

CAR RESALE VALUE PREDICITON

A PROJECT REPORT

Submitted by

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MELVISHARAM, ARCOT - 632503

TABLE OF CONTENT

CHAPTER NO	TITLE	PAGE NO
1	INTRODUCTION	2
	1.1 PROJECT OVERVIEW	2
	1.2 PURPOSE	2
2	LITERATURE SURVEY	3
	2.1 EXISTING PROBLEM	4
	2.2 REFERENCES	5
	2.3 PROBLEM STATEMENT DEFINTION	5
3	IDEATION & PROPRSED SOLUTION	6
	3.1 EMPATHY MAP CANVAS	6
	3.2 IDEATION & BRAINSTROMING	7
	3.3 PROPOSED SOLUTION	8
	3.4 PROBLEM SOLUTION FIT	9
4	PROJECT DESIGN	10
	4.1 DATA FLOW DIAGRAMS	10
	4.2 SOLUTION & TECHNICAL ARCHITECTURE	11

5	PROJECT PLANNING & SCHEDULING	12
	5.1 SPRINT PLANNING & ESTIMATION	12
	5.2 SPRINT DELIVERY SCHEDULE	12
	5.3 REPORTS FROM JIRA	12
6	CODING & SOLUTIONING	13
	6.1 CREATE AND CONFIGURE IBM CLOUD SERVICES	14
	6.2 CREATE THE WEBPAGE FOR CAR VALUE PREDICTION	15
7	TESTING	20
	7.1 User Acceptance Testing	20
8	RESULTS	21
	8.1 Performance Metrics	22
9	ADVANTAGES & DISADVANTAGES	25
10	CONCLUSION	28
11	FUTURE SCOPE	30

CHAPTER 1

INTRODUCTION

The introduction about the car resale value prediction and notifying using applied data science are briefly discussed in this chapter

1.1 PROJECT OVERVIEW

Vehicle price prediction especially when the vehicle is used and not coming direct from the factory, is both a critical and important task. With increase in demand for used cars more and more vehicle buyers are finding alternatives of buying new cars. There is a need of accurate price prediction mechanism for the used cars. Prediction techniques of machine learning can be helpful in this regard. It is common to lease a car in many countries rather than buying a new car. The prices of new car 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 car and the incapability of customers to buy new car due to the lack of funds, used car 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 offer 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.

1.2 PURPOSE

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.

This resale value prediction system is made for general purpose **to just predict the amount that can be roughly acquired by the user**. We try to predict the amount of resale by best 70% accuracy so the user can get estimated value before he resales the car and doesn't make a deal in loss.

CHAPTER 2

LITERATURE SURVEY

The introduction about the literature survey gone through for the project are briefly discussed in this chapter.

2.1 EXISTING PROBLEM

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.

2.2 REFERENCES

1.Used Car Price Prediction

Authors: Praful Rane, Deep Pandya, Dhawal Kotak.

Published in: 2021

The system which is been proposed helps in determining the accurate price of used cars.It combines three different Machine Learning algorithms,whic h are Lasso regression, Linea r regression and Ridge regression.

Drawbacks

For better performance deep learning network structures must be designed. Rather than training on whole dataset, clusters of data can be used for training. Also large historical data can be used for improving the accuracy.

2. Vehicle Resale Price prediction using Machine Learning

Authors : B.Lavanya , Sk.Reshma , N.Nikitha , M.Namitha, L.Kanya Kumari,S.Kishore Babu

Published in : 2021

Four distinctive AI procedures have been utilised which helps in figuring the cost of pre owned vehicles. This model gives the anticipated cost of a pre owned vehicle on the basis of past shopper information.

Drawbacks

Model should be trained on more datasets to improve the accuracy. Also the information cleaning cycle needs improvement.

3. Predicting the Price of Used Cars using Machine Learning Technique

Authors: Research Gate

Published in: 2014

The mean error with linear regression was about Rs51, 000 while for kNN it was about Rs27, 000 for Nissan cars and about Rs45, 000 for Toyota cars. J48 and NaiveBayes accuracy ranged between 60 - 70% for different combinations of parameter

Drawbacks

The main weakness of decision trees and naïve bayes is their inability to handle output classes with numeric values. Hence, the price attribute had to be classified into classes which contained a range of prices but this evidently introduced further grounds for inaccuracies.

4. Car Resale Value Prediction System

Authors: Dhwani Nimbark, Akshat Patel, Sejal Thakkar

Published in: 2021

This project focuses on building a system that can accurately predict a resale value of the car based on minimal features like kms driven, year of purchase etc. without manual or human interference and hence it remains unbiased

