CAR RESALE VALUE PREDICTION

A PROJECT REPORT

Submitted by

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1.INTRODUCTION

1.1 PROJECT OVERVIEW

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.

In order to predict the resale value of the car, we proposed an intelligent, flexible, and effective system that is based on using regression algorithms. Considering the main factors which would affect the resale value of a vehicle a regression model is to be built that would give the nearest resale value of the vehicle. We will be using various regression algorithms and algorithm with the best accuracy will be taken as a solution, then it will be integrated to the web-based application where the user is notified with the status of his product.

1.2 PURPOSE

The main idea of making a car resale value prediction system is to get hands-on practice for python using Data Science. Car resale value prediction is the system to predict the amount of resale value based on the

parameters provided by the user. User enters the details of the car into the form given and accordingly the car resale value is predicted.

2. LITERATURE SURVEY

2.1 EXISTING PROBLEM

Several regression techniques were used based on supervised machine learning to predict the resale price of used cars given many factors such as mileage, fuel type, fiscal power , mark , model, and the production year of the car. In all tested models, gradient boosting regressor showed a high R-squared score and low root mean square error. The results showed that gradient boosting regressor outperformed all tested models with a highest R2 score and a minimized root mean squared error. As a future work, it is intended to increase the performance of the model by scaling the training data and adding more other variables to the feature set.

In this research the price of the car is considered as dependent variable for target prediction .The data used for prediction was taken from web. The suitability of linear regression algorithm is identified and implemented in this research work for accurately predicting the resale value of the vehicle based on most significant attributes that are been selected on the basis of highest correlation.The Linear Regression model for prediction of resale value of the car is providing an accuracy of 90% and an error of 10%. Linear Regression model is better suited for prediction of target attribute that is mrp (car price). Further this work can be implemented using

different machine learning algorithms and approaches in order to get higher accuracy rate and lower error percentage.

The objective of this paper is to provide empirical answers to these questions. i) to which degree are resale prices predictable, ii) what is the relative accuracy of different prediction methods and are some methods particularly effective, iii) given that market research agencies have specialized in residual value estimation, is it sensible for car makers to invest into an in-house resale price forecasting system? The results suggest that the methods most widely used in resale price modeling are least effective. In particular, linear regression methods predict significantly less accurately than advanced methods such as RF and ES. Advanced methods are able to extract useful predictive information from PI and are robust toward high dimensionality.

The paper proposes a methodology to support pricing decisions in the car leasing industry. In particular, the price is given by the monthly fee to be paid by the lessee as compensation for using a car over some contract horizon. After contract expiration, lessors are obliged to take back the vehicle, which will then be sold in the used car market. Therefore, lessors require an accurate estimate of cars' residual values to manage the risk inherent to their business and determine profitable prices. This paper explores the organizational and technical requirements associated with this forecasting task and develop a prediction model that complies with identified application constraints. The model is rigorously tested within an empirical study and compared to established benchmarks. The results obtained in several experiments provide strong evidence for the proposed model being effective in generating accurate predictions of cars' residual values and efficient in requiring little user intervention.

The aim of this study is to assess whether it is possible to predict the price of second-hand cars using artificial neural networks. Thus, data for 200 cars from different sources was gathered and fed to four different machine learning algorithms. And it was found that support vector machine regression produced slightly better results than using a neural network or linear regression. However, some of the predicted values are quite far away from the actual prices, especially for higher priced cars. Thus, more investigations with a larger data set are required and more experimentation with different network type and structures is still required in order to obtain better predictions.

This research focuses on Building a mathematical model that could predict the price of a second-hand car based on its current features. Determining the price of a used automobile is a difficult task because several factors like Current Mileage, Current Condition, Make, Year, etc.,can influence the prediction prices of an automobile. And, from the perspective of a person who sells, it becomes a dilemma to predict the price of a second-hand car accurately. Thus, the point of interest of this challenge is in growing gadgets, studying models that can correctly expect the price of a used car primarily based on its capabilities. Due to this, in turn, a consumer can make a much more informed purchase. Therefore, implementing and examining various Machine Learning Techniques with Data Analysis will be useful to Provide an Accurate and Easy to use solution.

A primary objective of this project is to estimate used car prices by using attributes that are highly correlated with a label (Price). To accomplish this, data mining technology has been employed. Null, redundant, and missing values were removed from the dataset during pre-

processing. In this supervised learning study, three regressors (Random Forest Regressor, Linear Regression, and Bagging Regressor) have been trained, tested, and compared against a benchmark dataset. The researchers of this project anticipate that in the near future, the most sophisticated algorithm is used for making predictions, and then the model will be integrated into a mobile app or web page for the general public to use.

The recent advent of online portals has facilitated the need for both the customer and the seller to be better informed about the trends and patterns that determine the value of a used car in the market. Using Machine Learning Algorithms such as Lasso Regression, Multiple Regression and Regression trees, they try to develop a statistical model which will be able to predict the price of a used car, based on previous consumer data and a given set of features and also comparing the prediction accuracy of these models to determine the optimal one. To get even more accurate models, we can also choose more advanced machine learning algorithms such as random forests, an ensemble learning algorithm which creates multiple decision/regression trees, which brings down overfitting massively or Boosting, which tries to bias the overall model by weighing in the favor of good performers. More data from newer websites and different countries can also be scraped and this data can be used to retrain these models to check for reproducibility.

This model reduces time and cost and is also more user friendly as a result of which there is improvement in business by selling more cars. Here we are also conducting a comparative study on performance of regression based on supervised machine learning models. Each model is trained using data of used car market collected from e-commerce website.

As a result, Linear regression gives the best performance with Root mean square error (RMSE) =8902.410 . Followed by ridge, random forest regression algorithms respectively. We can also extend this project by considering more attributes like Resale history, Lic , Accidents history, image etc to the data set for getting clear and accurate analysis.

An early-stage concept for automated spare part valuation which classifies pricing data before applying appropriate valuation methods is presented and hereby combines methods from multiple disciplines. Information from heterogeneous sources is aggregated, transformed and then supports machine learning methods to automatically determine a Fair Market Value for surplus spare parts. The concept for automated spare part valuation is a promising alternative for value determination and pricing in secondary markets and thus may serve as a foundation for building a generic surplus part trading platform to overcome market transparency issues if the obstacles of validation are overcome. Handling incomplete historical data sets as well as validating the calculated Fair Market Value are some of the challenges which become visible.

