PROJECT REPORT

PROJECT TITLE   : **Car Resale value Prediction**

TEAM ID   **:** PNT2022TMID30858

TEAM MEMBERS   **:** Dhandapani D (TEAMLEAD)

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Hari C

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1.INTRODUCTION

1.1 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 estimates 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.

1.2 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

2.1Existing 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.

2.2 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
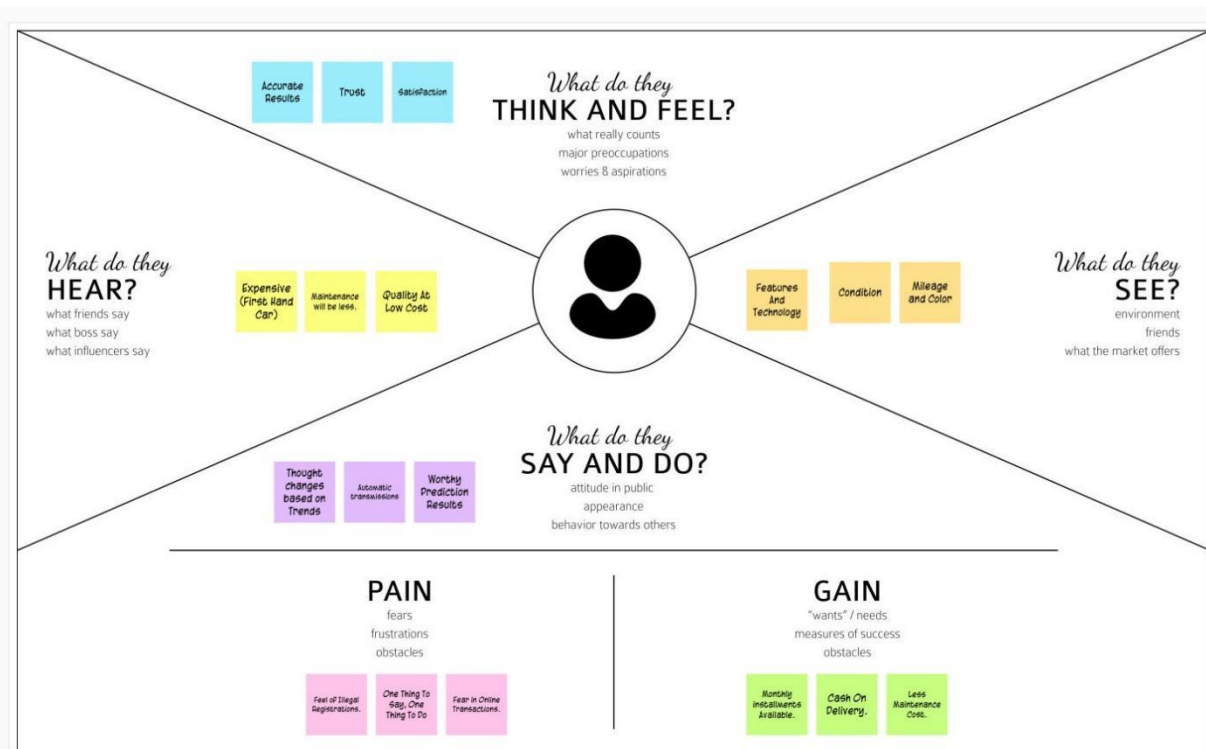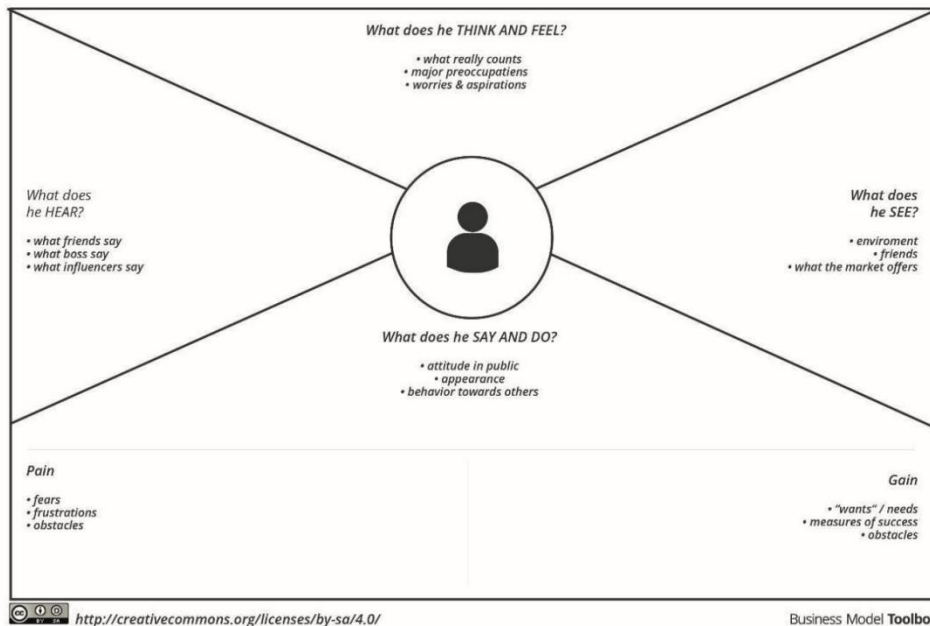
2.3 Problem Statement Definition