Drawbacks

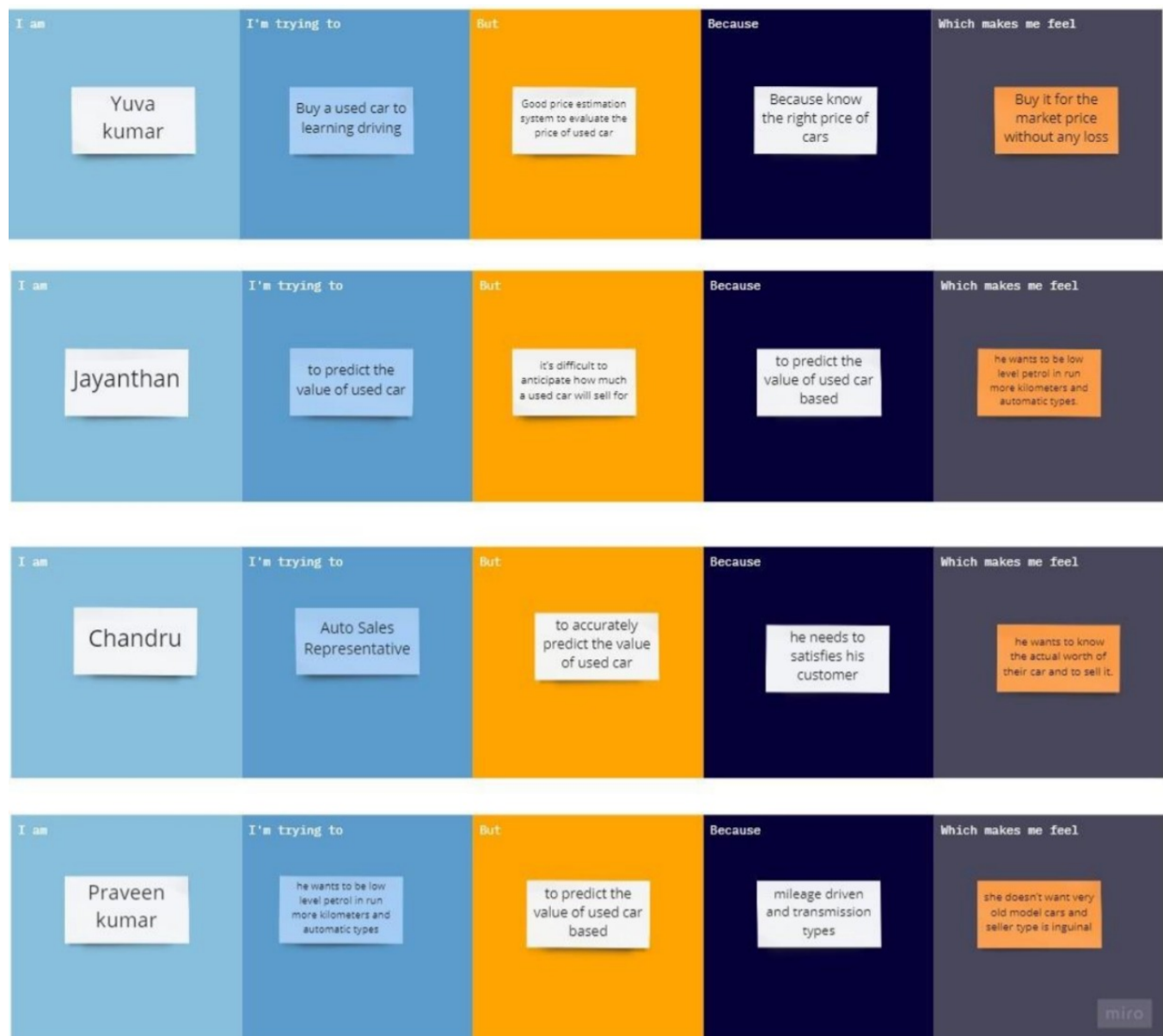
Once more data is collected and various different cars are included in the system, the system not [performs well. deep learning based ANN or LSTM would perform better.

Even though for some seeds the regression tree has better accuracy, its error rates are higher for the rest. 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.

2.3 PROBLEM STATEMENT DEFINITION

The main aim of this project is to predict the price of used cars using the various Machine Learning (ML) models. This can enable the customers to make decisions based on different inputs or factors namely

The system is defined in the python language that predicts the amount of resale value based on the given information. The system works on the trained dataset of the machine learning program that evaluates the precise value of the car. User can enter details only of fields like purchase price of car,



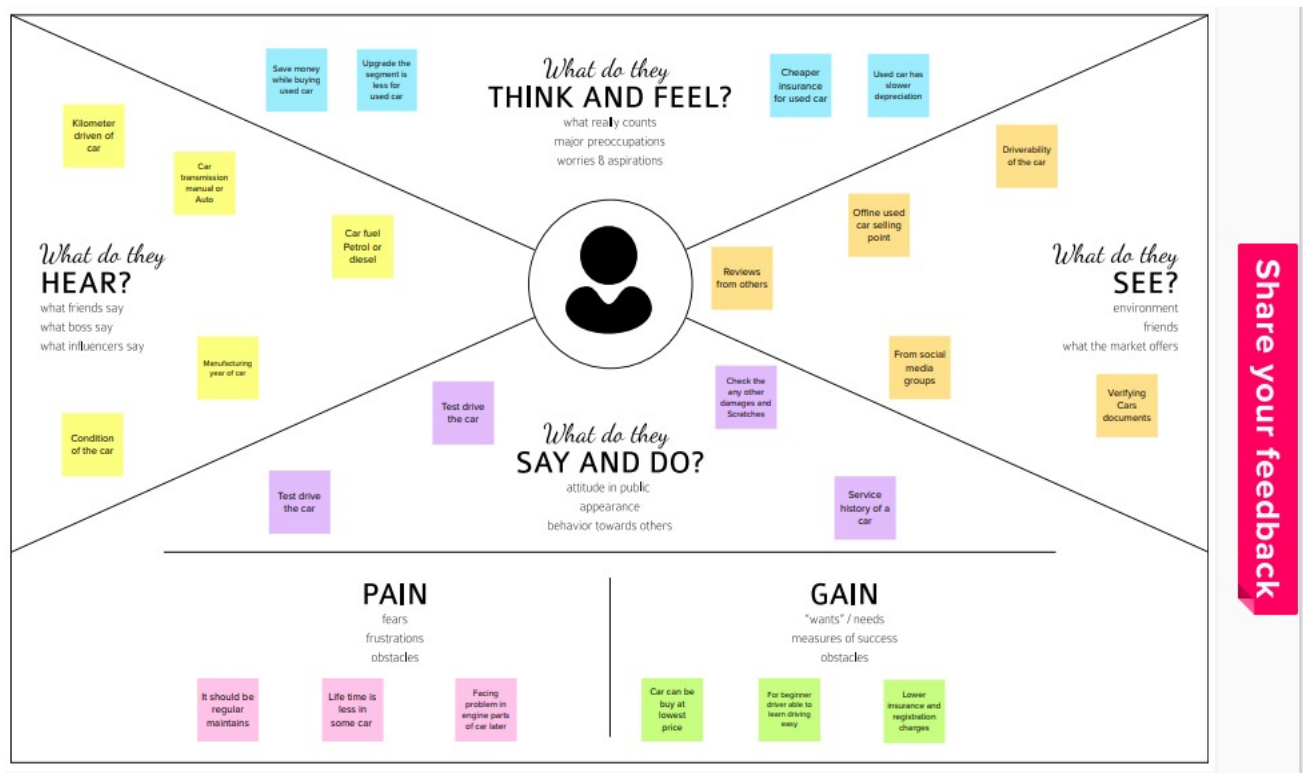
CHAPTER 3

IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviors and attitudes. It is a useful tool to help teams better understand their users.

Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her



3.2 IDEATION & BRAINSTORMING

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

Template



Brainstorm & idea prioritization

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

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

[Share template feedback](#)



Before you collaborate

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

10 minutes

A

Team gathering

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

B

Set the goal

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

C

Learn how to use the facilitation tools

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

[Open article](#)

PROJECT:
CAR RESALE
VALUE
PREDICTION

1

Define your problem statement

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

5 minutes

PROBLEM

How might we [your problem statement]?



