

1.INTRODUCTION

1.1 Project overview

Determining whether the listed price of a used car is a challenging task, due to the many factors that drive a used vehicle's price on the market. The focus of this project is developing machine learning models that can accurately predict the price of a used car based on its features, in order to make informed purchases. We implement and evaluate various learning methods on a dataset consisting of the sale prices of different makes and models across cities in the United States. Our results show that Random Forest model and K-Means clustering with linear regression yield the best results, but are compute heavy. Conventional linear regression also yielded satisfactory results, with the advantage of a significantly lower training time in comparison to the aforementioned methods.

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. It helps users to sell the car remotely with perfect valuation and without human intervention in the process to eliminate biased valuation.

2.LITERATURE SURVEY

2.1 Existing problem

The prices of new cars in the industry is fixed by the manufacturer with some additional costs incurred by the Government in the form of taxes. So, customers buying a new car can be assured of the money they invest to be worthy. But due to the increased price of new cars and the incapability of customers to buy new cars due to the lack of funds, used cars sales are on a global increase. There is a need for a used car price prediction system to effectively determine the worthiness of the car using a variety of features. Even though there are websites that offers this service, their prediction method may not be the best. Besides, different models and systems may contribute on predicting power for a used car's actual market value. It is important to know their actual market value while both buying and selling.

2.2 References

- [1] Kanwal Noor, 2017, Vehicle Price Prediction System using Machine Learning Techniques International Journal of Computer Applications. Volume 167 - Number 9
- [2] Mariana Lusitania et al, (2009). Support vector regression analysis for price prediction in a vehicle leasing application
- [3] Richardson, M. S. (2009). Determinants of used vehicle resale value.
- [4] Listiani, M. (2009). Support vector regression analysis for price prediction in a car leasing application (Doctoral dissertation, Master thesis, TU Hamburg-Harburg).
- [6] Wu, J. D., Hsu, C. C., & Chen, H. C. (2009). An expert system of price forecasting for used cars using adaptive neuro-fuzzy inference. *Expert Systems with Applications*, 36(4), 7809-7817
- [7] Gongqi, S., [5] Richardson, M. S. (2009). Determinants of used car resale value. Retrieved from: <https://digitalcc.coloradocollege.edu/islandora/object/> Yansong, W., & Qiang, Z. (2011, January). New Model for Residual Value Prediction of the Used Car Based on BP Neural Network an Nonlinear Curve Fit. In *Measuring Technology and Mechatronics Automation (ICMTMA)*, 2011 Third International Conference on (Vol. 2, pp. 682.
- [8]. Pudaruth, S. (2014). Predicting the price of used cars using machine learning techniques. *Int. J. Inf. Comput. Technol*, 4(7), 753-764.
- [9]. Noor, K., & Jan, S. (2017). Vehicle Price Prediction System using Machine Learning

2.3 Problem Statement Definition

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. • Ananth is an Auto Sales Representative who needs a way to accurately predict the value of used car because he needs to satisfies his customer.

Sujith needs a way to predict the value of used car by taking its model name and seller type because he doesn't want old model cars provided that seller type is inguinal. • Sruthi needs a way to predict the value of used car because it's difficult to anticipate the selling price of a used car.

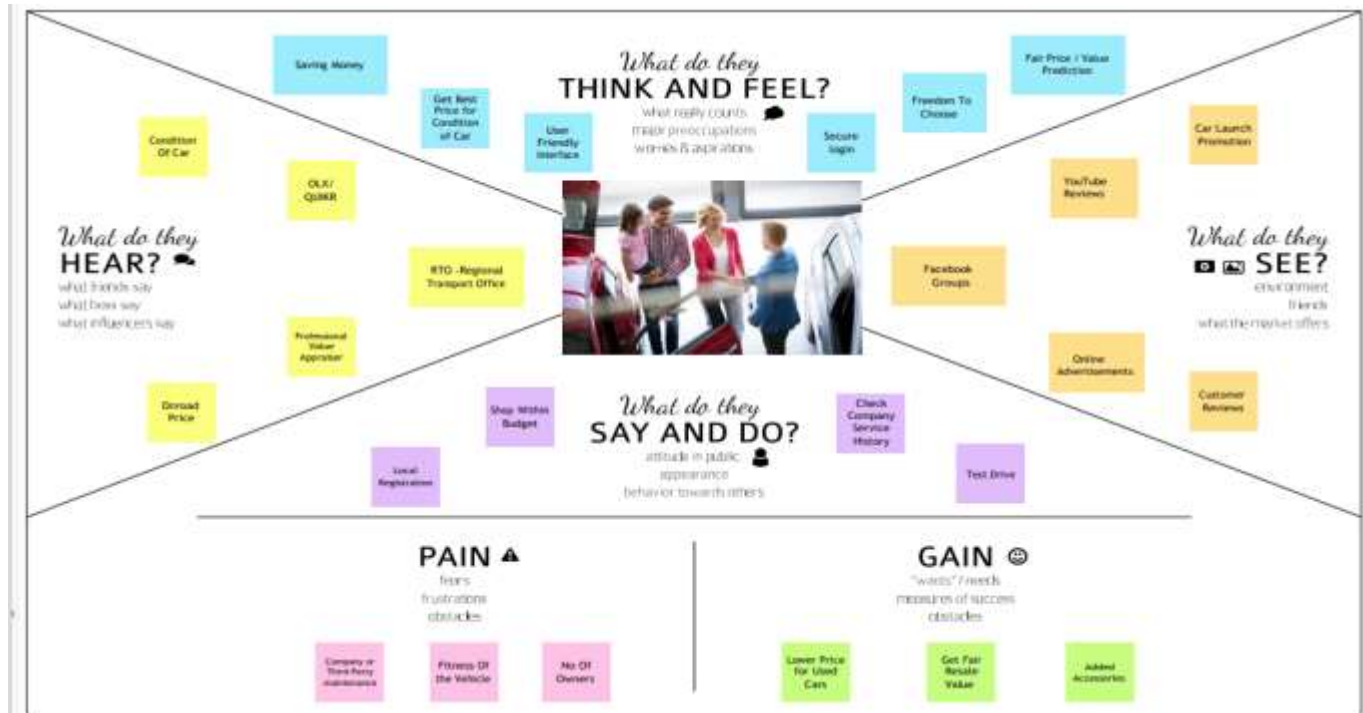
User is an explorer who needs a way to predict the value of used car based on mileage driven and transmission types because he wants to be low level petrol in runmore kilometers and automatic types.

