </option>
<option value="ford">Ford </option>
<option value="mazda">Mazda </option>
<option value="nissan">Nissan </option>
<option value="renault">Renault </option>
<option value="mercedes_benz">Mercedes Benz </option>
<option value="opel">Opel </option>

```



```

<option value="seat">Seat </option>
<option value="citroen">Citroen </option>
<option value="honda">Honda </option>
<option value="fiat">Fiat </option>
<option value="mini">Mini </option>
<option value="smart">Smart </option>
<option value="hyundai">Hyundai </option>
<option value="sonstige_autos">Sonstige Autos </option>
<option value="alfa_romeo">Alfa Romeo </option>
<option value="subaru">Subaru </option>
<option value="volvo">Volvo </option>
<option value="mitsubishi">Mitsubishi </option>
<option value="kia">Kia </option>
<option value="suzuki">Suzuki </option>
<option value="lancia">Lancia </option>
<option value="porsche">Porsche </option>
<option value="toyota">Toyota </option>
<option value="chevrolet">Chevrolet </option>
<option value="dacia">Dacia </option>
<option value="daihatsu">Daihatsu </option>
<option value="trabant">Trabant </option>
<option value="saab">Saab </option>
<option value="chrysler">Chrysler </option>
<option value="jaguar">Jaguar </option>
<option value="daewoo">Daewoo </option>
<option value="rover">Rover </option>
<option value="land_rover">Land Rover </option>
<option value="lada">Lada </option>
</select>
<br>
<br>
</td>
</tr>

<tr>
<td><label for="fuelType">Fuel Type :</label></td>
<td>
<select name="fuelType" id="brand">
<option value="" disabled selected hidden>Choose Fuel Type...</option>
<option value="petrol"> Petrol </option>
<option value="diesel"> Diesel </option>
<option value="not-declared"> Not Declared </option>
<option value="lpg">LPG </option>
<option value="cng">CNG </option>
<option value="hybrid">Hybrid </option>

```

```

<option value="others">Others </option>
<option value="electric">Electric </option>
</select>
<br>
<br>
</td>
</tr>

<tr>
<td><label for="vehicletype">Vehicle type:</label></td>
<td>
<select name="vehicletype" id="vehicle" >
<option value="" disabled selected hidden>Choose Vehicle Type...</option>
<option value="coupe">Coupe </option>
<option value="suv">SUV </option>
<option value="kleinwagen">Kleinwagen </option>
<option value="limousine">Limousine </option>
<option value="cabrio">Cabrio </option>
<option value="bus">Bus </option>
<option value="kombi">Kombi </option>
<option value="andere">Andere </option>
<option value="volkswagen">Volkswagen </option>
</select>
<br>
<br>
</td>
</tr>
</tbody>
</table><center>

<a href="predict.html" style="font-size:30px;">submit</a>

</center>
</form>

</section>

</body>
</html>

```

Form.css

```
.header{
  width: 100%;
  text-align: center;
  padding-top: 20px;
  font-size: 20px;
  font-family: 'Franklin Gothic Medium';
  background-color: #43FFB6;
  border: 0%;
  top: 0px;
  bottom: 0px;
  right: 0px;
  left: 0px;
  overflow-y: auto;
}
body{
  margin: 0;
  font-family: 'Franklin Gothic Medium';
}
.form{
  background-image: linear-
gradient(rgba(25,30,30,0.7),rgba(25,30,30,0.7)),url(../Images/car2.jpg);
  background-position: center;
  background-size: cover;
  position: relative;
  text-align: center;
  padding: 20px;
  display: flex;
  flex-direction: column;
  align-items: center;
  font-size: 22px;
}
input[type=text] {
  width: 100%;
  padding: 12px 20px;
  margin: 8px 0;
  display: inline-block;
  border: 1px solid #ccc;
  border-radius: 4px;
  box-sizing: border-box;
}
select {
  width: 100%;
```

```

padding: 16px 20px;
border: none;
border-radius: 4px;
background-color: #f1f1f1;
}
input[type=submit] {
  font-family : 'Franklin Gothic Medium';
  font-weight: 700;
  width: 40%;
  background-color: #4CAF50;
  color: black;
  font-size: 20px;
  padding: 20px 20px;
  margin: 8px 0;
  border: none;
  border-radius: 4px;
  cursor: pointer;
}
input[type=submit]:hover {
  background-color: #37853b;
}
*{
color:black;
}

```

Predict.html