2.2 REFERENCES

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Stefan Voß (corresponding author) Institute of Information Systems,University of Hamburg, Germany

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Santosh Kumar Satapathy,Rutvikraj Vala,Shiv Virpariya ICT, Pandit Deendayal Energy University, Gandhinagar, INDIA

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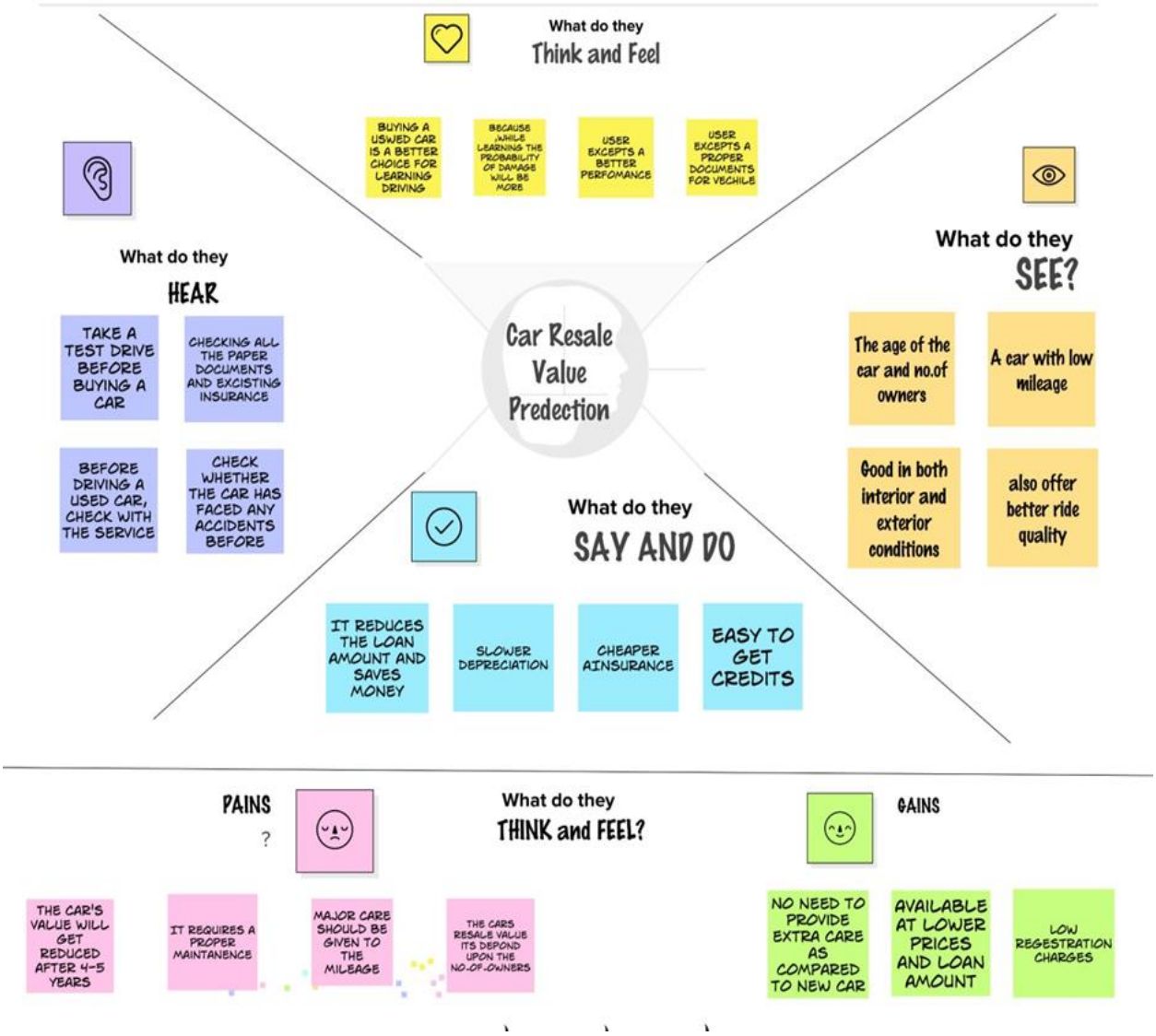
2.3 PROBLEM STATEMENT DEFINITION

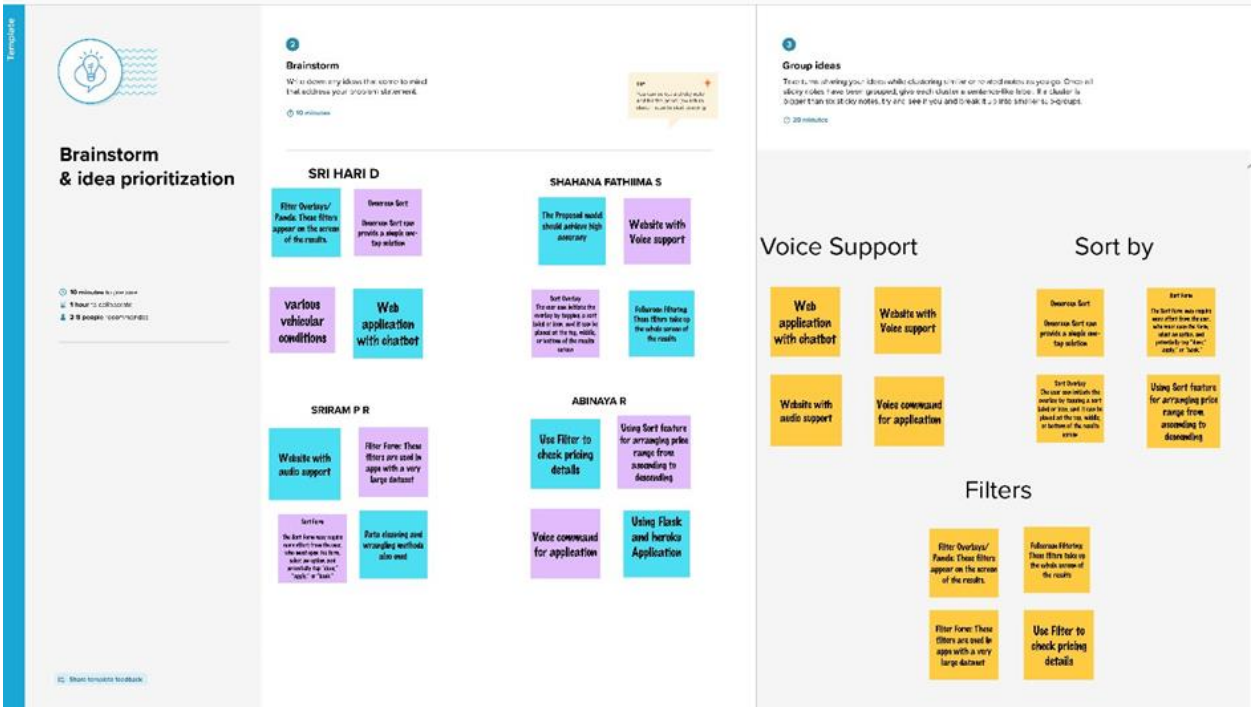
It is very difficult to remember all the models and variants of the car's price. So here we go with a web application where it helps the user to know the resale value of the used car. The user needs to provide the model, variant and some other factors of the vehicle to the application to calculate the value. The prediction is based upon the details provided by the user.