- User is an owner who needs a way to predict the accurate value of used car because he wants to know the actual worth of their car and to sell it

3.IDEATION & PROPOSED SOLUTION

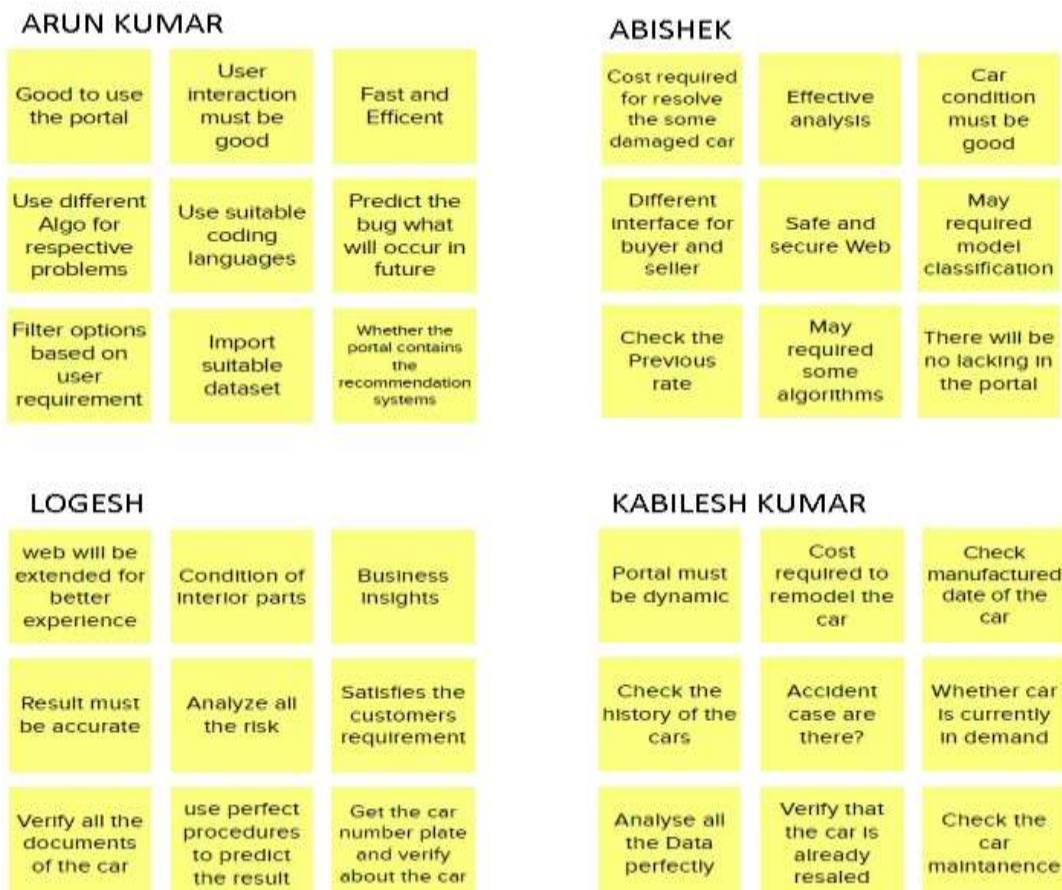
3.1 Empathy Map Canvas:

An empathy map is a collaborative tool teams can use to gain a deeper insight into their customers. Much like a user persona, an empathy map can represent a group of users, such as a customer segment. The empathy map was originally created by Dave Gray and has gained much popularity within the agile community.



3.2 Ideation & Brainstorming

A mind map is a tool for the brain that captures the thinking that goes on inside your head. Mind mapping helps you think, collect knowledge, remember and create ideas. Most likely it will make you a better thinker.



3.3 PROPOSED SOLUTION

S.no.	Parameter	Description
1.	Problem Statement (Problem to be solved)	To predict the resale value for Cars and provide the Customer with accurate and satisfactory results regarding the same.
2.	Idea / Solution description	To develop a Machine Learning Algorithm which predicts the resale value by using Python.
3.	Novelty / Uniqueness	The resale value of the Car can be predicted with a much higher and apt accuracy as the Customer expects.
4.	Social Impact / Customer Satisfaction	Customer Satisfaction plays a vital role in our project. If the customer is satisfied, then automatically the project will become popular & useful, thus leading to a great Social Impact.
5.	Business Model (Revenue Model)	A Revenue Model is a blueprint which shows how much revenue or gross income that will be earned through the sales and how those costs will be able to cover the operating costs and expenses.
6.	Scalability of the Solution	The Software is being deployed in Cloud, so it can be accessed by anyone who owns it from anywhere. It can even be accessed through mobile phones by customers. This project will provide the most accurate results by using algorithms related to the Customer and their preferences.

3.4 PROBLEM SOLUTION FIT

Problem – Solution Fit Template:

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem. It helps entrepreneurs, marketers and corporate innovators identify behavioral patterns and recognize what would work and why

Purpose:

- Solve complex problems in a way that fits the state of your customers.
- Succeed faster and increase your solution adoption by tapping into existing mediums and channels of behaviour.
- Sharpen your communication and marketing strategy with the right triggers and messaging.
- Increase touch-points with your company by finding the right problem-behaviour fit and building trust by solving frequent annoyances, or urgent or costly problems.
- Understand the existing situation in order to improve it for your target group.

Project Title: Car Resale value Prediction		Project Design Phase-I - Solution Fit Template		Team ID: PNT2022TMO21127	
Define CS, R into CC	1. CUSTOMER SEGMENT(S) CS People looking for budget friendly cars, Second-hand car buyers.	5. CUSTOMER CONSTRAINTS CC Not affordable. Tough finding a well-maintained car, Whether the price of purchasing is worth it or not.	9. AVAILABLE SOLUTIONS AS Through searching the Internet. Through asking relatives and friends.	Explore AS, differentiate	
	2. JOBS-TO-BE-DONE / PROBLEMS JD Provide Customers with the necessary details regarding the car. Ensure that the Customer does not have any trust issues.	6. PROBLEM ROOT CAUSE PC Not aware of the right pricing of cars. Lack of trust.	7. BEHAVIOUR BE Customer does more detailed research. Analyses the worth of the car through multiple sources.		
Focus on Job To Be Done, BE, Behaviour fit	3. TRIGGERS TR People they know buying their own cars. Advertisements everywhere.	10. YOUR SOLUTION YS Customer can be provided with all of the essential details needed in order to make an informed and well thought decision before the purchase of the car.	8. CHANNELS of BEHAVIOUR CH <u>ONLINE:</u> Searching through websites and social media. <u>OFFLINE:</u> Checking out the car model in-person and getting all of their doubts cleared.	Focus on Job To Be Done, BE, Behaviour fit	
	4. EMOTIONS: BEFORE / AFTER EM Before – Nervous, Tense, Doubt. After – Happiness, Relief, Pride.				
Identify strong TR & EM				Identify strong TR & EM	

4. REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS –

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration directly on website Registration through Gmail Registration through Google
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Dashboard	User details Used and new cars details Buy and sell cars Latest updates in automobile industry Customer reviews
FR-4	Car Registration	The user can add the details like vehicle price, model name and number, vehicle model, vehicle brand and mileage
FR-5	Value Prediction	Predicting the car resale value
FR-6	Car Ordering	The user can order the cars by past and top predictions as well as reseller's history and background mentioned