```

<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta http-equiv="X-UA-Compatible" content="IE=edge">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <link rel="stylesheet" href="../static/css/predict.css">
  <title>Car Resale Predicted Value</title>
</head>
<body>
  <section class="header">
    <nav></nav>
    <div class="text-box">
      <h1>The Predicted Car Resale Value is </h1>
      <h1>{{predict}}</h1>
    </div>

```

```
</section>

</body>
</html>
```

Predict.css

```
.header{
  min-height: 100vh;
  width: 100%;
  background-image: linear-
gradient(rgba(25,30,30,0.7),rgba(25,30,30,0.7)),url(../Images/car3.jpg);
  background-position: center;
  background-size: cover;
  position: relative;
}
nav{
  display:flex;
  padding: 2% 6%;
  justify-content: space-between;
  align-items: center;
}
.text-box{
  text-align: center;
  position: relative;
  color: #cfbba3;
  top:50%;
}
.text-box h1{
  margin-top: 50px;
  font-size: 55px;
}
body{
  margin: 0;
  font-family :'Franklin Gothic Medium';
}
```

app.py

```
from flask import Flask, render_template, request

import requests
import pickle
import numpy as np
```

```

import sklearn
from sklearn.preprocessing import StandardScaler

# NOTE: you must manually set API_KEY below using information retrieved from your IBM Cloud
account.
API_KEY = "<your API key>"
token_response = requests.post('https://iam.cloud.ibm.com/identity/token', data={"apikey":
    API_KEY, "grant_type": 'urn:ibm:params:oauth:grant-type:apikey'})
mltoken = token_response.json()["access_token"]

header = {'Content-Type': 'application/json', 'Authorization': 'Bearer ' + mltoken}

app = Flask(__name__)
model = pickle.load(open('random_forest_regression_model.pkl', 'rb'))
@app.route('/')
def index():
    return render_template('index.html')

@app.route('/hai')
def Hai():
    return render_template('form.html')

@app.route('/hello', methods=['GET'])
def Home():
    return render_template('form.html')

standard_to = StandardScaler()
@app.route("/predict", methods=['POST'])
def predict():
    Fuel_Type_Diesel=0
    if request.method == 'POST':
        Year = int(request.form['Year'])
        Present_Price=float(request.form['Present_Price'])
        Kms_Driven=int(request.form['Kms_Driven'])
        Kms_Driven2=np.log(Kms_Driven)
        Owner=int(request.form['Owner'])
        Fuel_Type_Petrol=request.form['Fuel_Type_Petrol']
        if(Fuel_Type_Petrol=='Petrol'):
            Fuel_Type_Petrol=1
            Fuel_Type_Diesel=0
        else:
            Fuel_Type_Petrol=0
            Fuel_Type_Diesel=1
        Year=2020-Year

```

```

Seller_Type_Individual=request.form['Seller_Type_Individual']
if(Seller_Type_Individual=='Individual'):
    Seller_Type_Individual=1
else:
    Seller_Type_Individual=0
Transmission_Mannual=request.form['Transmission_Mannual']
if(Transmission_Mannual=='Mannual'):
    Transmission_Mannual=1
else:
    Transmission_Mannual=0
prediction=model.predict([[Present_Price,Kms_Driven2,Owner,Year,Fuel_Type_Diesel,Fuel_Type_Petrol,Seller_Type_Individual,Transmission_Mannual]])
output=round(prediction[0],2)
if output<0:
    return render_template('predict.html',prediction_texts="Sorry you cannot sell this car")
else:
    return render_template('predict.html',prediction_text="You Can Sell The Car at {}".format(output))
else:
    return render_template('predict.html')

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

```

GitHub & Project Demo Link:

<https://github.com/IBM-EPBL/IBM-Project-50387-1660905826>

<https://drive.google.com/file/d/1WAftHO54d48pN9HtFZJQbguXPdKX-O1F/view?usp=drivesdk>