3.IDEATION AND PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS



3.2 IDEATION AND BRAINSTROMING

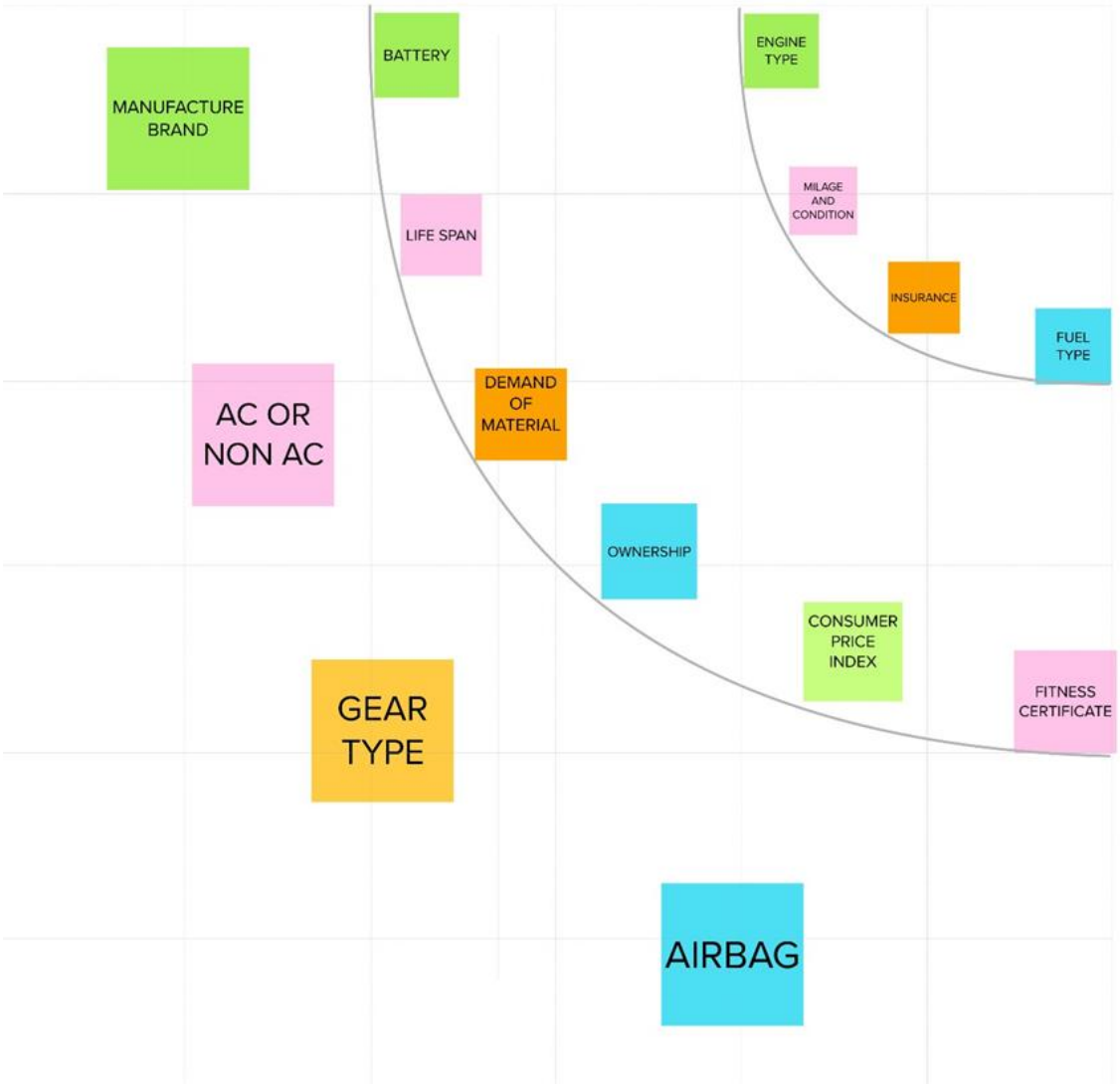


4

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

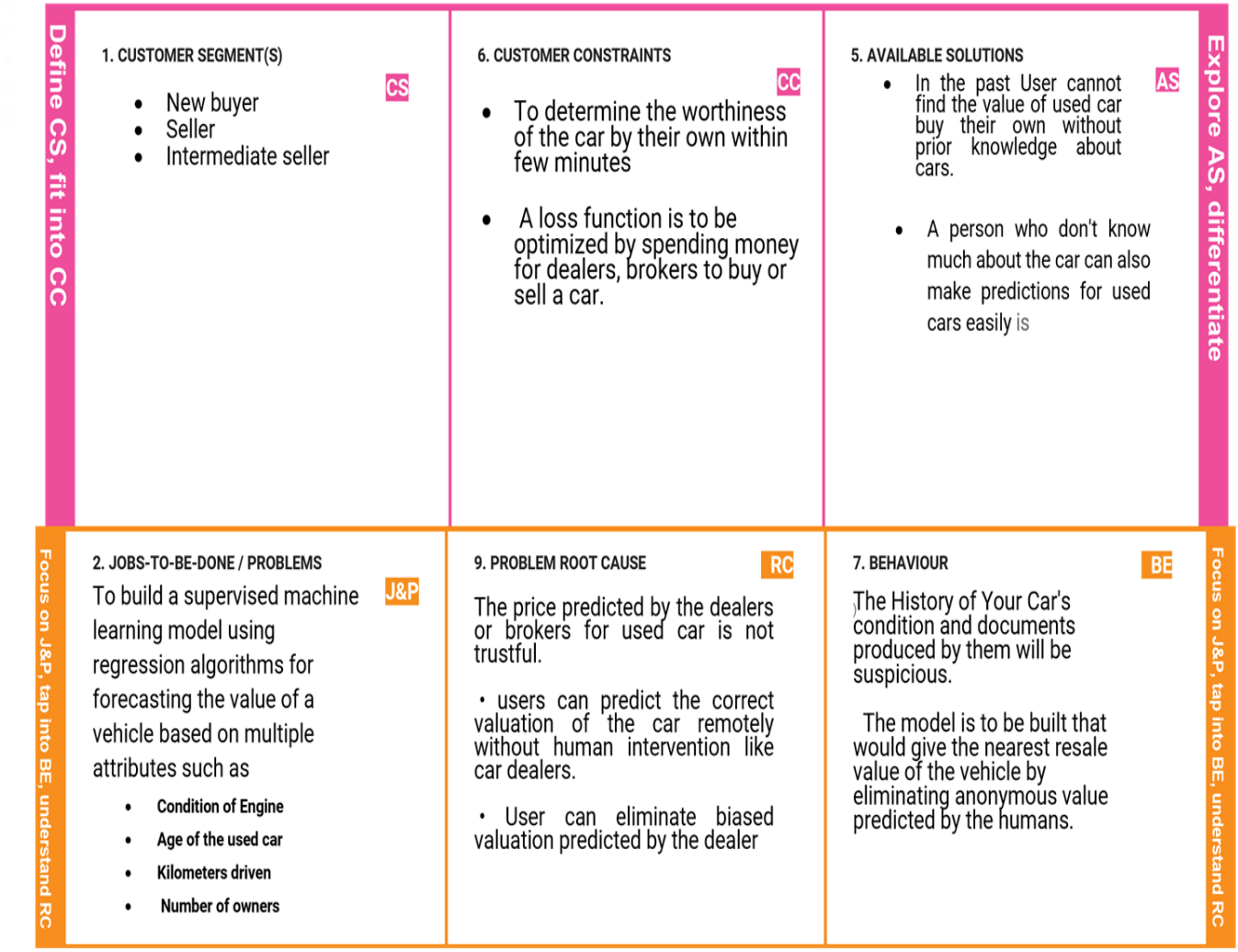


3.3 PROPOSED SOLUTION

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	The main aim of this project is to predict the price of used cars using the various Machine Learning (ML) models. The project should take parameters related to used car as inputs and enable the customers to make decisions by their own
2.	Idea / Solution description	The model is to be 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 webbased application where the user is notified with the status of his product
3.	Novelty / Uniqueness	Used car 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 users to predict the correct valuation by their own. A loss function is to be optimized and mainly a weak learner can make predictions of cars easily for use.