Key rules of brainstorming

To run a smooth and productive session

-  Stay in topic.
-  Encourage wild ideas.
-  Defer judgment.
-  Listen to others.
-  Go for volume.
-  If possible, be visual.



Need some inspiration?

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

[Open example](#)

2

Brainstorm

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

⌚ 10 minutes

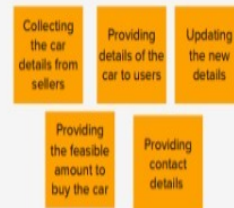
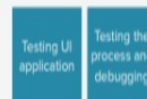
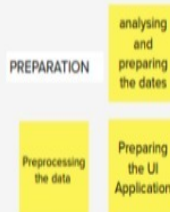
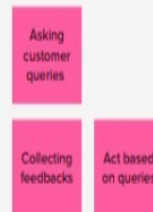
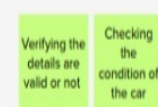
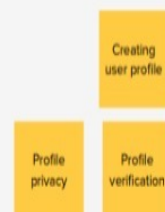
Yuva kumar.K**Chandru.R****Jayanthan.S****Praveen kumar.V**

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

⌚ 20 minutes

CAR DETAILS**REFINEMENT****TESTING:****PREPARATION****HISTORY****FEEDBACK****CHECKING****USER PROFILE**

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



After you collaborate

You can export the mural as an image or pdf to share with members of your company who might find it helpful.

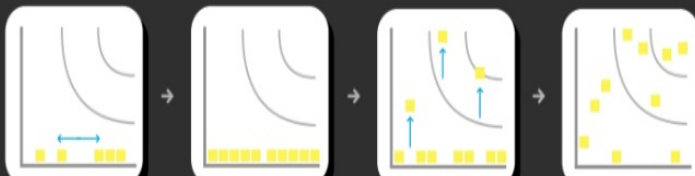
Quick add-ons

- A Share the mural**
Share a view link to the mural with stakeholders to keep them in the loop about the outcomes of the session.
- B Export the mural**
Export a copy of the mural as a PNG or PDF to attach to emails, include in slides, or save in your drive.

Keep moving forward

- Strategy blueprint**
Define the components of a new idea or strategy.
[Open the template →](#)
- Customer experience journey map**
Understand customer needs, motivations, and obstacles for an experience.
[Open the template →](#)
- Strengths, weaknesses, opportunities & threats**
Identify strengths, weaknesses, opportunities, and threats (SWOT) to develop a plan.
[Open the template →](#)

[Share template feedback](#)



3.3 PROPOSED SOLUTION

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Due to the huge requirement of used cars and lack of experts who can determine the correct valuation, users need an effective solution is needed to predict used cars prices by scraping data from websites that sell used cars, and analysing the different aspects and factors that lead to the actual used car price valuation
2.	Idea / Solution description	Car Resale Value prediction on Applied Data Science using Linear, Decision Tree, Random Forest, Gradient Boosted Regression
3.	Novelty / Uniqueness	Accurately predicting the resale value of the used car from the parameters given by user using Regression technique.
4.	Social Impact / Customer Satisfaction	<ul style="list-style-type: none">• Reduces the Human effort by searching a used vehicle in online.• Helps the users to get their desired vehicle details in online at a single place
5.	Business Model (Revenue Model)	<ul style="list-style-type: none">• Revenue through AdSense• Sponsorships – We get the sponsorships where We post the sponsored posts, events, links etc• Affiliate Marketing• Commission – we get commission from the suppliers and Manufacturers as per the sales of used cars..• Lead Generation – Charge money from the clients to send the leads of the users as per the requirements.