4.2 NON-FUNCTIONAL REQUIREMENTS –

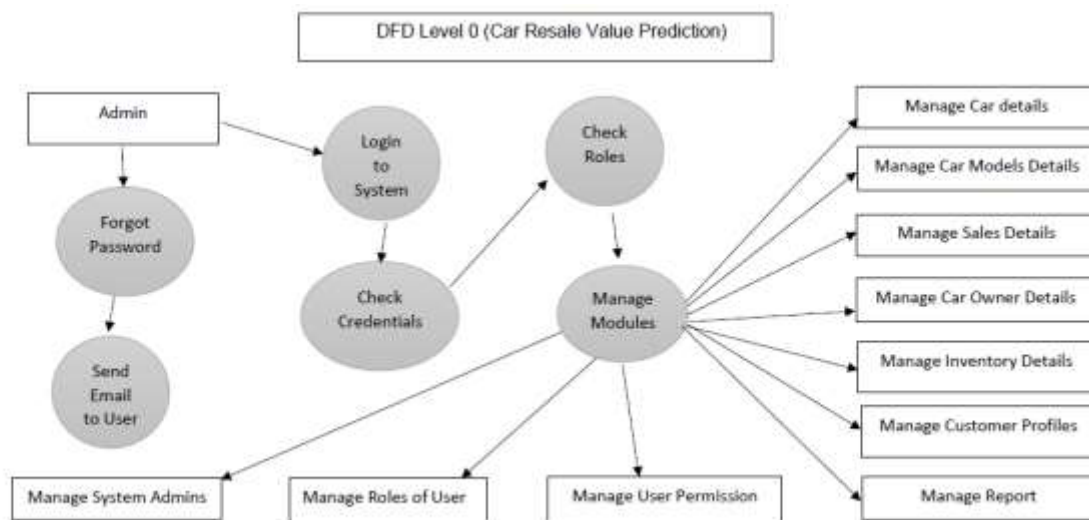
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Smart and user-friendly interface with proper design that can be provide a better experience for the user.
NFR-2	Security	Make sure that the all user information should be safe and protected.
NFR-3	Reliability	Provides high reliability by predicting values for cars. The ML model, which is responsible for prediction, should be accurate enough to predict prices and the error rate should be as low as possible.

NFR-4	Performance	Provides high performance by using some machine learning algorithms.
NFR-5	Availability	The website should be available to users 24x7. Any issues or errors will be addressed within the next 24 hours.
NFR-6	Scalability	Providing high scalability in predicting values for the cars.

5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.



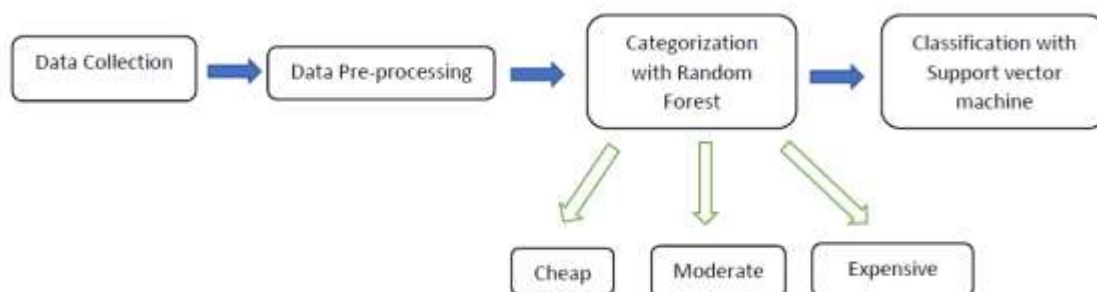
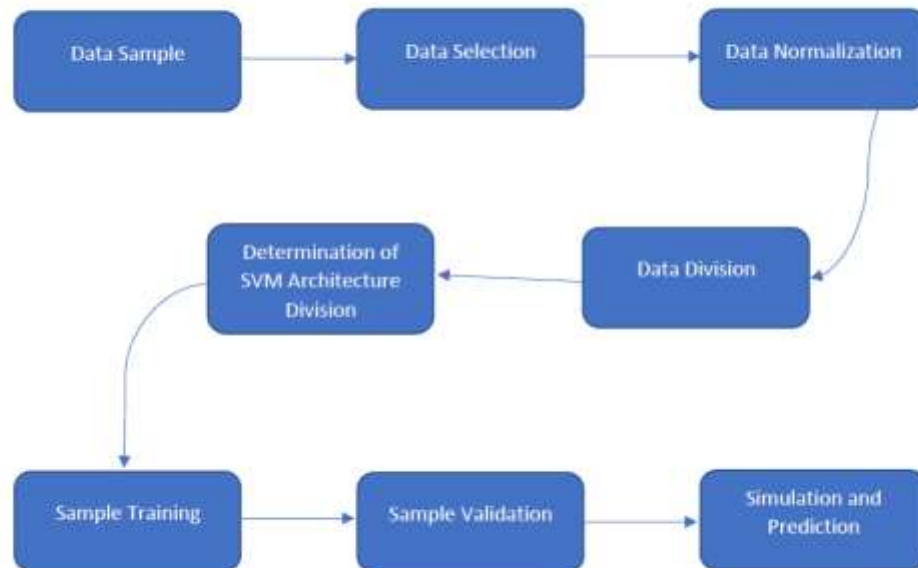
5.2 SOLUTION & TECHNICAL ARCHITECTURE

SOLUTION ARCHITECTURE

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behaviour, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.

Solution Architecture Diagram:



TECHNICAL ARCHITECTURE

Technical Architecture (TA) is a form of IT architecture that is used to design computer systems. It involves the development of a technical blueprint with regard to the arrangement, interaction, and interdependence of all elements so that system-relevant requirements are met.