5.	Business Model (Revenue Model)	It helps users to predict the correct valuation of the car remotely with perfect valuation and without human intervention like car dealers 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 type of used cars present all over India

3.4 PROBLEM FIT SOLUTION



4.REQUIREMENT ANALYSIS

4.4 FUNCTIONAL REQUIREMENTS

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Mobile Registration through Gmail
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User login through (web)	Login with registered mail id and password
FR-4	User login through (mobile app)	Login with registered mail id and password
FR-5	User needs	In the app ,enter your car variant and color .

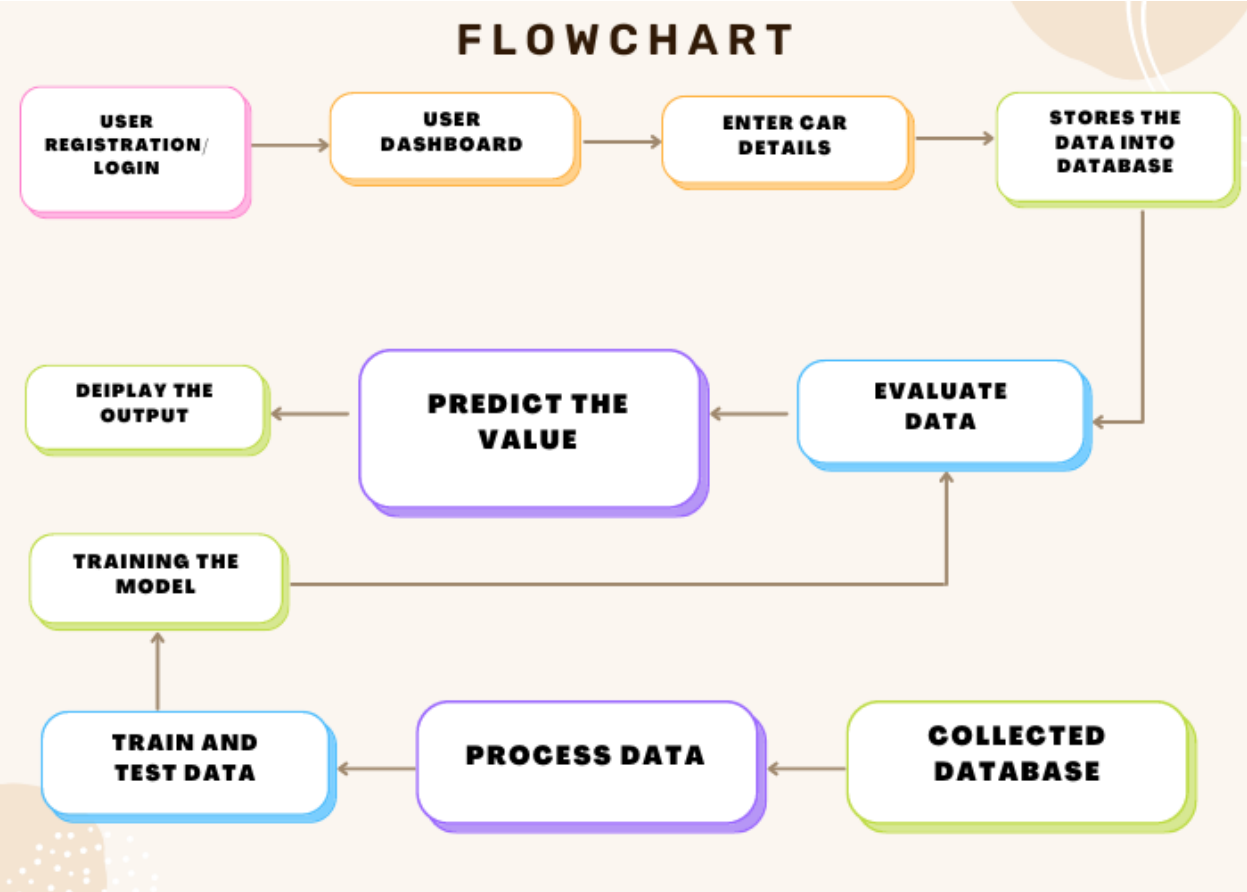
4.5 Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