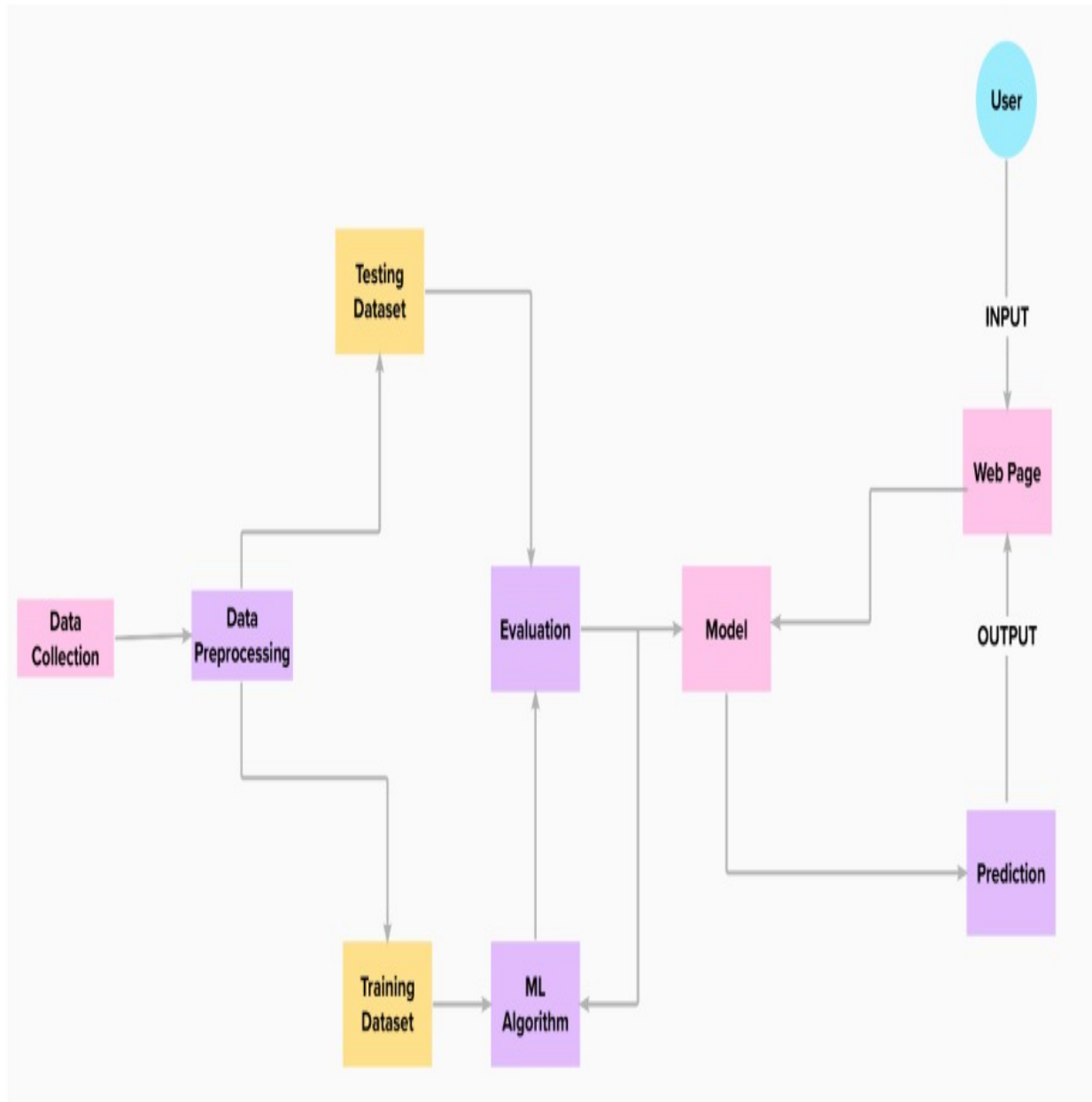
3.4 PROBLEM SOLUTION FIT

Define CS, fit into CC	1. CUSTOMER SEGMENT(S) CS Who is your customer? I.e. working parents of 0-5 y.o. kids Second hand Car Buyers	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. Avoidable prediction errors. Low price vehicle rates. Lack of transparency. Difficulty finding a good condition car. Medium maintenance costs. Presence of insurance coverage. The shortage of affordable value prediction.	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 I. Eliminate the short-term practice of data. II. Learn how to perform analysis, data preprocessing and machine learning algorithms effectively. III. Car resale value prediction system aims to exploit data mining techniques on vehicle data set to assist in the prediction of the car resale value.	Explore AS, differentiate
	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 aides. Machine learning has become a tool used in almost every task that requires estimation. Companies like cars24 and car Dekho. Com uses Regression analysis to estimate the used car prices. So, we need to build a model to estimate the price of cars. The model should take car-related parameters and output a selling price. The selling price of a used car depends on certain features as mentioned below • Fuel Type • Manufacturing year • Miles Driven • Number of Historical Owners • Maintenance Record	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. Leading risk factors for predicting the values and to trust the anonymous sellers, fear about the car condition, Engine condition, fuel type, mileage of vehicle, and physical damages. Solutions: Don't trust anonymous sellers, buying for affordable price, check the car condition, predict through the prediction analysis.	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) I. Develop or improve upon the strategic vision. II. Segment buyers with vehicle personalization. III. Difficulty in predicting the values for second handled car value, trusting of anonymous brokers ,	
	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. Accuracy of Datasets, Information of year of manufacturing, Type of fuel, Engine condition, Miles driven, Maintenance record	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. This project aims to deliver price prediction models to the public, to help guide the individuals looking to buy or sell cars and to give them a better insight into the automotive sector. Buying a used car from a dealer can be a frustrating and an unsatisfying experience as some dealers are known to deploy deceitful Didactics to close a deal. Therefore, to help consumers avoid falling victims to match tactics, this study hopes to equip consumers with right tools to guide them in their shopping experience.	8. CHANNELS of BEHAVIOUR CH 8.1 ONLINE What kind of actions do customers take online? Extract online channels from #7 Second hand car will be a part of virtualization. For example, accessing and seeing all second handled car records in online 8.2 OFFLINE What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development I. Buying for unaffordable price II. Without checking the car condition III. False documents about car	
Identify strong TR & EM	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. Prediction of values, fear about engine condition, outlook condition, affordable price predicting			Extract online & offline CH of BE