Technical Architecture:

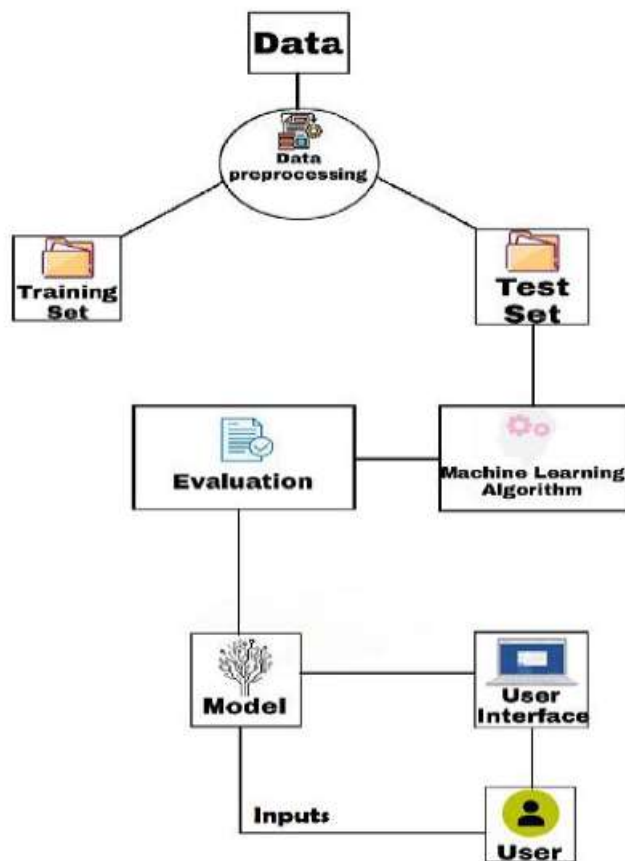


Table-1 : Components & Technologies:

S.no	Component	Description	Technology
1.	User Interface	User interacts with the application using Web UI	HTML, CSS, JavaScript
2.	Application Logic-1	The user create login id and password	Python
3.	Application Logic-2	The user add the car's details in the application	Python
4.	Application Logic-3	The user can place their orders by best predicted values	Python
5.	Database	Stores the user's id and vehicles information in database	MySQL / SQL Server
6.	Cloud Database	The dataset stored in IBM cloud	IBM cloud
7.	File Storage	Stores the users and vehicles details	Local Storage System
8.	Machine Learning Model	The different types of ML models are used for the application. Like, KNN, Random Forest Regression	Regression Algorithm
9.	Infrastructure (Server / Cloud)	Application Deployment : Local System / Cloud Local Server Configuration : User's local data stored in local network Cloud Server Configuration : Car details, prediction process and car value are in cloud	Local

Table-2: Application Characteristics:

S.no	Characteristics	Description	Technology
1.	Open-Source Frameworks	It is a code, that is designed to be accessible publicly	HTML, CSS, Python Flask
2.	Security Implementations	Protection for authentication process and securing data in cloud	Encryptions
3.	Scalable Architecture	It is the property of a model to handle a raising amount of work by adding resources to the model. It consists of 3 tiers	Web Server - HTML, CSS, Java Script Database Server - IBM Cloud Application Server - Python Flask
4.	Availability	It is for use of distributed servers and load balancers	IBM cloud
5.	Performance	It defines the function of application and how responsive to the user	IBM Cloud environment

5.3 USER STORIES

In software development and product management, a user story is an informal, natural language description of one or more features of a software system. A user story is a tool used in Agile software development to capture a description of a software feature from an end-user perspective. A user story describes the type of user, what they want and why. A user story helps to create a simplified description of a requirement.

User stories are often recorded on index cards, on Post-it notes, or in project management software. Depending on the project, user stories may be written by various stakeholders such as clients, users, managers or development team members.

User Stories: Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the car resale value prediction application by entering my email id, password and confirming my password	I can access my account and dashboard	High	Sprint-1
		USN-2	I will receive confirmation email once I have registered for the application	I can receive confirmation email and click confirm to verify my account	High	Sprint-1
		USN-3	I can register for the application through Google, LinkedIn	I can register and access the dashboard with Google and LinkedIn login	Medium	Sprint-2
	Login	USN-4	As a User, I can login to the application by entering the email id and password	I can login using email and password	High	Sprint-1
	Dashboard	USN-5	I can access the dashboard after login and view the details about different models of used and used cars	I can access the dashboard and predicted values of used cars	Low	Sprint-2
Customer (Web user)	Registration	USN-6	As a user, I can register for the car resale value prediction web application by entering my email id, password and confirming my password	I can access my account and dashboard	High	Sprint-1
		USN-7	As a user, I will receive confirmation email once I have registered for the web application	I can receive confirmation email and click confirm to verify my account	High	Sprint-1
		USN-8	As a user, I can register for the web application through Google, LinkedIn	I can register and access the dashboard with Google and LinkedIn login	Medium	Sprint-2
	Login	USN-9	As a user, I can login to the web application by entering the email id and password	I can login using email and password	High	Sprint-3
	Dashboard	USN-10	As a user, I can access the dashboard after login and view the details about different models of used and used cars	I can access the dashboard and predicted values of used cars	Low	Sprint-4
Customer Care Executive	Customer Support	USN-11	As a user, I can contact the customer care and raise a query to them	I can contact the customer care and chat with them	High	Sprint-3
Administrator	Data Maintenance	USN-12	As a user, my data is maintained by the admin	Admin can access and maintains the customers data	High	Sprint-4

6. PROJECT PLANNING & SCHEDULING

6.1 SPRINT PLANNING & ESTIMATION

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Pre-process the data	USN-1	Collect Dataset	1	Low	Vallarasu R
Sprint-1		USN-2	Import required libraries	1	Low	Vallarasu R
Sprint-1		USN-3	Read and Clean dataset	3	Medium	Vallarasu R
Sprint-1	Model Building	USN-1	Split data into independent and dependent variables	3	Medium	Narendran G
Sprint-2		USN-2	Apply using regression model	3	Medium	Nikhil Madhav M
Sprint-2	Application Building	USN-1	Build Python Flask Application and HTML page	3	Medium	Narendran G
Sprint-2		USN-2	Execute and test	3	Medium	Narendran G
Sprint-2	Train the Model	USN-1	Train machine learning model	3	Medium	Sudharsan K
Sprint-3		USN-2	Integrate flask	3	Medium	Sudharsan K
Sprint-3	Registration	USN-1	User can register for the car resale value prediction application by entering my email id, password and confirming my password.	5	High	Nikhil Madhav M
Sprint-3		USN-2	User will receive confirmation email once I have	5	High	Sudharsan K

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
			registered for the application			
Sprint-3		USN-3	User can register for the application through google	1	Low	Sudharsan K
Sprint-4		USN-4	User can register for the application through Gmail	3	Medium	Narendran G
Sprint-4	Login	USN-5	User can log into the application by entering email & password	5	High	Nikhil Madhav M
Sprint-4	Dashboard	USN-6	User can access the dashboard after login and view the details about different models of used and used cars	5	High	Vallarasu R

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)
Sprint-1	8	2 Days	01 Nov 2022	02 Nov 2022	8	02 Nov 2022
Sprint-2	12	4 Days	03 Nov 2022	06 Nov 2022	10	07 Nov 2022
Sprint-3	14	5 Days	07 Nov 2022	11 Nov 2022	11	11 Nov 2022
Sprint-4	13	7 Days	12 Nov 2022	18 Nov 2022	3	18 Nov 2022