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

3.1 Empathy Map Canvas
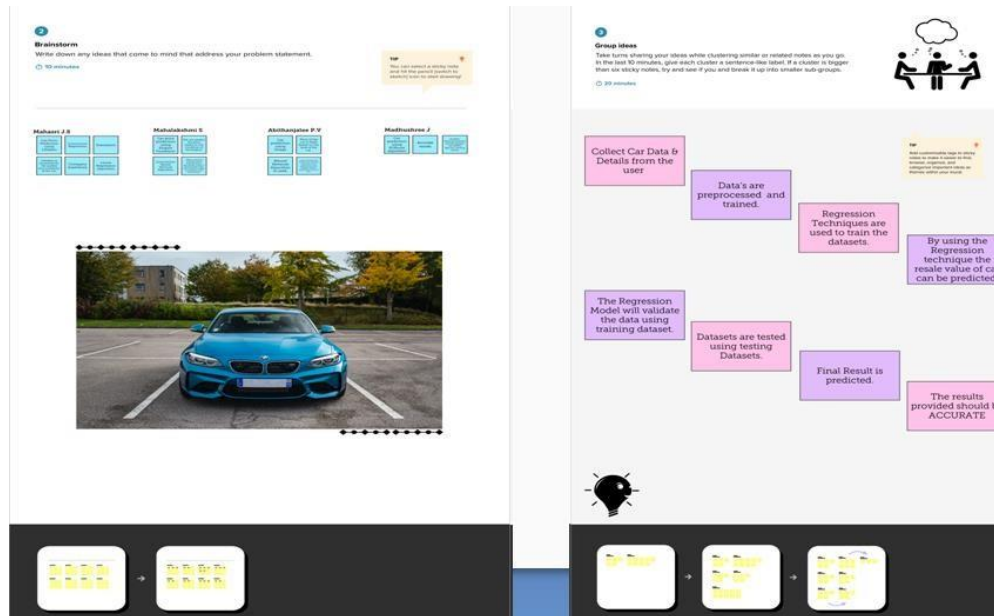
3.2 Ideation & Brainstroming

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.
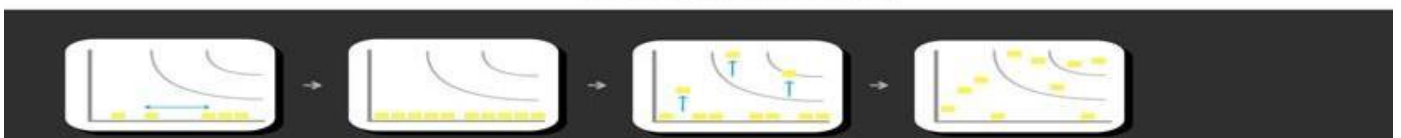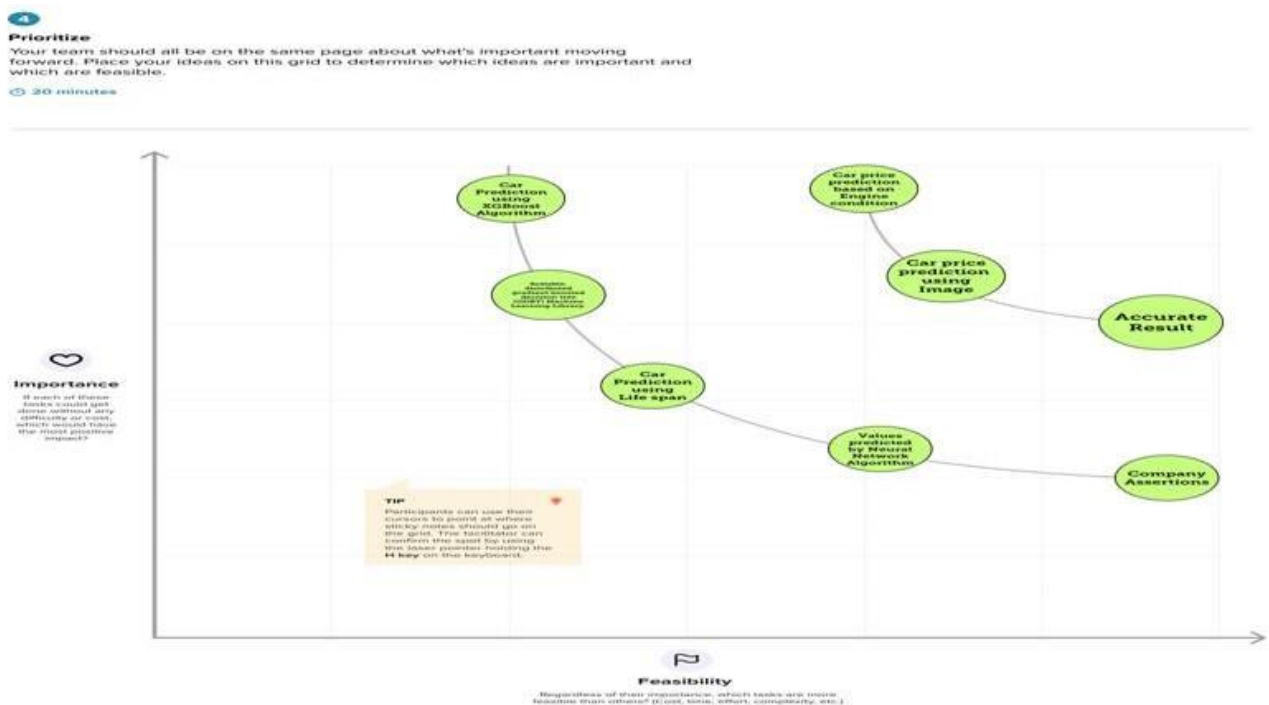
🕐 **5 minutes**

PROBLEM

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

Idea prioritation :

3.3 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	To predict the resale value of second hand car or used car considering its features.
2.	Idea / Solution description	To develop a Machine learning algorithm which predicts the resale value of any used car which is shown in web design.
3.	Novelty / Uniqueness	The model predicts the resale value of car with high accuracy.
4.	Social Impact / Customer Satisfaction	A good platform with more reliability and portability.
5.	Business Model (Revenue Model)	The model deployed in cloud so anyone can access it anywhere and anytime.
6.	Scalability of the Solution	It is a web page model so it can be viewed and accessed in both computer as well as mobile phones.

3.4 Problem Solution Fit

1. CUSTOMER SEGMENT(S) `CS`

Who is your customer?
i.e. working parents of 0-5 y.o. kids

- Used car sellers
- Buyers
- First time car buyer

6. CUSTOMER CONSTRAINTS `CC`

What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices.

- Customer were concerned when they still had no clue what they had discovered.

- They may have heard of internet scammers.

5. AVAILABLE SOLUTIONS `AS`

Which solutions are available to the customers when they face the problem
or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking

- By searching in online websites.

- By acquiring knowledge from the people and gaining an understanding.