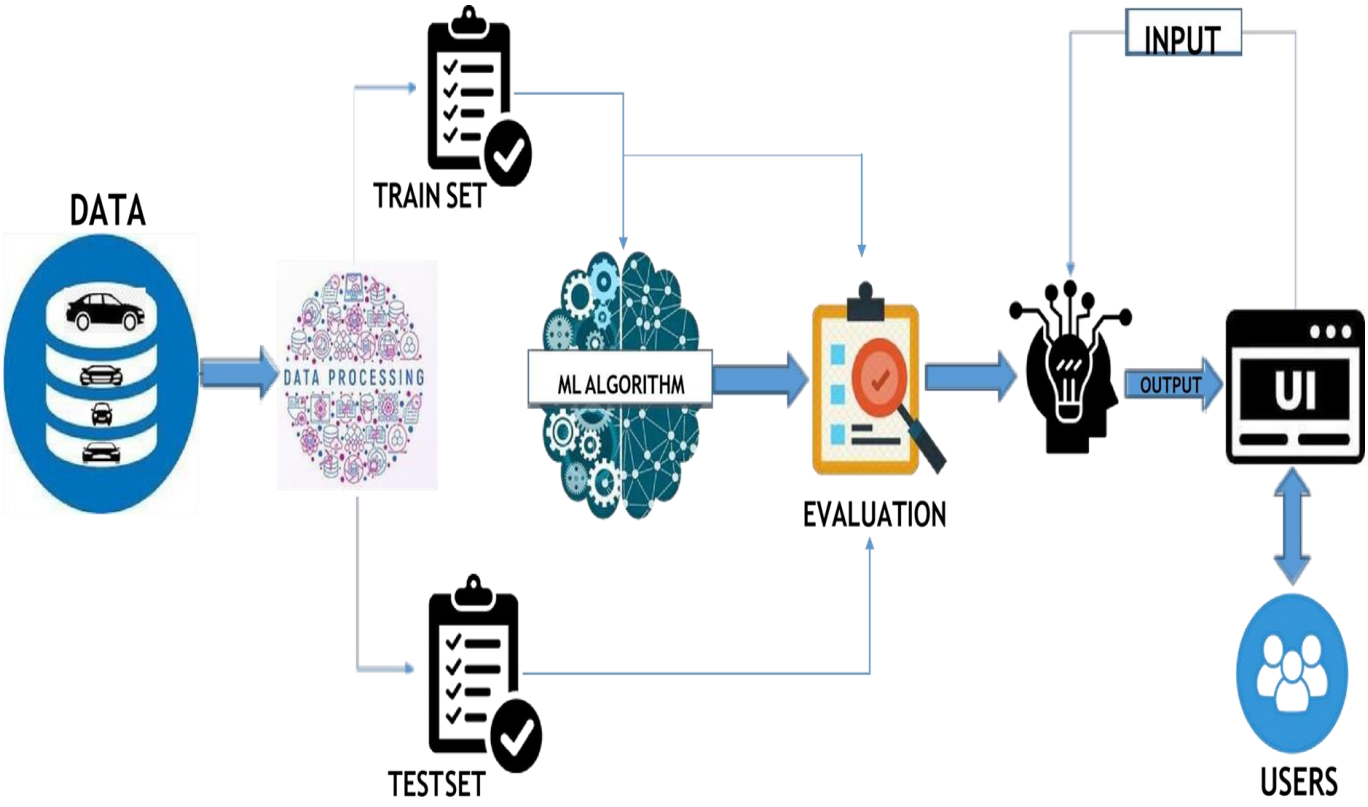
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	The system should be user friendly for the user It should recommended to predict the car value
NFR-2	Security	The login information should not be accessed by any other user than the respective. The user data should be kept confidential.
NFR-3	Reliability	User can able to guess the approximate value of the all model and variant
NFR-4	Performance	The vehicle value will get updated every year consecutively according to the market.
NFR-5	Availability	It can be used by any registered user from any place
NFR-6	Scalability	It is easily adaptable The device can handle any number of registration

5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS



5.2 SOLUTION AND TECHNICAL ARCHITECTURE



- Getting the information from the user through web application about the car model and other factors.
- After gathering the application from user, the web application starts analyzing the database.
- Atlas the web application predicts the value of the car Create and Configure IBM Cloud Services.
- Create a database in IBM Clouding DB for car and other factors.
- Create Node-Red service Develop an application.

- Develop an application in which the user can feed the data on the medicine name and time car.

5.3 USER STORIES

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Admin	Dataset	USN-1	Gather the information needed to make the car resale prediction.	enough data has been gathered to train the model.	High	Sri Hari D
	Data preprocessing	USN-2	Perform data cleaning to optimize the dataset	Clean Dataset enough to make correct predictions	High	Sri Hari D
	Training & Building Model	USN-3	Build the model using regression algorithmsto classify the data	Model should be used for Predicting perfect valuation of the car.	High	Sri Hari D
	Deploy the model	USN-4	Deployment of ML model using IBM Cloud	Model should be working fine from the cloud	High	Sriram P R
	Integrate the web app with the IBM model	USN-5	Use flask for the integration purpose.	The model ought to be simple to use and reliable on the web application.	High	Sriram P R

Customer	Homepage	USN-6	Information on the application and the process for selling used cars	We can get an idea about how to use these model.	Medium	Sriram P R
	Registration	USN-7	User can register the application by entering email, password, and confirming my password.	user can access my account /dashboard	High	Shahana Fathima S
		USN-8	user will receive confirmation email.jonce they have registered for the application	user can receive confirmationemail	High	Shahana Fathima S
	Login	USN-9	user can log into the application by entering email & password	user can login to my account	High	Shahana Fathima S
	Dashboard	USN-10	User can add new cars and get access to insert and update their details	user can add new cars	Medium	Abinaya R
	Car Details	USN-11	user should give the required car details like carmodel, kilometer driven,manufactured year, etc…	After filling the car's details and taking them for further processing.	High	Abinaya R
	Car Price	USN-12	The price of a used car can be displayed and seen by the user.	Car prices must be displayed depending on the data provided by the user.	High	Abinaya R

6. PROJECT PLANNING & SCHEDULING

6.1. Sprint Delivery Schedule

Sprint	Functional (Requirements)	User Story Number	User story/Task	Story points	Priority
Sprint 1	Home page	USN 1	As a user, I can view the home page of the web application.	20	Low
Sprint 2	Car resale value display	USN 2	As a user, I can be redirected to the data entry page.	20	medium
Sprint 3	Required data entry	USN 3	As a user, I can enter my car details in the required fields.	20	medium
Sprint 4	Resale vale prediction	USN 4	As a user, I expect the application to predict the	20	medium

			resale value of my car.		

6.3. Reports from JIRA

Sprint 1

[CR-1] As a user, I am unable to engage with anything Created: 24/Nov/22 **Updated:** 24/Nov/22 Resolved: 24/Nov/22	
Status:	**Done**
Project:	**Car-Resale Value Prediction**
Components:	**None**
Affects versions:	**None**
Fix versions:	**None**

Type:	**Task**	**Priority:**	**Medium**
Reporter:	**Sri Hari**	**Assignee:**	**sriramsanthosh36**
Resolution:	**Done**	**Votes:**	**0**
Labels:	**None**		
Remaining Estimate:	**Not Specified**		
Time Spent:	**Not Specified**		
Original estimate:	**Not Specified**		

Rank:	**0|i0000f:**
Sprint:	**CR Sprint 1**

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Sprint 2

[CR-3] As a user, I can predict the Car Resale Value using the best created ML models Created: 24/Nov/22 Updated: 24/Nov/22 Resolved: 24/Nov/22

Status:	**Done**
Project:	**Car-Resale Value Prediction**
Components:	**None**
Affects versions:	**None**
Fix versions:	**None**

Type:	**Task**	**Priority:**	**Medium**
Reporter:	**Sri Hari**	**Assignee:**	**Sri Hari**
Resolution:	**Done**	**Votes:**	**0**
Labels:	**None**		

Remaining Estimate:	**Not Specified**
Time Spent:	**Not Specified**
Original estimate:	**Not Specified**