CHAPTER 4

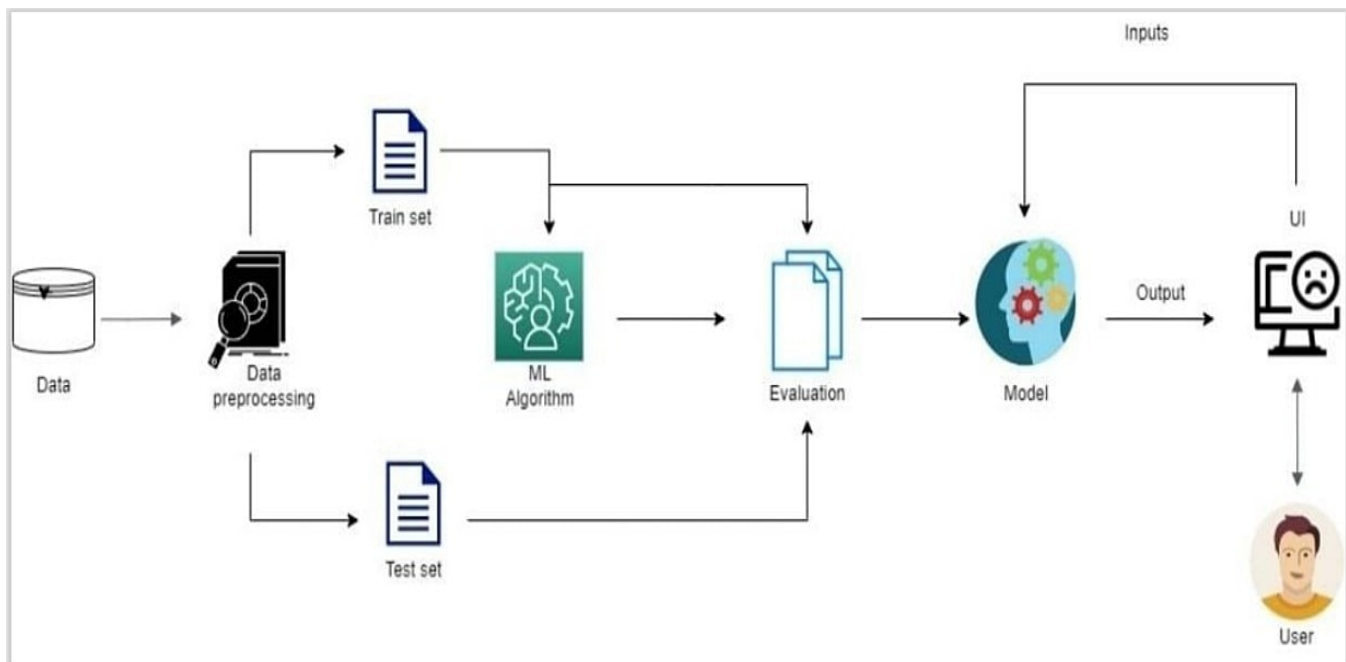
PROJECT DESIGN

4.1 DATA FLOW DIAGRAMS

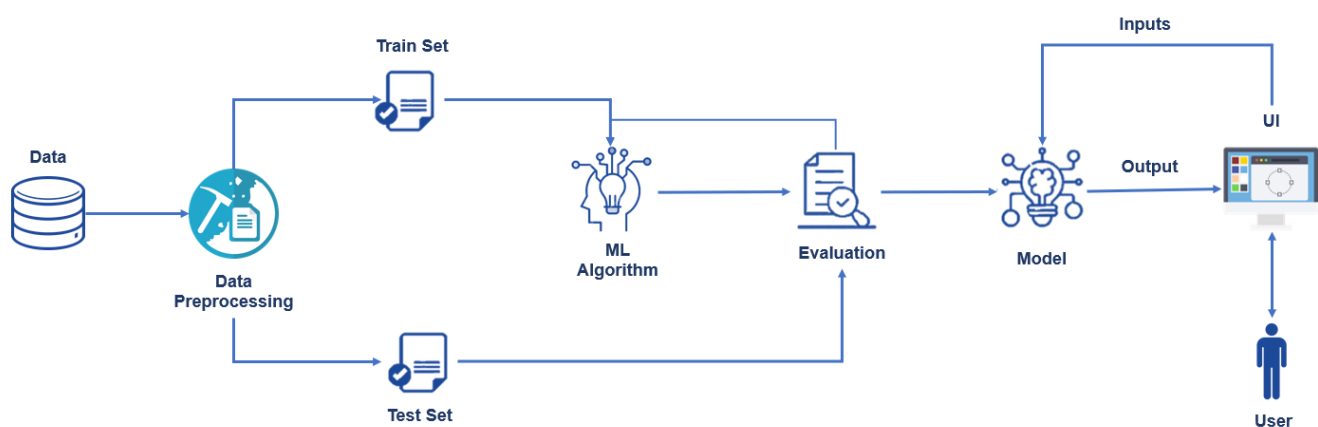


4.2 SOLUTION & TECHNICAL ARCHITECTURE

4.2.1 SOLUTION ARCHITECTURE



4.2.2 TECHNICAL ARCHITECTURE



CHAPTER 5

PROJECT PLANNING & SCHEDULING

5.1 SPRINT PLANNING & ESTIMATION

MILESTONE NAME	ACTIVITIES	MILESTONE NUMBER	DESCRIPTION	COMPLETION DATE
PRE REQUISITES			Create the IBM account and download the necessary software for your chosen category of the project	27/08/2022
IDEATION PHASE	Literature Survey	1	Literature survey on the selected project by gathering and referring research paper and publications	02/09/2022
	Empathy Map	1	Create an empathy map that list the user's pains and gains	08/09/2022
	Brainstorming	1	Gather many different ideas from the team mates and prioritize the idea based on feasibility and innovative	16/9/2022

PROJECT DESIGN PHASE -1	Proposed Solution	2	Prepare the proposed solution document that you proposed to solve the problem statement which should include feasibility ,business model ... etc.	24/9/2022
	Solution Architecture	2	Prepare Solution architecture diagram for the proposed solution	01/10/2022
	Problem Solution Fit	2	Prepare Solution Fit Document for the proposed solution	01/10/2022
PROJECT DESIGN PHASE - 2	Customer Journey Map	3	Prepare a customer journey map to understand how the user interact and experience your product	08/10/2022
	Data Flow Diagram	3	Draw the data flow diagram for you	12/10/2022

			proposed solution	
	Solution Requirements	3	Create a solution requirement document for the proposed solution	14/10/2022
	Technology Stack	3	Prepare the technology stack diagram for the proposed solution	14/10/2022

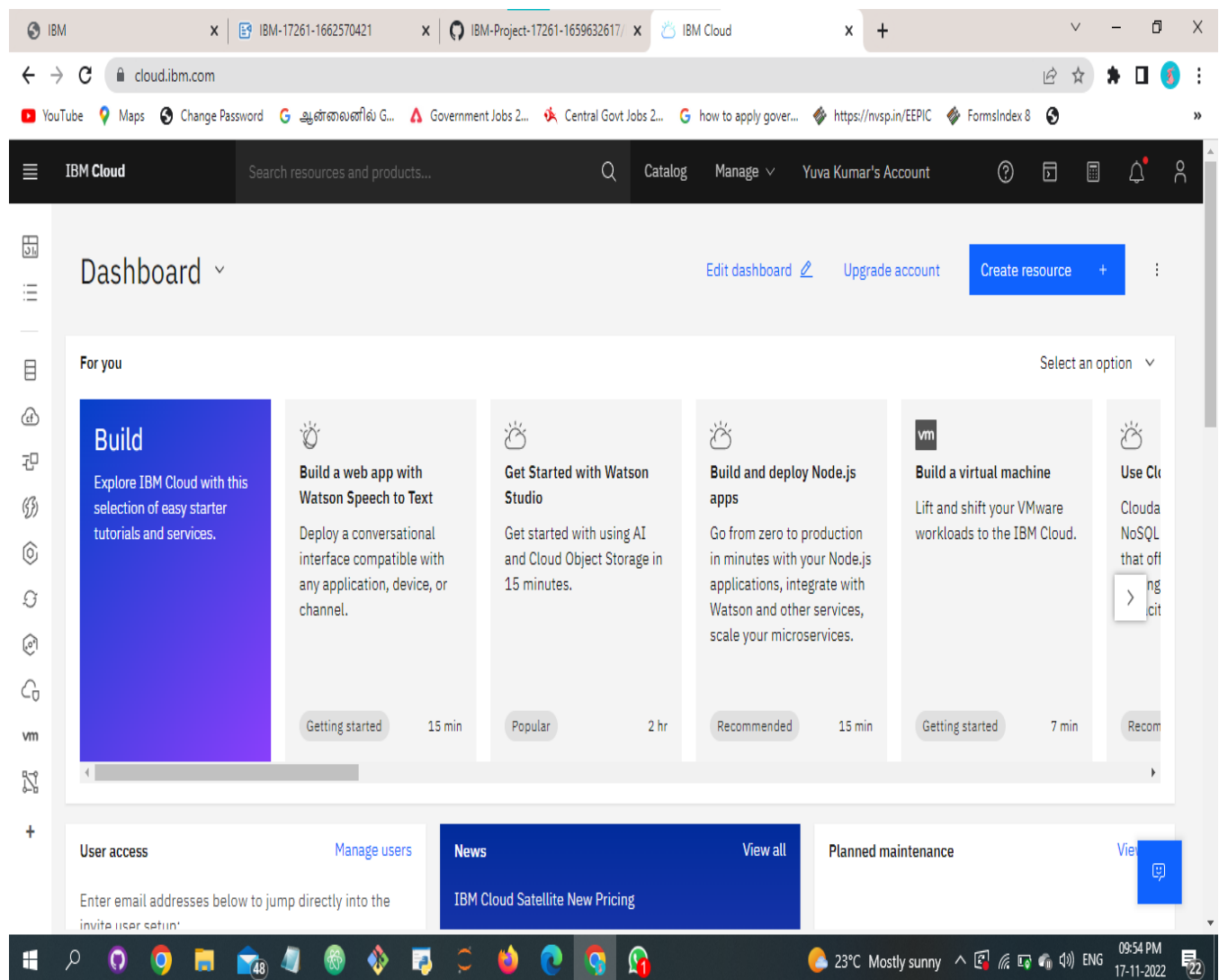
PROJECT PLANNING	Milestone And Activity List	4	Create a document to show your milestones as well as activity in your development cycle	06/11/2022
	Sprint Delivery Plan	4	Create a sprint plan for the project	06/11/2022
PROJECT DEVELOPMENT PHASE	Sprint-1	5	Delivery of the sprint-1	07/11/2022
	Sprint-2	6	Delivery of the sprint-2	10/11/2022
	Sprint-3	7	Delivery of the sprint-3	13/11/2022
	Sprint-4	8	Delivery of the sprint-4	17/11/2022