2. JOBS-TO-BE-DONE / PROBLEMS `J&P`

Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.

To build a supervised machine learning model that use regression methods to anticipate the value of a car based on several factors like as

- Condition of Engine
- Life span of used car
- Kilometers driven
- Look of the car
- Solving customer doubts

9. PROBLEM ROOT CAUSE `RC`

What is the real reason that this problem exists?
What is the back story behind the need to do this job?
i.e. customers have to do it because of the change in regulations.

- The price projected by dealers or brokers for a secondhand car is untrustworthy.

- Users can predict the proper car valuation remotely, without the need for human interaction, like car dealers do.

7. BEHAVIOUR `BE`

What does your customer do to address the problem and get the job done?
i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace)

- To avoid wear and tear fines, leased cars must be returned in excellent condition.

- Beware of selling frauds.

3. TRIGGERS `TR`

What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news.

Users may calculate the proper valuation of a car on their own utilizing model, year, owner, and other car resale value prediction websites.

4. EMOTIONS: BEFORE / AFTER `EM`

How do customers feel when they face a problem or a job and afterwards?
i.e. lost, insecure > confident, in control - use it in your communication strategy & design.

Before:
- The user will be concerned about the inaccurate figures anticipated by humans based on the state of the vehicle.

After:
- Without user intervention, the user may decide the reliability of the car on their own.

10. YOUR SOLUTION `SL`

If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality.
If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour.

- Machine learning and a regression model were used to create this system. We can estimate the resale value of a car at any moment and from any location by applying this model.

- The project should use used car parameters as inputs and allow buyers to make their own judgments.

8. CHANNELS of BEHAVIOUR `CH`

8.1 ONLINE
What kind of actions do customers take online? Extract online channels from #7

8.2 OFFLINE
What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.

ONLINE
- Customers don't just look for information on vehicle brand websites; they also visit comparison sites to compare pricing and user ratings.

OFFLINE
- When a buyer wanted to buy a car, they would go from dealership to dealership, meeting with salesmen and determining where they might get the greatest bargain.

4 REQUIREMENT ANALYSIS

4.1 Functional requirement

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Website
FR-2	User Confirmation	Confirmation via Website
FR-3	Car Registration	Registration through Website
FR-4	Car Information	Getting the car details through Website
FR-5	Value Prediction	Shows the resale value of the car through website

4.2 Non-Functional requirement

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The model predicts the resale value of the car with more accuracy.
NFR-2	**Security**	Protect the user information as well as their car details.
NFR-3	**Reliability**	The model performs consistently well and also it begins trust to the user.
NFR-4	**Performance**	The model performance has high accuracy and with portable from one machine to another machine.
NFR-5	**Availability**	The model can be available anywhere at anytime.
NFR-6	**Scalability**	The model can be viewed and accessed in both computer as well as mobile phone.

5 PROJECT DESIGN

5.1 Data Flow Diagram
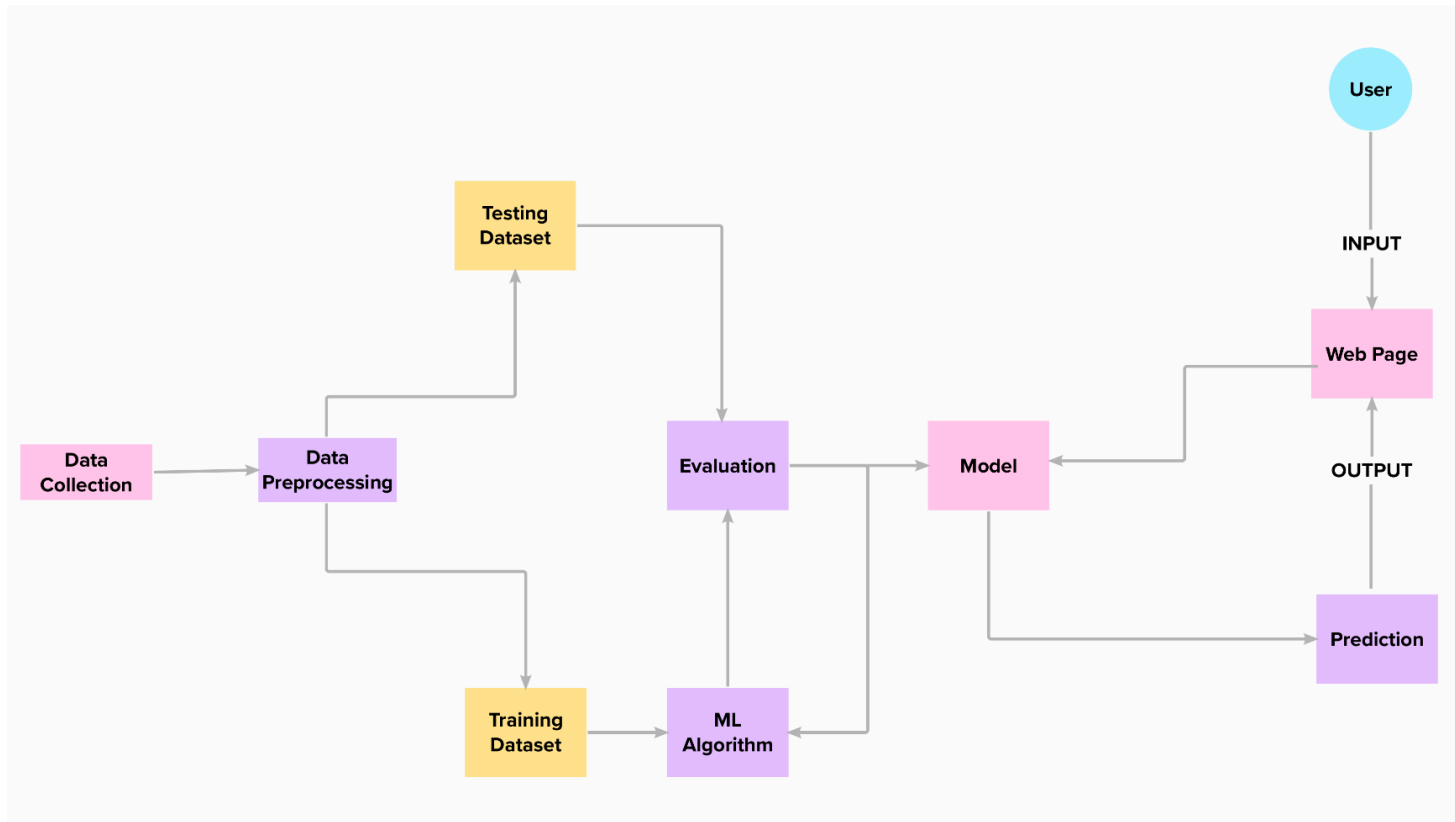
5.2 Solution & Technical Architecture

USER | IBM CLOUD | ADMIN

TOLL FREE NUMBER

AUDIO RECORDING

WATSON SERVICES

SPEECH TO TEXT

LANGUAGE TRANSLATOR

KNOWLEDGE STUDIO

NATURAL LANGUAGE UNDERSTANDING

IBM DB2 ON CLOUD

APP UI
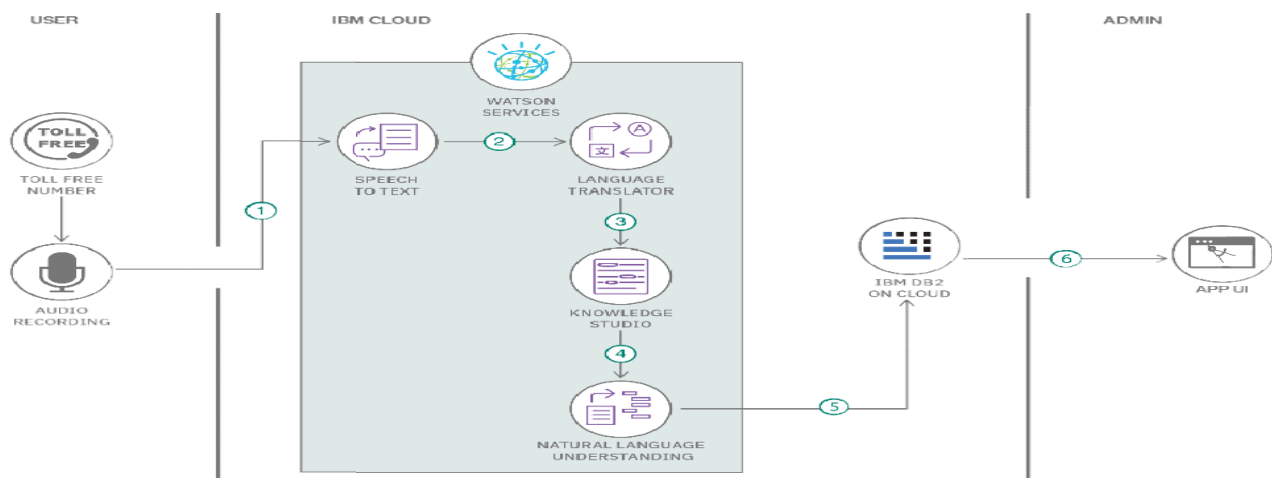
User Stories

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 for the application	I can receive confirmation email & click confirm	High	Sprint-1
	Dashboard	USN-3	As a user, I can register for the application through internet	I can register & access the dashboard with Internet login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can confirm the registration in Gmail	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can login with my id and password	High	Sprint-1

6 PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Resources Initialization	We have to create and initialize accounts in various public APIs like OpenWeatherMap API.	1	LOW	Dhandapani D Harshan AK DhanzilRahman M Duraivenugopal R Hari C
Sprint-1	Local Server/Software Run	Write a Python program that outputs results given the inputs like weather and location through the software	1	MEDIUM	Dhandapani D Harshan AK DhanzilRahman M Duraivenugopal R Hari C
Sprint-2	Push the server/software to cloud	Push the code from Sprint 1 to cloud so it can be accessed from anywhere	2	MEDIUM	Dhandapani D Harshan AK DhanzilRahman M Duraivenugopal R Hari C