Rank:	**0|i0000v:**
Sprint:	**CR Sprint 2**

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Sprint 3

[CR-5] As a user, I can predict the Car Resale Value using the best created ML models Created: 24/Nov/22 Updated: 24/Nov/22 Resolved: 24/Nov/22

Status:	**Done**
Project:	**Car-Resale Value Prediction**
Components:	**None**
Affects versions:	**None**
Fix versions:	**None**

Type:	**Task**	**Priority:**	**Medium**
Reporter:	**Sri Hari**	**Assignee:**	**Abinaya Rajendran**
Resolution:	**Done**	**Votes:**	**0**
Labels:	**None**		

Remaining Estimate:	**Not Specified**
Time Spent:	**Not Specified**
Original estimate:	**Not Specified**

Rank:	**0|i0001b:**
Sprint:	**CR Sprint 3**

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Sprint 4

[CR-6] As a user, I can use the model by requesting the deployed model on cloud Created: 24/Nov/22 Updated: 24/Nov/22 Resolved: 24/Nov/22	
Status:	**Done**
Project:	**Car-Resale Value Prediction**
Components:	**None**
Affects versions:	**None**
Fix versions:	**None**

Type:	**Task**	**Priority:**	**Medium**
Reporter:	**Sri Hari**	**Assignee:**	**SHAHANA FATHIMA S**
Resolution:	**Done**	**Votes:**	**0**
Labels:	**None**		
Remaining Estimate:	**Not Specified**		

Time Spent:	**Not Specified**
Original estimate:	**Not Specified**

Rank:	**0|i0001j:**
Sprint:	**CR Sprint 4**

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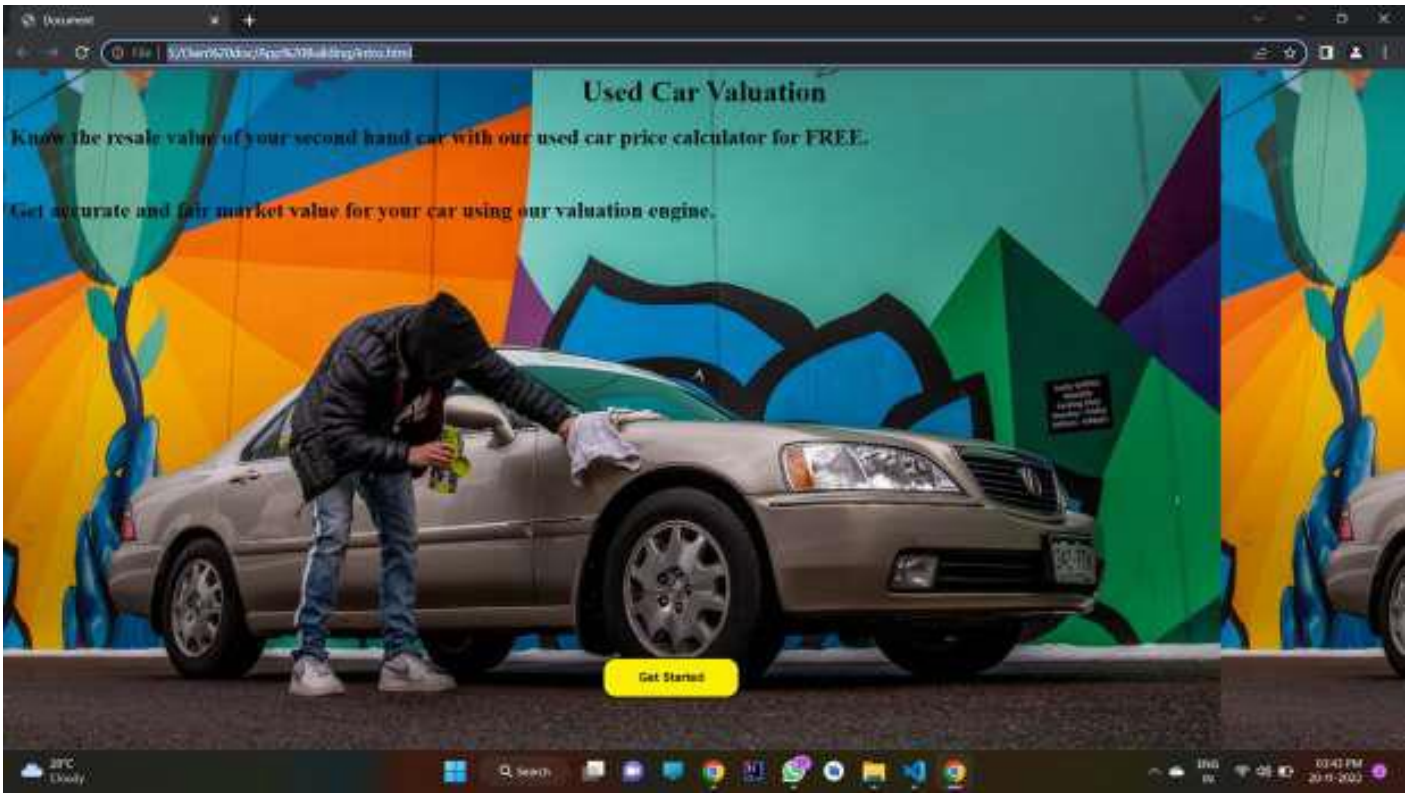
7. CODING & SOLUTIONING:

7.1 Feature 1

Index Page



7.2 Feature 2

Form Page

8.TESTING

8.1. Test Cases

A test case is a document which has a set of conditions or actions that are performed on the software application in order to verify the expected functionality of the feature. After test scripts, test cases are the second most detailed way of documenting testing work. They describe a specific idea that is to be tested, without detailing the exact steps to be taken or data to be used. For example, in a test case, you document something like ‘Test if coupons can be applied on actual price‘. This doesn’t mention how to apply the coupons or whether there are multiple ways to apply. It also doesn’t

mention if the tester uses a link to apply a discount, or enter a code, or have a customer service apply it. They give flexibility to the
tester to decide how they want to execute the test.

Benefits of Writing Test Cases

The key purpose of a test case is to ensure if different features within an application are working as expected. It helps tester, validate if the software is free of defects and if it is working as per the expectations of the end users. Other benefits of test cases include:

- Test cases ensure good test coverage
- Help improve the quality of software,
- Decreases the maintenance and software support costs
- Help verify that the software meets the end user requirements
- Allows the tester to think thoroughly and approach the tests from as many angles as possible
- Test cases are reusable for the future – anyone can reference them and execute the test.

So, these are a few reasons why test cases are extremely useful in software testing. Test cases are powerful artifacts that work as a good source of truth for how a system and a particular feature of software works. However, before we deep dive into the lessons for writing top notch test cases, let us have a basic idea on the terminologies associated with them.