CHAPTER 6

CODING AND SOLUTIONING

6.1 CREATE AND CONFIGURE IBM CLOUD SERVICES

USN 1: As a user I need to enroll the cloud registration



The screenshot displays the IBM Cloud Dashboard in a web browser. The browser's address bar shows the URL `cloud.ibm.com`. The dashboard header includes the IBM Cloud logo, a search bar, and navigation links for Catalog, Manage, and the user's account (Yuva Kumar's Account). The main content area is titled "Dashboard" and features a "For you" section with several recommended actions:

- Build**: Explore IBM Cloud with this selection of easy starter tutorials and services.
- Build a web app with Watson Speech to Text**: Deploy a conversational interface compatible with any application, device, or channel. (Getting started, 15 min)
- Get Started with Watson Studio**: Get started with using AI and Cloud Object Storage in 15 minutes. (Popular, 2 hr)
- Build and deploy Node.js apps**: Go from zero to production in minutes with your Node.js applications, integrate with Watson and other services, scale your microservices. (Recommended, 15 min)
- Build a virtual machine**: Lift and shift your VMware workloads to the IBM Cloud. (Getting started, 7 min)
- Use Cloudant**: Cloudant NoSQL that offloads data to the edge. (Recommended)

The bottom of the dashboard includes sections for "User access" (with a "Manage users" link), "News" (featuring "IBM Cloud Satellite New Pricing" with a "View all" link), and "Planned maintenance". The Windows taskbar at the bottom shows the system time as 09:54 PM on 17-11-2022, with a temperature of 23°C and weather forecast of "Mostly sunny".

USN 2: As a user, I will create IBM cloud account.

IBM Cloud

Search resources and products...

Q

Catalog

Manage

Yuva Kumar's Account


?

Sell on IBM Cloud

Catalog settings

Catalog

Q Search the catalog...



Category

Viewing 206 products

Alphabetically

Recommended products (6)

Compute (30)

Containers (9)

Networking (29)

Storage (19)

AI / Machine Learning (17)


Analytics (10)

Blockchain (1)

Databases (28)

Developer tools (25)

Logging and monitoring (3)




Analytics Engine

By IBM

Submit your Apache Spark applications as needed and customize the Spark runtimes to satisfy the requirements of your application.

Lite • Free • HIPAA Enabled • IAM-enabled • Service Endpoint Supported • IBM supported




AnonTech ViziVault Platform

By Anon Technology, Inc.

Manage personal information as-a-service safely, securely, and in compliance with data privacy regulations using ViziVault

Lite • Free • HIPAA Enabled • IAM-enabled • Third party supported




API Connect

By IBM

An enterprise-grade platform for creating, securing, managing, sharing, monetizing, and analyzing custom APIs located on-premises...

Lite • Free • EU Supported • IAM-enabled • IBM supported




App Configuration


By IBM

Centralized, in-flight configuration for web and mobile applications and distributed environments.


Lite • Free • IAM-enabled • Service Endpoint Supported • IBM supported




App Connect



App ID



Bare Metal Servers for Classic



Bare Metal Servers for VPC

USN 3: Install the Anaconda software

The screenshot shows a Windows File Explorer window titled 'IBM Project'. The ribbon at the top includes 'File', 'Home', 'Share', 'View', and 'Application Tools'. The 'File' tab is active, showing options like 'Pin to Quick access', 'Copy', 'Paste', 'Cut', 'Copy path', 'Paste shortcut', 'Move to', 'Copy to', 'Delete', 'Rename', 'New folder', 'New item', 'Easy access', 'Properties', 'Open', 'Select all', 'Select none', and 'Invert selection'. The address bar shows the path 'IBM Project' and a search box labeled 'Search IBM Project'.

The main area displays a list of files and folders. The 'Quick access' sidebar on the left shows various locations like Desktop, AVENGERS FOLDE, This PC, Downloads, Documents, Camera Roll, 21. Git, Github an, Movies, ELCOT, KSK, English movies, Pictures, TAMIL SONG, AUDIO, G:\, IBM Project, Captures, Car resale value Pred, Collect Dataset, and iLovePDF_Output. The 'IBM Project' folder is selected in the sidebar.

Name	Date modified	Type	Size
Assessments	20-09-2022 11:23 AM	File folder	
Collect Dataset	09-11-2022 08:57 PM	File folder	
Final_Deliverables	20-09-2022 11:25 AM	File folder	
IBM_CLOUD	08-11-2022 05:04 PM	File folder	
Model Building	09-11-2022 09:02 PM	File folder	
Pre-Process The Data	10-11-2022 11:20 AM	File folder	
pre-requisites	10-11-2022 11:32 AM	File folder	
Project_Design_and_Planning	20-09-2022 11:18 AM	File folder	
Project_Development_Phase	20-09-2022 11:21 AM	File folder	
house-votes-84.data	03-10-2022 10:47 AM	Microsoft Excel C...	19 KB
Iris	12-10-2022 08:32 PM	Microsoft Excel C...	5 KB
Sprint 3	11-11-2022 07:17 PM	Microsoft Edge P...	305 KB
Sprint3	11-11-2022 07:18 PM	Microsoft Edge P...	595 KB
Anaconda3-2022.05-Windows-x86_64 (1)	16-09-2022 08:06 AM	Application	6,08,137 KB

At the bottom left, it says '14 items 1 item selected 593 MB'. A small icon of a document with a checkmark is visible in the bottom right corner.