7. CODING & SOLUTIONING

7.1 Splitting the dataset

In this activity, the dependent and independent variables are to be identified. The first column (Result) in the cleaned dataset is the dependent variable which is dependent on the remaining different factors. The independent columns are considered as x and the dependent column as y.

```
Y = labeled.iloc[:,0].values
X = labeled.iloc[:,1:].values
Y=Y.reshape(-1,1)
from sklearn.model_selection import cross_val_score, train_test_split
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.3, random_state=3)
```

7.2 Choose the Appropriate model

We will be initially considering the Random Forest Regressor model and fit the data.

```
from sklearn.ensemble import RandomForestRegressor
from sklearn.metrics import r2_score
```

```
regressor = RandomForestRegressor(n_estimators = 1000,max_depth=10,random_state=34)
regressor.fit(X_train,np.ravel(Y_train,order='C'))
```

7.3 Integrate the Flask with Scoring End Point

```
import pandas as pd
import numpy as np
from flask import Flask, render_template, Response, request
import pickle
from sklearn.preprocessing import LabelEncoder
app = Flask(__name__)
filename = 'resale_model.sav'
model_rand = pickle.load(open(filename, 'rb'))
@app.route('/')
def index():
    return render_template('home.html')
@app.route('/getQuote')
def getQuote():
    brands = np.load('./Data/classesbrand.npy', allow_pickle=True)
    model = np.load('./Data/classesmodel.npy', allow_pickle=True)
    return render_template('UserForm.html', brands=brands, models=model)
@app.route('/y_predict', methods=['GET', 'POST'])
def y_predict():
    regyear1 = request.form['regyear']
```

```

regyear = regyear1[0:4]
powerps = request.form.get('powerps')
kms = request.form.get('kms')
regmonth = regyear1[5:]
gearbox = request.form.get('gearbox')
damage = request.form.get('damage')
model = request.form.get('model')
brand = request.form.get('brand')
fuelType = request.form.get('fuel')
vehicleType = request.form.get('vehicle')

print(regyear)

new_row = {'yearOfRegistration': regyear, 'powerPS': powerps, 'kilometer': kms, 'monthOfRegistration':
regmonth, 'gearbox': gearbox, 'notRepairedDamage': damage, 'model': model, 'brand': brand, 'fuelType':
fuelType, 'vehicleType': vehicleType}

print(new_row)

new_df = pd.DataFrame(columns=['vehicleType', 'yearOfRegistration', 'gearbox', 'powerPS', 'model',
'kilometer', 'monthOfRegistration', 'fuelType', 'brand', 'notRepairedDamage'])

new_df = new_df.append(new_row, ignore_index=True)

labels = ['gearbox', 'notRepairedDamage', 'model', 'brand', 'fuelType', 'vehicleType']
mapper = {}

print(new_df)

for i in labels:
    mapper[i] = LabelEncoder()
    mapper[i].classes_ = np.load(str('./Data/classes' + i + '.npy'), allow_pickle=True)
    tr = mapper[i].fit_transform(new_df[i])
    new_df.loc[:, i + '_labels'] = pd.Series(tr, index=new_df.index)

labeled = new_df[['yearOfRegistration', 'powerPS', 'kilometer', 'monthOfRegistration'] + [x + "_labels" for
x in labels]]

X = labeled.values

print(new_df)

print(X)

y_prediction = model_rand.predict(X)

print(y_prediction)

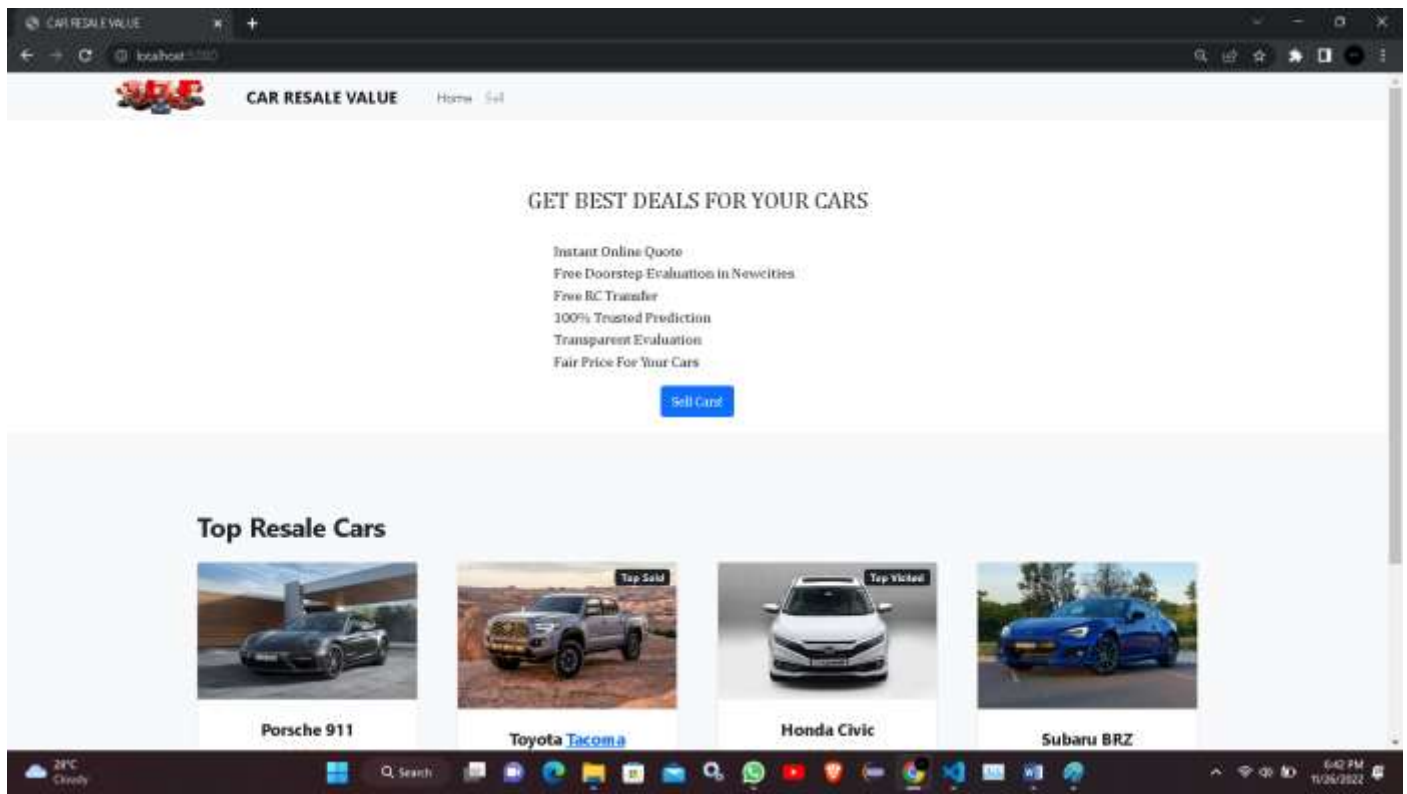
return render_template('price.html', y_pred="The Resale Value is {:.2f}$".format(y_prediction[0]),
brand=brand, model=model)

if __name__ == '__main__':
    app.run(host='localhost', debug=True, threaded=False)

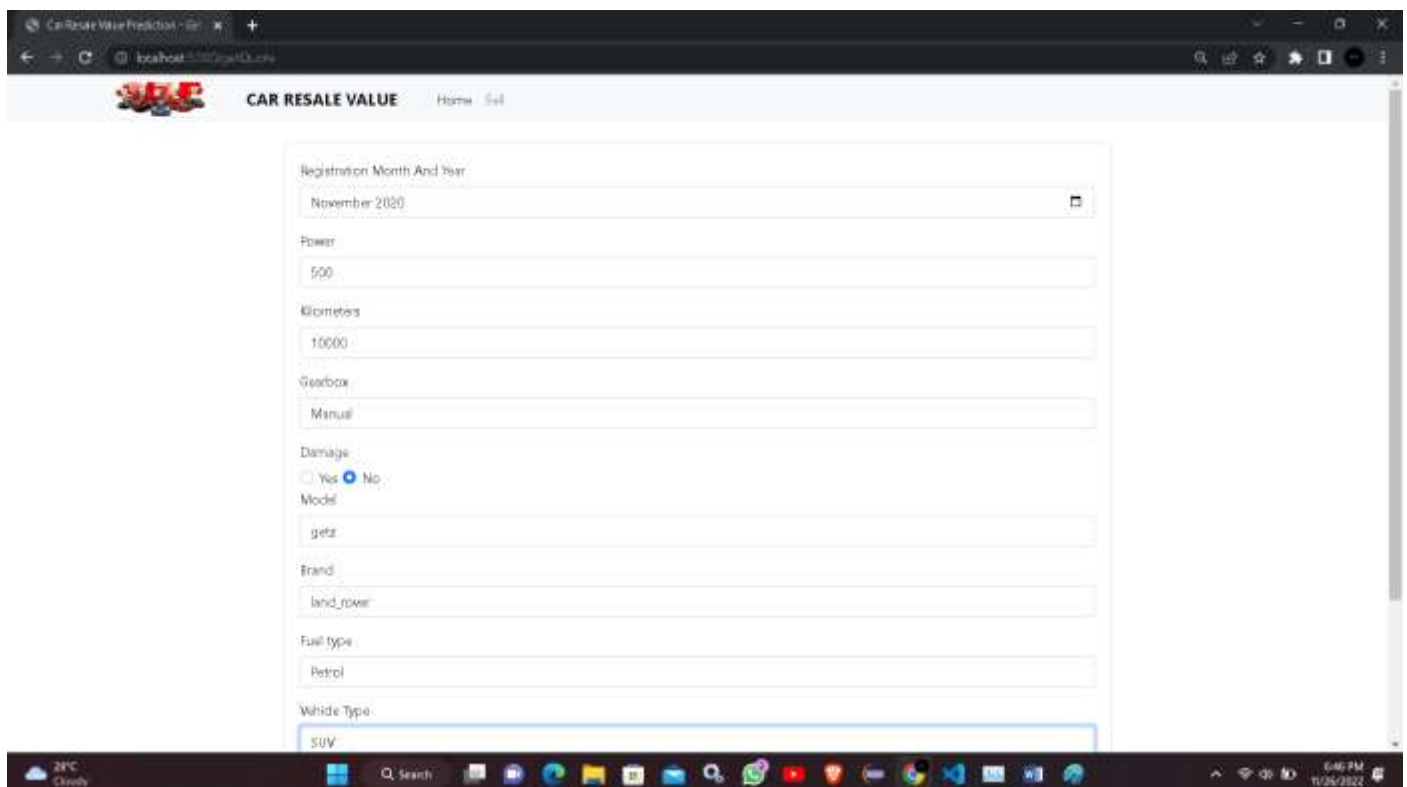
```