Test Case Format

The primary ingredients of a test case are an ID, description, bunch of inputs, few actionable steps, as well as expected and actual results. Let's learn what each of them is:

Test Case Name:A test case should have a name or title that is selfexplanatory.

○**Test Case Description:**The description should tell the tester what they're going to test in brief.

○**Pre-Conditions:**Any assumptions that apply to the test and any preconditions

that must be met prior to the test being executed should be listed here.

○**Test Case Steps:**The test steps should include the necessary data and information on how to execute the test. The steps should be clear and brief, without leaving out essential facts.

○**Test Data:**It's important to select a data set that gives sufficient coverage. Select a data set that specifies not only the positive scenarios but negative ones

as well.

○**Expected Result:**The expected results tell the tester what they should experience as a result of the test steps.

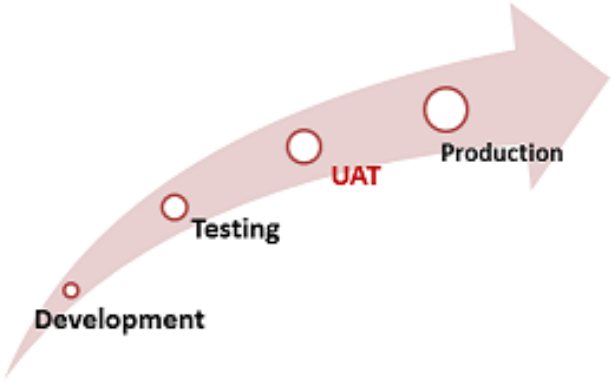
○**Actual Result:**They specifies how the application actually behaved while test

cases were being executed.

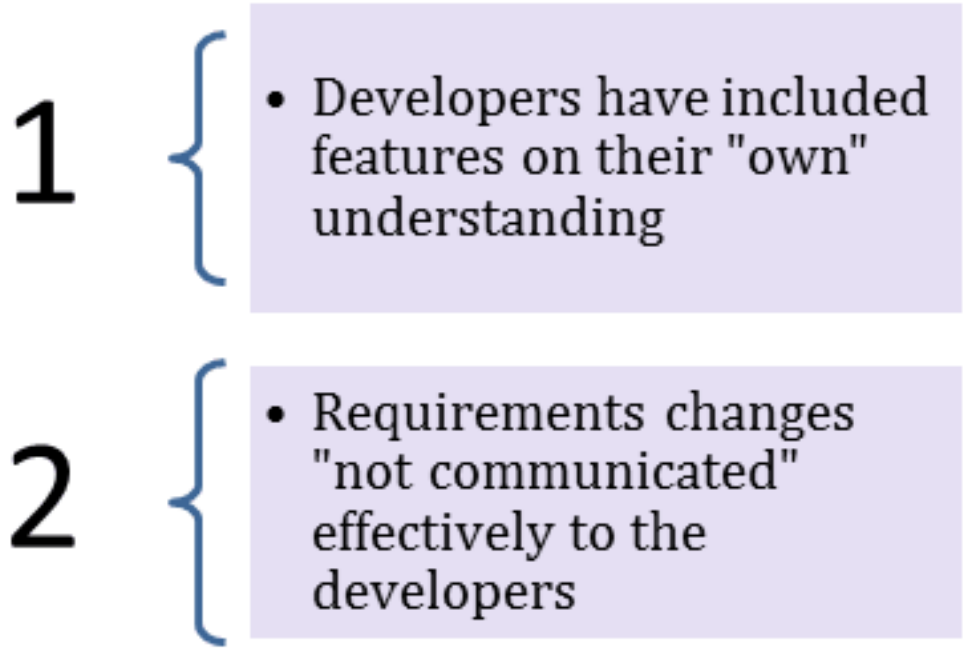
○**Comments:**Any other useful information such as screenshots that tester want's to specify can be included here.

8.2. User Acceptance Testing

User Acceptance Testing (UAT) is a type of testing performed by the end user or the client to verify/accept the software system before moving the software application to the production environment. UAT is done in the final phase of testing after functional, integration and system testing is done.



Purpose of UAT



The main Purpose of UAT is to validate end to end business flow. It does not focus on cosmetic errors, spelling mistakes or system testing. User Acceptance Testing is carried out in a separate testing environment with production-like data setup. It is kind of black box testing where two or more end-users will be involved.

- UAT is performed by Client and End Users

Test Case Analysis

This reports hows the number of test cases that have passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pass
Home Page	4	0	0	4
Car Resale Value Display	20	0	0	20
Required Data Entry	3	0	0	3
Resale Value Prediction	1	0	0	1

9. Result

9.1) Performance Metrics

- These metrics are used to track and measure the effectiveness and profitability of various projects.
- Each stage of the project is tracked and measured against the goals that the project set out to achieve.
- The data compiled from the metrics can be used to plan future projects and gives insight on how to
- make projects more efficient.

10) Advantages and Disadvantages

Advantages:

- The original owner of the car received the depreciation hit. The market value of the new car decreases from year to year. An average 30% of its value within three years from the time it was bought, so buying their car would save you a lot of money.
- Unlike purchasing a new vehicle with high insurance fees, you will receive a lower cost of insurance if you choose to buy second hand cars.
- Although buying new cars and used cars both provide loans, lease, or money-saving the majority of dealers who sell second hand cars often have shorter loan terms.
- If your investment is decided based on appearance and gas mileage, choosing a second hand car would guarantee the value and reliability it has provided over the years.

Disadvantages:

- Used car dealers provide a warranty, it is only limited to a couple of months unlike purchasing a new car with full warranty. Certain maintenance on your purchased used car could be more expensive.
- The main disadvantage of purchasing used cars is that it has an unknown quantity.
- Whether the dealer has worked the vehicle to make it attractive for the test drive, the buyers are still unaware of the repair bills, economical issues, and its reliable transportation.
- It is difficult to negotiate fair financing terms on an older vehicle.

11) Conclusion

The increased prices of new cars and the financial incapability of the customers to buy them, Used Car sales are on a global increase. Therefore, there is an urgent need for a Used Car Price Prediction system which effectively determines the worthiness of the car using a variety of features. The proposed system will help to determine the accurate price of used car price prediction. As future work, we intend to collect more data and to use more advanced techniques like artificial neural networks, fuzzy logic and genetic algorithms to predict car prices.

12) Future Scope

In future this machine learning model may bind with various website which can provide real time data for price prediction. Also we may add large historical data of car price which can help to improve accuracy of the

machine learning model. We can build an android app as user interface for interacting with user. For better performance, we plan to judiciously design deep learning network structures, use adaptive learning rates and train on clusters of data rather than the whole dataset.

13)Appendix

Source Code

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">
    <title>Document</title>
    <style>
        img {
                position:fixed;
           width: 100%;
           height: 100%;
       }

                .cont {
                position:relative;
       line-height:1.0;
```

```
        color: rgb(0, 0, 0);

}
                a {
                position:relative;
                margin-left: 700px;
                margin-top:443px;
                color:rgb(57, 211, 232);}

        .btm{

            margin-left: 60px;
                margin-top:443px;


}


        body {
            background-image: url('https://images.unsplash.com/photo-
1610411605947-0a96f654d829?ixlib=rb-
4.0.3&ixid=MnwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHx8
&auto=format&fit=crop&w=1334&q=80');

            /* text-align: center; */
```

```
            padding: 0px;
        }


    </style>
</head>
<body>


        <div class="cont">
    <h1><center>Used Car Valuation</center></h1>
    <h2>Know the resale value of your second hand car with our used car price calculator for FREE.</h2><br>
    <h2>Get accurate and fair market value for your car using our valuation engine.</h2><br>
        </div>
    <div class="btm">
    <center>
        <a href ="{{ 'hai' }}">
            <button>Get Started</button></a>
    </div></center>

</body>
</html>
```

HTML:

```
<!DOCTYPE html>
<html lang="en">

<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-
scale=1.0">
    <title>Document</title>
</head>

<body>

    <div style="color:whitesmoke">
        <form action="{{ url_for('predict')}}" method="post">
            <center><h1>Please fill the following details of your
car</h1></center>
            <div class="up">
```

```
            <h3>Brand</h3><br><select name="Brand" id="Brand"
required="required">
              <option value="Maruti Suzuki">Maruti Suzuki</option>
              <option value="Hyundai">Hyundai</option>
              <option value="Ford">Ford</option>
              <option value="Toyota">Toyota</option>
              <option value="Mahindra">Mahindra</option>
              <option value="Kia">Kia</option>
              <option value="Renault">Renault</option>
              <option value="Audi">Audi</option>
              <option value="Nissan">Nissan</option>
            </select>

          <h3>Model</h3><br><input id="last" name="Car_Name"
required="required">

          <h3>Year</h3>
          <input id="first" name="Year" type="number " >
             <h3>What is the Showroom Price?(In
lakhs)</h3><br><input id="second" name="Present_Price"
required="required">
          <h3>How Many Kilometers Drived?</h3><input id="third"
name="Kms_Driven" required="required">

          </div>
```

```
        <div class="bottom">
            <h3>How much owners previously <br>had the car(0 or 1 or
3) ?</h3><br><input id="fourth" name="Owner" required="required">
            <h3>What Is the Fuel type?</h3><br><select
name="Fuel_Type_Petrol" id="fuel" required="required">
                <option value="Petrol">Petrol</option>
                <option value="Diesel">Diesel</option>
                <option value="Diesel">CNG</option>
            </select>
            <h3>Are you A Dealer or Individual</h3><br><select
name="Seller_Type_Individual" id="resea" required="required">
                <option value="Dealer">Dealer</option>
                <option value="Individual">Individual</option>
            </select>
            <h3>Transmission type</h3><br><select
name="Transmission_Mannual" id="research" required="required">
                <option value="Mannual">Manual Car</option>
                <option value="Automatic">Automatic Car</option>
            </select>
        </div>

        <button id="sub" type="submit ">Calculate the Selling
Price</button>
```

```
        </form>



        <br><h3 style="text-align:center;">{{ prediction_text }}<h3>
    </div>



    <style>
        body {
            background-image:
url('https://images.pexels.com/photos/248747/pexels-photo-
248747.jpeg?auto=compress&cs=tinysrgb&w=1260&h=750&dpr=1');

            /* text-align: center; */
            padding: 0px;
        }

        h1 {
```

```
        font-family: 'Franklin Gothic Medium', 'Arial Narrow', Arial,
sans-serif;
        font-size: 47px;
    }

    h3 {
        font-family: 'Lucida Sans', 'Lucida Sans Regular', 'Lucida
Grande', 'Lucida Sans Unicode', Geneva, Verdana, sans-serif;
    }

    #research {
        font-size: 18px;
        width: 100px;
        height: 23px;
        top: 23px;
    }

    #box {
        border-radius: 60px;
        border-color: 45px;
        border-style: solid;
        font-family: cursive;
        text-align: center;
        background-color: rgb(255, 170, 0);
        font-size: medium;
```

```
    position: absolute;
    width: 700px;
    bottom: 9%;
    height: 850px;
    right: 30%;
    padding: 0px;
    margin: 0px;
    font-size: 14px;
}

#fuel {
    width: 83px;
    height: 43px;
    text-align: center;
    border-radius: 14px;

    font-size: 20px;
}

#fuel:hover {
    background-color: rgb(159, 22, 22);;
}
#Brand {
    width: 155px;
    height: 43px;
```

```
    text-align: center;
    border-radius: 14px;

    font-size: 20px;
}

#research {
    width: 99px;
    height: 43px;
    text-align: center;
    border-radius: 14px;
    font-size: 18px;
}

#research:hover {
    background-color: rgb(159, 22, 22);;
}

#resea {
    width: 99px;
    height: 43px;
    text-align: center;
    border-radius: 14px;
    font-size: 18px;
}
```

```
#resea:hover {
    background-color: rgb(159, 22, 22);
}

#sub {
    margin-left:46% ;
    margin-top: 32%;
    width: 120px;
    height: 43px;
    text-align: center;
    border-radius: 14px;
    font-size: 18px;
}

#sub:hover {
    background-color: darkcyan;
}

#first {
    border-radius: 14px;
    height: 25px;
    font-size: 20px;
    text-align: center;
    /* background-color: gray; */
```

```
}

#second {
    border-radius: 14px;
    height: 25px;
    font-size: 20px;
    text-align: center;
}

#third {
    border-radius: 14px;
    height: 25px;
    font-size: 20px;
    text-align: center;
}

#fourth {
    border-radius: 14px;
    height: 25px;
    font-size: 20px;
    text-align: center;
}

#last {
    border-radius: 14px;
```

```
            height: 25px;
            font-size: 20px;
            text-align: center;

        }
        .up{
            position:absolute;
        }
        .bottom{
            float: right;
            position: relative;
        }
    </style>
</body>

</html>
```

PYTHON FLASK:

```
from flask import Flask, render_template, request
import requests
import pickle
import numpy as np
import sklearn
from sklearn.preprocessing import StandardScaler
app = Flask(__name__)
```

```
model = pickle.load(open('random_forest_regression_model.pkl', 'rb'))
@app.route('/')
def index():
    return render_template('index1.html')

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

@app.route('/hello',methods=['GET'])
def Home():
    return render_template('index.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('index.html',prediction_texts="Sorry you cannot sell this car")
        else:
```

```
            return render_template('index.html',prediction_text="You Can
Sell The Car at {}".format(output))
    else:
        return render_template('index.html')

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

GitHub:

https://github.com/IBM-EPBL/IBM-Project-21497-1659781765

Project Demo Link:

https://youtu.be/6AmIQpkj9FE