USN 4: Lanuching the Jupyter Notebook software

```
Jupyter Notebook (anaconda3)
[W 2022-11-18 14:21:40.865 LabApp] 'notebook_dir' has moved from NotebookApp to ServerApp. This config will be passed to ServerApp. Be sure to update your config before our next release.
[W 2022-11-18 14:21:40.865 LabApp] 'notebook_dir' has moved from NotebookApp to ServerApp. This config will be passed to ServerApp. Be sure to update your config before our next release.
[I 2022-11-18 14:21:40.981 LabApp] JupyterLab extension loaded from C:\Users\ELCOT\anaconda3\lib\site-packages\jupyterlab
[I 2022-11-18 14:21:40.981 LabApp] JupyterLab application directory is C:\Users\ELCOT\anaconda3\share\jupyter\lab
[I 14:21:41.049 NotebookApp] Serving notebooks from local directory: C:\Users\ELCOT
[I 14:21:41.049 NotebookApp] Jupyter Notebook 6.4.8 is running at:
[I 14:21:41.065 NotebookApp] http://localhost:8888/?token=d28b7f80343715b35db1e05cd75aa6f8c8fd60d57143eb12
[I 14:21:41.065 NotebookApp] or http://127.0.0.1:8888/?token=d28b7f80343715b35db1e05cd75aa6f8c8fd60d57143eb12
[I 14:21:41.081 NotebookApp] Use Control-C to stop this server and shut down all kernels (twice to skip confirmation).
[C 14:21:41.381 NotebookApp]

To access the notebook, open this file in a browser:
    file:///C:/Users/ELCOT/AppData/Roaming/jupyter/runtime/nbserver-10300-open.html
Or copy and paste one of these URLs:
    http://localhost:8888/?token=d28b7f80343715b35db1e05cd75aa6f8c8fd60d57143eb12
    or http://127.0.0.1:8888/?token=d28b7f80343715b35db1e05cd75aa6f8c8fd60d57143eb12
```


6.2 CREATE THE WEBPAGE FOR CAR VALUE PREDICTION

Build the Python Flask App

```
#Importing required libraries
import pandas as pd
import Numpy as np
from flask import Flask, render_template, Response, request
import pickle
from sklearn.preprocessing import LabelEncoder
import pickle

#Load the model and initialize Flask app
app=Flask(__name__) filename='resale_model.sav'
model=pickle.load(open(filename,'rb'))
#Configure app.py to fetch the parameter values from the ui,and return the prediction
@app.route('/')
def index():
    return render_template('resaleintro.html')
@app.route('/predict')
def predict():
    return render_template('resalepredict.html')
@app.route('/predict', methods=['GET', 'POST']) def y_predict():
    regyear = int (request.form['reg year'])
    powerps = float(request.form['powerps'])
    kms = float(request.form['kms'])
    regmonth=int(request.form.get('regmonth'))
    gearbox = request.form['gearbox']
    damage=request.form['dam']
    model=request.form.get('modeltype')
    brand=request.form.get('brand')
    fuelType = request.form.get('fuel')
    vehicle type= request.form.get('vehicle type')
    new_row("yearOfRegistration":reg year, 'powerPS':power ps, 'kilo-meter':kms,
    monthofRegistration': regmonth, gearbox gearbox, 'notRepairedDamage': damage,
    'model':model, 'brand':brand, 'fuelType': fuelType, 'vehicleType': vehicle type)
```

WEBPAGE CREATIONS

```
<html>
<body>
  <p> this is a application to predict the profit</p>
  <form action = "/login" method= "post">
    <p>Marketing spend</p>
    <p><input type="text" name = "ms" /></p>

    <p>Administration spend</p>
    <p><input type="text" name = "as" /></p>

    <p>R & D spend</p>
    <p><input type="text" name = "rd" /></p>

    <label for = "states">Choose the state</label>
    <select name ="s">
      <option Value = "cal">California</option>
      <option Value = "flo">Florida</option>
      <option Value = "ny">New York</option>
    </select>

    <p><input type="submit" value = "submit" /></p>
  </form>
  <b>{{y}}</b>
</body>
</html>
```

```
.header{
  width: 100%;
  text-align: center;
  padding-top: 20px;
  font-size: 20px;
  font-family: 'Franklin Gothic Medium';
  background-color: #43FFB6;
  border: 0%;
  top: 0px;
  bottom: 0px;
  right: 0px;
  left: 0px;
  overflow-y: auto;
}
body{
  margin: 0;
  font-family: 'Franklin Gothic Medium';
}
.form{
  background-image: linear-gradient(rgba(25,30,30,0.7),rgba(25,30,30,0.7)),url(../images/car2.jpg);
  background-position: center;
  background-size: cover;
```

```
position: relative;
text-align: center;
padding: 20px;
display: flex;
flex-direction: column;
align-items: center;
font-size: 22px;
}
input[type=text] {
width: 100%;
padding: 12px 20px;
margin: 8px 0;
display: inline-block;
border: 1px solid #ccc;
border-radius: 4px;
box-sizing: border-box;
}
select {
width: 100%;
padding: 16px 20px;
border: none;
border-radius: 4px;
```

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

CHAPTER 7

RESULT

Get the Accurate Resale Value of Your Car

Registration year :

Registration Month :

Power of car in PS:

Kilometers that car have driven :

Gear type :

☐ Manual ☐ Automatic ☐ Not declared

Your car is repaired or damaged :

☐ Yes ☐ No ☐ Not declared

Model Type :

Brand :

Fuel Type :

Vehicle type:

Submit

Car resale value Predictor

Welcome! To predict your used car price click the below button!