Sprint-3	Hardware initialization	Integrate the hardware to be able to access the cloud functions and provide inputs to the same.	2	HIGH	Dhandapani D Harshan AK DhanzilRahman M Duraivenugopal R Hari C
Sprint-4	UI/UX Optimization & Debugging	Optimize all the shortcomings and provide better user experience.	2	LOW	Dhandapani D Harshan AK DhanzilRahman M Duraivenugopal R Hari C

6.2 Sprint Delivery Schedule

Sprint	Functional Requirement(Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3	Home Page	USN-1	Description about car resale process	2	Low	Dhandapani D Harshan AK DhanzilRahman M Duraivenugopal R Hari C
Sprint-3	Registration/Login	USN-2	As a user, I can register for the application by entering my username, email, phone number, and password and verify it. As a user, I can log in to the web application by entering my Username &password.	5	Medium	Dhandapani D Harshan AK DhanzilRahman M Duraivenugopal R Hari C
Sprint-3	Form Page	USN-3	As a user, I submit my car details.	5	Medium	Dhandapani D Harshan AK DhanzilRahman M Duraivenugopal R Hari C
Sprint-3	Result	USN-4	The predicted resale price for the given car model will be displayed.	9	High	Dhandapani D Harshan AK DhanzilRahman M Duraivenugopal R Hari C
Sprint-1	Data collection andData preprocessing	USN-5	Collect the required data and read the data.	6	High	Dhandapani D Harshan AK DhanzilRahman M Duraivenugopal R Hari C
Sprint-1	Data collection andData preprocessing	USN-6	Clean and analyse the data to avoid duplications	9	High	Dhandapani D Harshan AK

						DhanzilRahman M
						Duraivenugopal R
						Hari C

Sprint		USN				
Sprint-1	Data collection andData preprocessing	USN-7	Split the data into Dependent and Independent variables	6	High	Dhandapani D Harshan AK DhanzilRahman M Duraivenugopal R Hari C
Sprint-2	Model Building	USN-8	Build the model using a Random Forest regression to classify the data.	9	High	Dhandapani D Harshan AK DhanzilRahman M Duraivenugopal R Hari C
Sprint-2	Model Building	USN-9	Check the metrics	7	High	Dhandapani D Harshan AK DhanzilRahman M Duraivenugopal R Hari C
Sprint-2	Model Building	USN-10	Save the model	5	High	Dhandapani D Harshan AK DhanzilRahman M Duraivenugopal R Hari C
Sprint-4	Deploy the model	USN-11	Deployment of ML model using IBM Watson Studio, object storage.	13	High	Dhandapani D Harshan AK DhanzilRahman M Duraivenugopal R Hari C
Sprint-4	Integrate the webapp with the IBM model	USN-12	Use flask for the integrationpurpose.	8	Medium	Dhandapani D Harshan AK DhanzilRahman M Duraivenugopal R Hari C

7 CODING & SOLUTIONING

7.1 Feature 1

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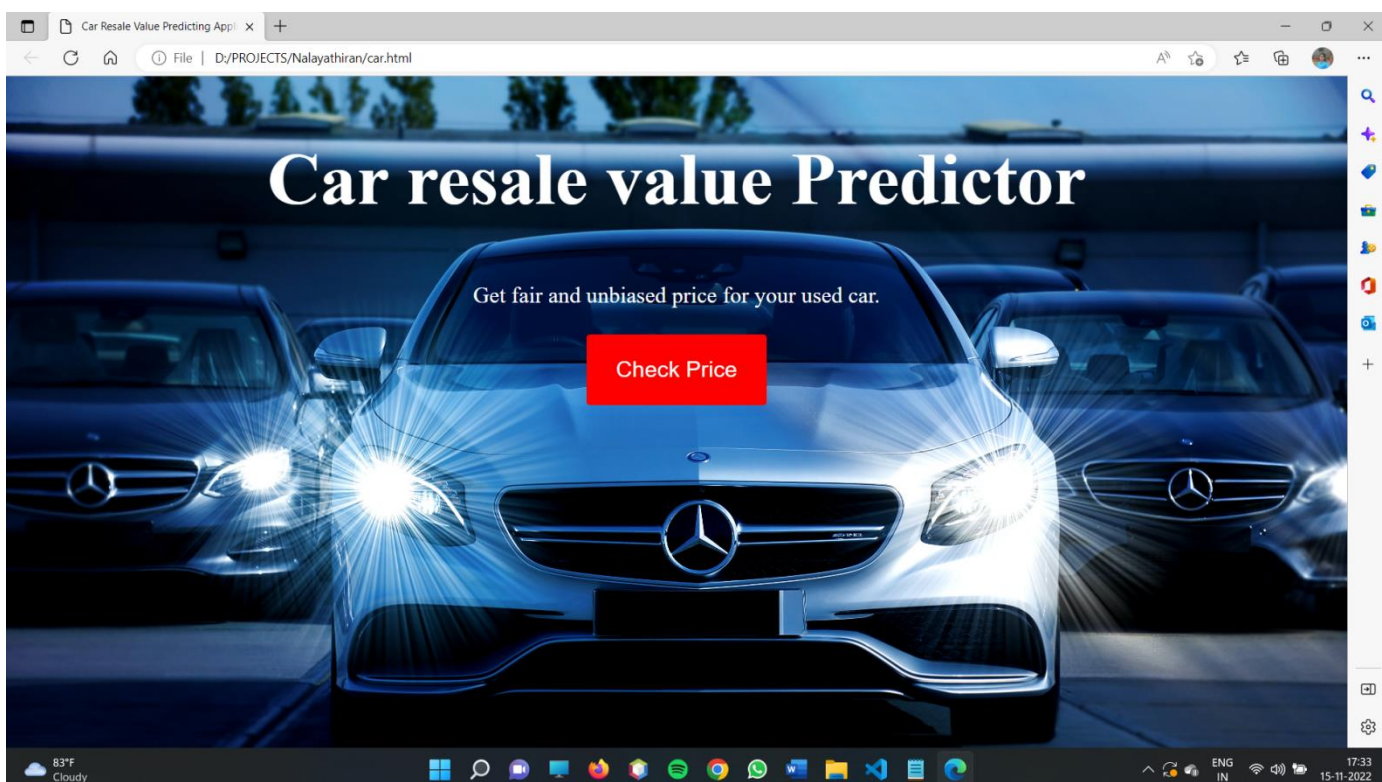- Cloudant DB
- Web UI
- MIT App Inventor
- Python code

7.2 Feature 2

- Login
- Wokwi

8 TESTING AND RESULTS

8.1 Test Cases

Test case 1:

Test case 2:

9 Result

10.

10.1 ADVANTAGES

- This will reduced installation cost.
- It will monitor 24/7.
- Very useful to sale the car for reasonable price

10.2 DISADVANTAGES

- Car Resale value can not be used by the person who doesn't have access to the internet.

- 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.

13 APPENDIX

13.1 Source Code

STYLE

```
<!DOCTYPE html>
<html lang="en" dir="ltr">
  <head>
    <meta charset="utf-8">
    <title>Car Resale Value Predicting Application</title>
    <link rel="icon" type="image/x-icon" href="../static/Images/favicon.ico">
    <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">
  <style>
h1 {
 font-size: 65px;
 top:40px
}
p {
 font-size: 20px;
}
```

```css
.button {
  display: inline-block;
  border-radius: 3px;
  background-color: red;
  border: none;
  color: white;
  text-align: center;
  font-size: 20px;
  padding: 20px;
  width: 160px;
  transition: all 0.5s;
  cursor: pointer;
  margin: 3px;
}
.button span {
  cursor: pointer;
  display: inline-block;
  position: relative;
  transition: 0.5s;
}

.button span:after {
  content: '\00bb';
  position: absolute;
  opacity: 0;
  top: 0;
  right: -20px;
  transition: 0.5s;
}

.button:hover span {
  padding-right: 20px;
}

.button:hover span:after {
  opacity: 1;
  right: 0;
}

body {
  background-image: url('car4.jpg');
  background-repeat: no-repeat;
  background-attachment: fixed;
  background-size: cover;

}
</style>
  </head>
```

```html
  <center>
  <body>
   <section class="header">
     <nav>

     </nav>
      <div class="text-box">
        <center><h1 style="color:white;">Car resale value Predictor</h1><center>
        <center><p style="color:White;">Get fair and unbiased price for your used
car.</p><center>
        <button class="button" style="vertical-align:middle"><span>Check Price
</span></button>

      </div>
    </section>

  </body>
 </center>
</html>
```

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>
<style>
body {
 background-image: url('car10.png');
 background-repeat: no-repeat;
 background-attachment: fixed;
 background-size: cover;

}
h1{
text-align: right;
margin-right: 39px;
}
h2{
text-align: right;
margin-right: 160px
```

```
        }
        </style>
        </head>
        <body>
        <right>
                <section class="header">
            <br>
             <br>
             <br>
             <br>
             <br>
             <br>
              <br>
             <br>
              <br>
             <br>


             <div class="text-box">

               <h1 style="color:Black;"><br>The Predicted Car Resale Value is </h1>
                        <h2 style="color:black;">₹3,50,000</h2>
             </div>
          </section>

        </right>
        </body>
        </html>
```

VALUE

```
<!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>
<style>
body {
 background-image: url('car10.png');
 background-repeat: no-repeat;
 background-attachment: fixed;
 background-size: cover;

}
h1{
```

```
text-align: right;
margin-right: 39px;
}
h2{
text-align: right;

margin-right: 160px
}
</style>
</head>
<body>
<right>
        <section class="header">
    <br>
     <br>
     <br>
     <br>
     <br>
     <br>
      <br>

<br>
     <br>
     <br>

     <div class="text-box">

      <h1 style="color:Black;"><br>The Predicted Car Resale Value is </h1>
            <h2 style="color:black;">₹3,50,000</h2>
     </div>
   </section>

</right>
</body>
</html>
```

13.2 GitHub &

Project   Demo

Link:

https://github.com/IBM-

EPBL/IBM-Project-

38558-1660382423

Demo link :

https://github.com/IBM-

EPBL/IBM-Project-

38558-

1660382423/blob/main/

Final%20Deliverables/de

movideo.mp4