8. TESTING:

Front Page of the Website




Entering the Details of the Car



Predicting the Value of the Car

Car Resale Value Prediction - Get

localhost:5000/predict



CAR RESALE VALUE


Home Sell

Your land_rover.getz Worth is listed below

Resale Value

Brand	Model
land_rover	getz

The Resale Value is 90271.45\$



Copyright © Your Website 2022

28°C
Cloudy



6:46 PM
10/06/2022



9. RESULTS

9.1 PERFORMANCE METRIC

Here we will be evaluating the model built. We will be using the test set for evaluation. The test set is given to the model for prediction and prediction values are stored in another variable called `y_pred`. The `r2` score of the model is calculated and its performance is estimated.

```
y_pred = regressor.predict(X_test)
print(r2_score(Y_test,y_pred))
```

Different regression models can be used to know the performance and choose whichever works better.

10. ADVANTAGES & DISADVANTAGES

ADVANTAGES –

- Good at learning complex & non-linear relationships.
- Highly explainable & easy to interpret.
- Robust to outliers.
- No feature scaling is required.

DISADVANTAGES

- Consumes more time.
- Requires high computational power.

11. CONCLUSION

We started with understanding the use case of machine learning in the Automotive industry & how machine learning has transformed the driving experience. Moving on, we looked at how the various factors that the resale value of a car takes into consideration and performed a Explanatory Data Analysis (EDA). We believe that through the project of the Car Resale Value Prediction, it would be beneficial to many and help in the overall use and finding out the accurate pricing of the car that the customer is planning to buy to be to be found correctly.

12. FUTURE WORK

Only after getting proper feedback from the customers will we be able to make a proper development and update in the project, but we do have a few ideas like –

- Making the app area-friendly
- Help in making the customer meet the previous owner more efficiently
- Help customer select the type of car they want
- Help customer choose the brand they want

These are some of the few ideas we have in mind and will also put some new ideas after customer feedback.

13. APPENDIX

HTML FILES:

Index..html

```
<!DOCTYPE html>

<html lang="en">

  <head>

    <link rel="stylesheet" type="text/css" href="{ {url_for('static', filename='cssstyle.css')}} ">

    <meta charset="utf-8" />

    <meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no" />

    <meta name="description" content="" />

    <meta name="author" content="" />

    <title>CAR RESALE VALUE</title>

    <link rel="icon" type="image/x-icon" href="assets/favicon.ico" />

    <link href="https://cdn.jsdelivr.net/npm/bootstrap-icons@1.5.0/font/bootstrap-icons.css" rel="stylesheet"
  />

  </head>

  <body>

    { % include 'navbar.html' % }

    <div>

      { % block intro % }

      { % endblock % }

    </div>

    { % block related % }

    { % endblock % }

    <footer class="py-5 bg-dark">

      <div class="container"><p class="m-0 text-center text-white">Copyright &copy; Your Website
2022</p></div>

    </footer>

    <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.1.3/dist/js/bootstrap.bundle.min.js"></script>

    <script src="js/scripts.js"></script>
```

</body>

</html>

Home.html

{ % extends 'index.html' % }

{ % block intro % }

<section id="banner">

<div class="flexBox" id="banner-container">

<div class="row" id="banner-row">

<div class="col-md-6" id="banner-col">

<h3> GET BEST DEALS FOR YOUR CARS </h3>

<ul class="fa-ul" style="list-style-type:none;font-size: large;">

<i class="fa fa-check-square-o" aria-hidden="true"></i>Instant Online Quote

<i class="fa fa-check-square-o" aria-hidden="true"></i>Free Doorstep Evaluation in Newcities

<i class="fa fa-check-square-o" aria-hidden="true"></i>Free RC Transfer

<i class="fa fa-check-square-o" aria-hidden="true"></i>100% Trusted Prediction

<i class="fa fa-check-square-o" aria-hidden="true"></i>Transparent Evaluation

<i class="fa fa-check-square-o" aria-hidden="true"></i>Fair Price For Your Cars

<div class="d-grid gap-2 d-md-flex justify-content-center">

Sell Cars!

</div>

</div>

</div>

</div>

</section>

{ % endblock% }

{ % block related % }

<section class="py-5 bg-light">

<div class="container px-4 px-lg-5 mt-5">

<h2 class="fw-bolder mb-4">Top Resale Cars</h2>

<div class="row gx-4 gx-lg-5 row-cols-2 row-cols-md-3 row-cols-xl-4 justify-content-center">

<div class="col mb-5">

<div class="card h-100">

<!-- Product image-->

<!-- Product details-->

<div class="card-body p-4">

<div class="text-center">

<!-- Product name-->

<h5 class="fw-bolder">Porsche 911</h5>

<div class="d-flex justify-content-center small text-warning mb-2">

<div class="bi-star-fill"></div>

<div class="bi-star-fill"></div>

<div class="bi-star-fill"></div>

<div class="bi-star-fill"></div>

<div class="bi-star-fill"></div>

</div>

<!-- Product price-->

14.6%

</div>

</div>

<!-- Product actions-->

</div>

</div>

<div class="col mb-5">

<div class="card h-100">

<!-- Sale badge-->

Top Sold

<!-- Product image-->

![...](https://media.ed.edmunds-media.com/toyota/tacoma/2020/oem/2020_toyota_tacoma_crew-cab-pickup_trd-off-road_fq_oem_1_1600.jpg)

<!-- Product details-->

<!-- Product name-->

#####

<!-- Product reviews-->

</div>

<!-- Product price-->

14.9%

</div>

</div>

</div>

<!-- Product actions-->

</div>

</div>

<!-- Sale badge-->

Top Visited

<!-- Product image-->

![...](https://imgd-ct.aeplcdn.com/1056x660/n/cw/ec/27074/civic-exterior-front-view.jpeg?q=75)

<!-- Product details-->

```
<div class="card-body p-4">
```

```
<div class="text-center">
```

```
<!-- Product name-->
```

```
<h5 class="fw-bolder">Honda Civic</h5>
```

```
<div class="d-flex justify-content-center small text-warning mb-2">
```

```
<div class="bi-star-fill"></div>
```

```
<div class="bi-star-fill"></div>
```

```
<div class="bi-star-fill"></div>
```

```
<div class="bi-star-fill"></div>
```

```
</div>
```

```
<!-- Product price-->
```

```
<div>16.3%</div>
```

```
</div>
```

```
</div>
```

```
<!-- Product actions-->
```

```
</div>
```

```
</div>
```

```
<div class="col mb-5">
```

```
<div class="card h-100">
```

```
<!-- Product image-->
```

```

```

```
<!-- Product details-->
```

```
<div class="card-body p-4">
```

```
<div class="text-center">
```

```
<!-- Product name-->
```

```
<h5 class="fw-bolder">Subaru BRZ</h5>
```

```
<!-- Product reviews-->
```

```
<div class="d-flex justify-content-center small text-warning mb-2">
```

```
<div class="bi-star-fill"></div>
```

```
<div class="bi-star-fill"></div>
```

```
</div>
```

```
<!-- Product price-->
```

```
18.2%
```

```

</div>

</div>

<!-- Product actions-->

</div>

</div>

</div>

</div>

</section>

{% endblock%}

Navbar.html

<html lang="en">

<head>

<link rel="stylesheet" type="text/css" href="{{ url_for('static', filename='cssstyle.css')}} ">

<meta charset="utf-8" />

<meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no" />

<meta name="description" content="" />

<meta name="author" content="" />

<title>CAR RESALE VALUE</title>

<link rel="icon" type="image/x-icon" href="assets/favicon.ico" />

<link href="https://cdn.jsdelivrivr.net/npm/bootstrap-icons@1.5.0/font/bootstrap-icons.css" rel="stylesheet" />

</head>

<body>

<nav class="navbar navbar-expand-lg navbar-light bg-light">

<div class="container px-4 px-lg-5">

</img>

<a class="navbar-brand" href="/"><b>CAR RESALE VALUE</b></a>

<button class="navbar-toggler" type="button" data-bs-toggle="collapse" data-bs-target="#navbarSupportedContent" aria-controls="navbarSupportedContent" aria-expanded="false" aria-label="Toggle navigation"><span class="navbar-toggler-icon"></span></button>

<div class="collapse navbar-collapse" id="navbarSupportedContent">

<ul class="navbar-nav me-auto mb-2 mb-lg-0 ms-lg-4">

<li class="nav-item"><a class="nav-link active" aria-current="page" href="/">Home</a></li>

<li class="nav-item"><a class="nav-link" href="/getQuote">Sell</a></li>

</ul>

</div>

```

```
        </div>

    </nav>

    <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.1.3/dist/js/bootstrap.bundle.min.js"></script>

    <script src="js/scripts.js"></script>

</body>

</html>
```

VehicleDetails.html

```
<!DOCTYPE html>

<html lang="en">

<head>

    <link rel="stylesheet" type="text/css" href="{ { url_for('static', filename='cssstyle.css') } } ">

    <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="https://cdn.jsdelivr.net/npm/bootstrap@4.0.0/dist/css/bootstrap.min.css"
integrity="sha384-
Gn5384xqQ1aoWXA+058RXPxPg6fy4IWvTNh0E263XmFcJlSAwiGgFAW/dAiS6JXm"
crossorigin="anonymous">

    <title>Car Resale Value Prediction - Get Quote</title>

    <script src="https://code.jquery.com/jquery-3.2.1.slim.min.js" integrity="sha384-
KJ3o2DKtIkVYIK3UENzmM7KCkRr/rE9/Qpg6aAZGJwFDMVNA/GpGFF93hXpG5KkN"
crossorigin="anonymous"></script>

    <script src="https://cdn.jsdelivr.net/npm/popper.js@1.12.9/dist/umd/popper.min.js" integrity="sha384-
ApNbgh9B+Y1QKtv3Rn7W3mgPxhU9K/ScQsAP7hUibX39j7fakFPskvXusvfa0b4Q"
crossorigin="anonymous"></script>

    <script src="https://cdn.jsdelivr.net/npm/bootstrap@4.0.0/dist/js/bootstrap.min.js" integrity="sha384-
JZR6Spejh4U02d8jOt6vLEHfe/JQGiRRSQQxSfFWpi1MquVdAyjUar5+76PVCmYl"
crossorigin="anonymous"></script>

    <script src="/js/getQuote.js"></script>

    <script src="http://underscorejs.org/underscore-min.js"></script>

    <style>

        .form-check-input{

            display: inline;

        }

    </style>

</head>

<body>

    {% include 'navbar.html' % }
```

```

<br>

{ % block form % }

{ % endblock % }

<br>

<footer class="py-5 bg-dark">

    <div class="container"><p class="m-0 text-center text-white">Copyright &copy; Your Website
2022</p></div>

</footer>

</body>

</html>

```

UserForm.html

```

{ % extends 'VehicleDetails.html' % }

{ % block form % }

<div class="card" style="width: 60%; margin:auto;padding:20px;">

    <form action="http://localhost:5000/y_predict" method="post">

        <div class="form-group">

            <label for="exampleFormControlSelect1">Registration Month And Year</label>

            <input class="form-control" type="month" min="1950" max="2022" value="2020-11" step="1"
name="regyear" required>

        </div>

        <div class="form-group">

            <label for="exampleFormControlInput1">Power</label>

            <input type="number" min="50" max="1000" step="0.1" class="form-control" id=""
placeholder="Enter" name="powerps" required>

        </div>

        <div class="form-group">

            <label for="exampleFormControlInput1">Kilometers</label>

            <input type="number" step="0.1" class="form-control" id="" placeholder="Kilometers" name="kms"
required>

        </div>

        <div class="form-group">

            <label for="exampleFormControlSelect1">Gearbox</label>

            <select class="form-control" id="" name="gearbox" required>

                <option value="automatic">Automatic</option>

```

```

    <option value="manual">Manual</option>
</select>
</div>
<div class="damage-radio" >
    <label for="">Damage</label>
<div class="form-check">
    <input class="form-check-input" type="radio" name="damage" id="">
    <label class="form-check-label" for="flexRadioDefault1" style="margin-right: 25px;">
        Yes
    </label>

    <input class="form-check-input" type="radio" name="damage" id="" checked>
    <label class="form-check-label" for="flexRadioDefault2">
        No
    </label>
</div>
</div>
<div class="form-group">
    <label for="exampleFormControlInput1">Model</label>
    <select class="form-control" id="" name="model" required>
        <option value="">Select Your Model</option>
        {% for x in models -%}
            <option value="{{ x }}">{{ x }}</option>
        {% endfor %}
    </select>
</div>
<div class="form-group">
    <label for="exampleFormControlSelect1">Brand</label>
    <select class="form-control" id="" name="brand" required>
        <option value="">Select Your Brand</option>
        {% for x in brands -%}
            <option value="{{ x }}">{{ x }}</option>
        {% endfor %}
    </select>
</div>

```

```
<div class="form-group">
  <label for="exampleFormControlSelect1">Fuel type</label>
  <select class="form-control" id="" name="fuel" required>
    <option value="petrol">Petrol</option>
    <option value="diesel">Diesel</option>
    <option value="electric">Electric</option>
    <option value="cng">CNG</option>
    <option value="lpg">LPG</option>
    <option value="hybrid">Hybrid</option>
    <option value="others">Others</option>

  </select>
</div>
```

```
<div class="form-group">
  <label for="exampleFormControlSelect1">Vehicle Type</label>
  <select class="form-control" id="" name="vehicle" required>
    <option value="bus">Bus</option>
    <option value="combination">Combination</option>
    <option value="convertible">Convertible</option>
    <option value="coupe">Coupe</option>
    <option value="small car">Small car</option>
    <option value="suv">SUV</option>
    <option value="limousine">Limousine</option>
    <option value="others">Others</option>

  </select>
</div>
```

```
<button type="submit" class="btn btn-primary">Submit</button>
```

```
</form>
```

```
</div>
```

```
{ % endblock % }
```

Price.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="https://cdn.jsdelivr.net/npm/bootstrap@4.0.0/dist/css/bootstrap.min.css"
integrity="sha384-
Gn5384xqQ1aoWXA+058RXPxPg6fy4IWvTNh0E263XmFcJlSAwiGgFAW/dAiS6JXm"
crossorigin="anonymous">

<title>Car Resale Value Prediction - Get Quote</title>

<script src="https://code.jquery.com/jquery-3.2.1.slim.min.js" integrity="sha384-
KJ3o2DKtIkVYIK3UENzmM7KCKr/rE9/Qpg6aAZGJwFDMVNA/GpGFF93hXpG5KkN"
crossorigin="anonymous"></script>

<script src="https://cdn.jsdelivr.net/npm/popper.js@1.12.9/dist/umd/popper.min.js" integrity="sha384-
ApNbgh9B+Y1QKtv3Rn7W3mgPxhU9K/ScQsAP7hUibX39j7fakFPskvXusvfa0b4Q"
crossorigin="anonymous"></script>

<script src="https://cdn.jsdelivr.net/npm/bootstrap@4.0.0/dist/js/bootstrap.min.js" integrity="sha384-
JZR6Spejh4U02d8jOt6vLEHfe/JQGiRRSQQxSfFWpi1MquVdAyjUar5+76PVCmYl"
crossorigin="anonymous"></script>

<script src="./js/getQuote.js"></script>

<script src="http://underscorejs.org/underscore-min.js"></script>

<style>

.form-check-input{
    display: inline;
}

</style>
</head>

{% include 'navbar.html' %}

<body>

<br>

<div class="alert alert-success" style="text-align:center" role="alert">

    Your <b><u>{{ brand }} {{ model }}</u></b> Worth is listed below

</div>

<br>

<center>

<div class="card" style="width:22rem;">

    <div class="card-body">

        <div class="card-title" style="background-color:rgba(0,0,0,0.7);color:white;font-weight:bold;font-
size:20px">Resale Value</div>

        <table class="table table-striped">

            <tr>
```



```
<th>Brand</th>
<th>Model</th>
</tr>
<tr>
  <td>{{ brand }}</td>
  <td>{{ model }}</td>
</tr>
<tr>
  <th colspan="2">{{ y_pred }}</th>
</tr>
</table>

</div>
</div>
</center>
<footer class="py-5 bg-dark" style="margin-top: 100px;">
  <div class="container"><p class="m-0 text-center text-white">Copyright &copy; Your Website
  2022</p></div>
</footer>
</body>
</html>
```