[Check price](#)

Welcome to Car Price Predictor

This app predicts the price of a car you want to sell. Try filling the details below:

Select the company:

Select the model:

Select Year of Purchase:

Select the Fuel Type:

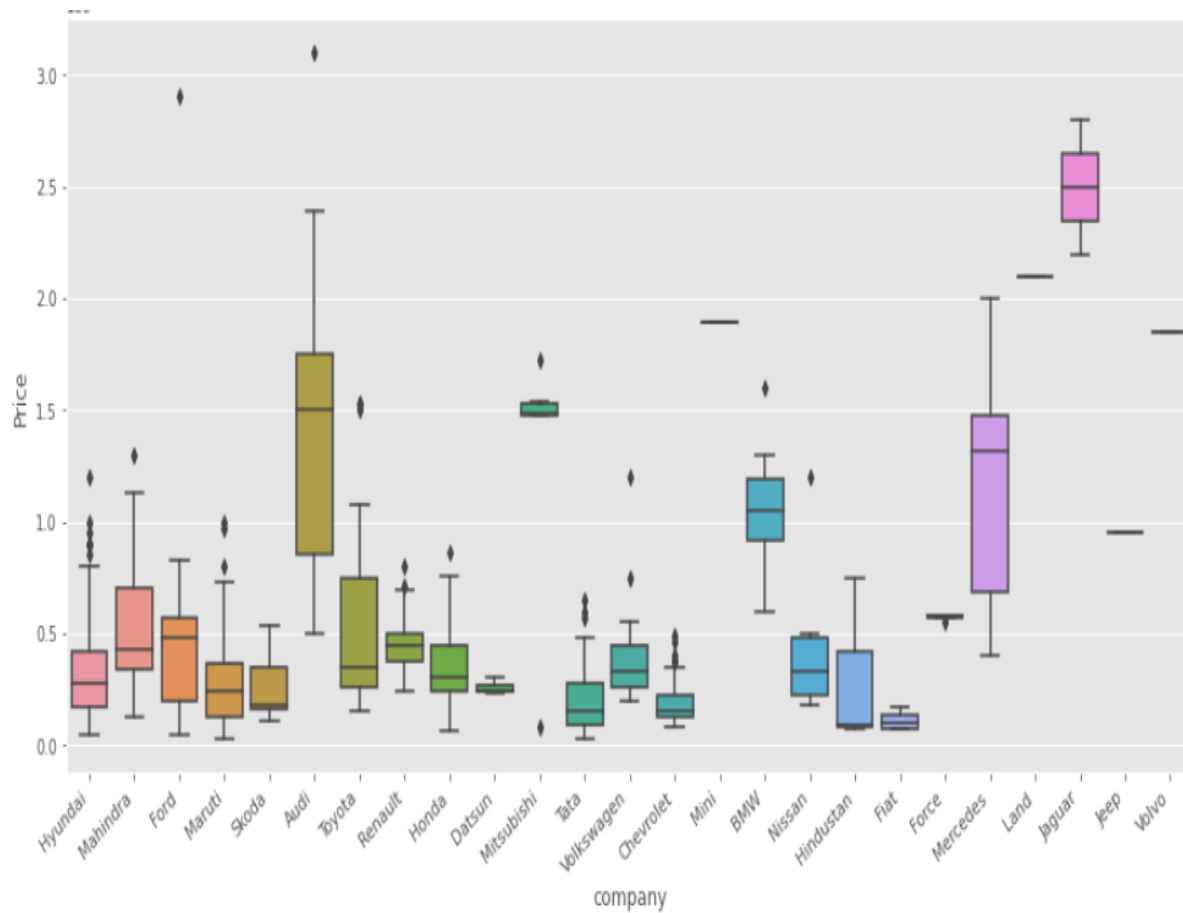
Enter the Number of Kilometres that the car has travelled:

Predict Price

Prediction: ₹1004392.78

CHAPTER 8

TESTING



CHAPTER 9

ADVANTAGES AND DISADVANTAGES

9.1 ADVANTAGES

The loss function used depends on the type of problem being solved. It must be differentiable, but many standard loss functions are supported and you can define your own. For example, regression may use a squared error and classification may use logarithmic loss. A benefit of the gradient boosting framework is that a new boosting algorithm does not have to be derived for each loss function that may want to be used, instead, it is a generic enough framework that any differentiable loss function can be used.

9.2 DISADVANTAGES

Decision trees are used as the weak learner in gradient boosting. Specifically, regression trees are used that output real values for splits and whose output can be added together, allowing subsequent models outputs to be added and “correct” the residuals in the predictions. Trees are constructed in a greedy manner, choosing the best split points based on purity scores like Gini or to minimize the loss. It is common to constrain the weak learners in specific ways, such as a maximum number of layers, nodes, splits or leaf nodes. This is to ensure that the learners remain weak, but can still be constructed in a greedy manner.

CHAPTER 10

CONCLUSION

With this project, we have built a model that can predict with a 87,03% of accuracy the price of used cars, given a set of features. This information can have an enormous value for both companies and individuals when trying to understand how to estimate the value of a vehicle and, more importantly, the key factors that determine its pricing.

As expected, the year of the vehicle is by far the main factor when calculating the price with almost a 43%, followed by odometer. Interestingly enough, I expected the state of the car and the odometer to be deeply related but there is a big gap in the difference of relevance between both measures.

That said, it seems the region also plays a part, which totally makes sense. There might be more general vehicles that are liked everywhere but specialised cars like sport or convertibles would be a better fit in warmer areas whilst bigger trucks and SUVs would play a better role in colder places.

Mastering the art of pricing is not an easy task, but with the study of historical data it is possible to find patterns that lead to accurate results. Acquiring this knowledge can provide you with a comparative advantage before putting a vehicle on sale or buying it on the market.

However, once more data is collected and various different cars are included in the system, deep learning-based ANN or LSTM would perform better. But currently, GBR based car valuation system can predict resale value of a car with Root Mean Squared Error

CHAPTER 11

FUTURE SCOPE

Currently, system can only deal with Swift Dzire cars due to lack of data. Also, data has been collected of only 5 cities of India. This can be extended to multiple car models and cities so as to improve accuracy and usability. Efficient use of deep learning such as LSTM (Long shortterm memory) or RNN (Recurrent Neural networks) can be implemented once enough data is collected. This can improve accuracy and decrease RMSE drastically. Currently, only few features are used to predict resale value of the car. This can be extended to more features. One can also implement CNN to determine physical condition of the car from images like identifying dents, scratches etc. and thus predicting more relevant resale value of a car.

For this project, I have only used a single model in order to predict the price of used cars: the **Random Forest Regressor**.

It has shown an excellent performance in such a big dataset and it has performed consistently throughout the Training and Testing process. Even more, the results of the Test Set are better than in the Training Set, with a 87.03% of accuracy in its predictions.

One of the goals of the project was to create a model that was able to estimate

the price of used cars and we already achieved it.

The second goal is to find which features are the **most relevant** ones when estimating the dependent variable “price”: