IBM Report

Car resale value prediction

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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 . We will compare the performance of various machine learning algorithms like Linear Regression, Ridge Regression, Lasso Regression, Elastic Net, Decision Tree Regressor and choose the best out of it. Depending on various parameters we will determine the price of the car. Regression Algorithms are used because they provide us with continuous value as an output and not a categorized value because of which it will be possible to predict the actual price a car rather than the price range of a car. User Interface has also been developed which acquires input from any user and displays the Price of a car according to user's input

1.2 Purpose

Deciding whether a used car is worth the posted price when you see listings online can be difficult. Several factors, including mileage, make, model, year, etc. can influence the actual worth of a car. From the perspective of a seller, it is also a dilemma to price a used car appropriately[2-3]. Based on existing data, the aim is to use machine learning algorithms to develop models for predicting used car prices.car resale value prediction helps the user to predict the resale value of the car depending upon various

features like kilometers driven, fuel type, etc. This resale value prediction system is made for general purpose to just predict the amount that can be roughly acquired by the user.

2 Literature Survey

2.1 Existing problem

- The Age of Your Trade-In.
- The Mileage on Your Trade-In.
- The Overall Condition of Your Trade-In.
- The History of Your Car's Maintenance.
- The Equipment in Your Car.
- Current Demand Dictates the Deal.
- Make a Good Impression at Trade-In Time.

2.2 References

[1] Sameerchand Pudaruth, “Predicting the Price of Used Cars using Machine Learning Techniques

[2] Enis gegic, Becir Isakovic, Dino Keco, Zerina Masetic, Jasmin Kevric, ”Car Price Prediction Using Machine Learning”;

[3] Ning sun, Hongxi Bai, Yuxia Geng, Huizhu Shi, “Price Evaluation Model In Second Hand Car System Based On BP Neural Network Theory”;

[4] Nitis Monburinon, Prajak Chertchom, Thongchai

Kaewkiriya, Suwat Rungpheung, Sabir Buya, Pitchayakit Boonpou, “Prediction of Prices for Used Car by using Regression Models”

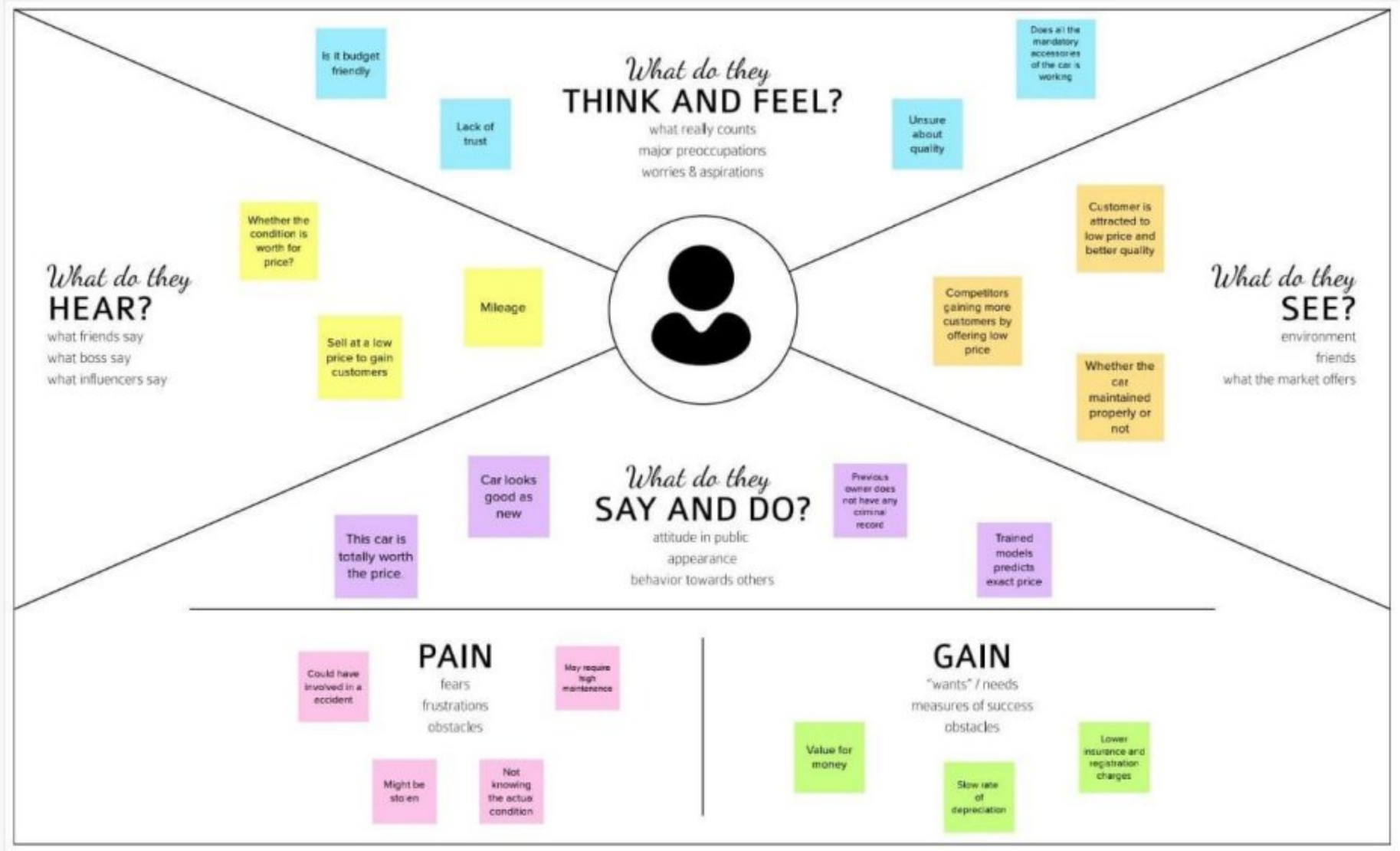
[5] Doan Van Thai, Luong Ngoc Son, Pham Vu Tien, Nguyen Nhat Anh, Nguyen Thi Ngoc Anh, “Prediction car prices using qualify qualitative data and knowledge-based system’’

2.3 Problem Statement Definition

The main challenge is the factors affecting a used vehicle's price are mileage and condition 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 Brand or Type of the car one prefers like Ford, Hyundai, Model of the car namely Ford Figo, Hyundai Creta, Year of manufacturing like 2020, 2021, Type of fuel namely Petrol, Diesel, Price range or Budget, Type of transmission which the customer prefers like Automatic or Manual, Mileage to name a few characteristic features required by the customer. This project Car Price Prediction deals with providing the solution to these problems. Different techniques like multiple linear regression analysis, k-nearest neighbours, naïve bayes and decision trees have been used to make the predictions. The predictions are then evaluated and compared in order to find those which provide the best performances.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



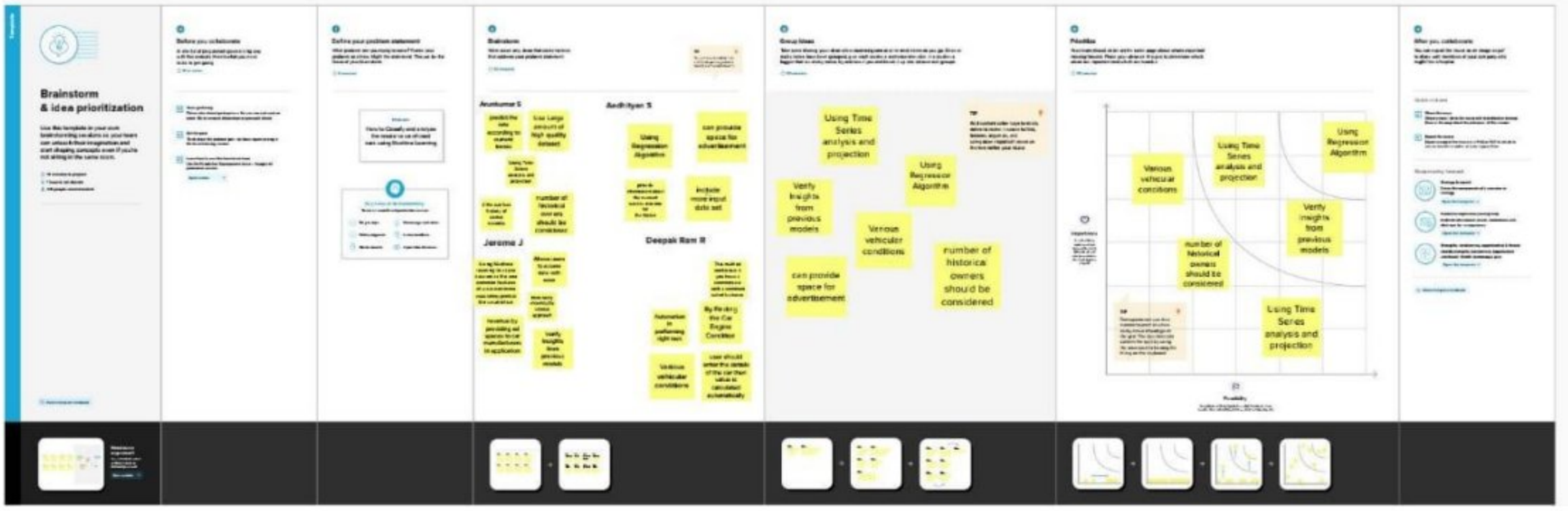
3.2 Ideation & Brainstorming

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.

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

Step-2: Brainstorm, Idea Listing and Grouping.

Step-3: Idea Prioritization.



3.3 Proposed Solution

- New cars of a particular make, model, and year all have the same retail price. excluding optional features. This price is set by the manufacturer. Used car, however, are subject to supply-and- demand pricing.
- Used cars have additional attributes that factor into the price. These include the condition, milage, and repair history, which sets cars that may have shared a retail price apart.
- The purpose of this thesis is to evaluate several different machine learning models for used car price prediction and draw conclusions about how they behave. This will deepen the knowledge of machine learning applied to car valuations and other similar price prediction problems.
- This work will focus on answering the research questions. They all entail a comparison of different ML algorithms for price prediction. This will be accomplished by sourcing and preparing

a dataset on which all the algorithms can be trained on and compared fairly.

- The algorithms selected must therefore be similar enough for the same dataset to be used for all of them.
- This also means that no large optimization efforts on the dataset will be made to boost the performance, if these changes do not benefit the other models.

3.4 Problem Solution Fit

PROJECT DESIGN PHASE-1

PROBLEM SOLUTION FIT

Problem-Solution fit canvas 2.0

Purpose / Vision

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 handle 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

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS — J&P

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

Machine learning has become a tool used in almost every task that requires estimation. Companies likecars24 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 ,

Focus on J&P, tap into BE, understand RC

Identify strong TR & EM

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

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

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. Baying 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 handled 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

Extract online & offline CH of BE

REQUIRMENT ANALYSIS

Anaconda Navigator :

Anaconda Navigator is a free and open-source distribution of the Python and R programming languages for data science and machine learning related applications. It can be installed on Windows, Linux, and macOS. Conda is an open-source, cross-platform, package management system. Anaconda comes with great tools like JupyterLab, Jupyter Notebook, QtConsole, Spyder, Glueviz, Orange, Rstudio, Visual Studio Code.

For this project, we will be using Jupyter notebook and Spyder

To install Anaconda navigator and to know how to use Jupyter Notebook & Spyder using Anaconda watch the video

Steps: 2:
To build Machine learning models you must require the following packages

Sklearn: Scikit-learn is a library in Python that provides many unsupervised and supervised learning algorithms.

NumPy: NumPy is a Python package that stands for 'Numerical Python'. It is the core library for scientific computing, which contains a powerful n-dimensional array object

Pandas: pandas is a fast, powerful, flexible, and easy to use open-source data analysis and manipulation tool, built on top of the Python programming language.

Matplotlib: It provides an object-oriented API for embedding plots into applications using general-purpose GUI toolkits

Flask: Web framework used for building Web applications.

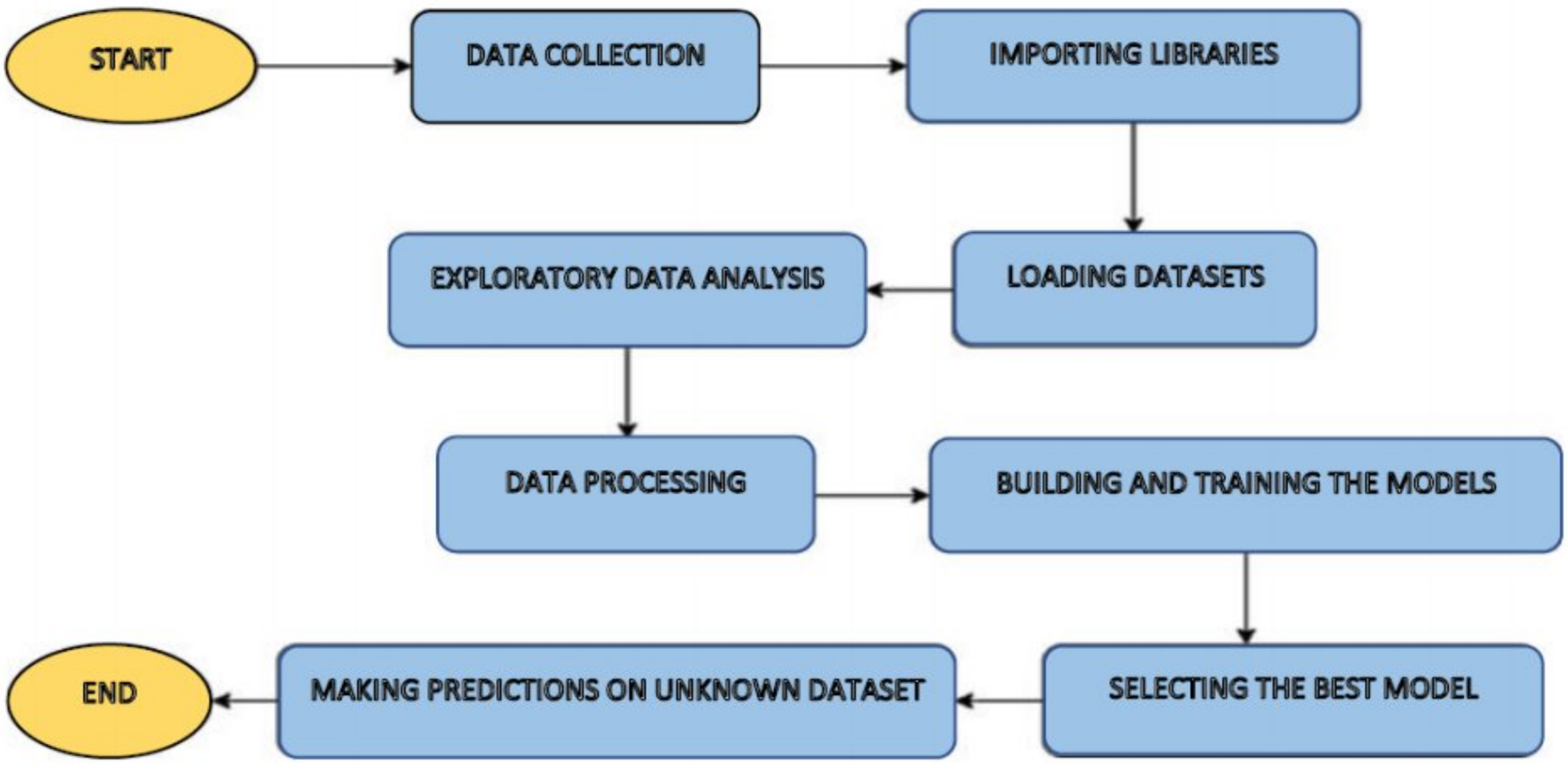
If you are using anaconda navigator, follow the below steps to download the required packages:

1. Open anaconda prompt.
2. Type **"pip install numpy"** and click enter.
3. Type **"pip install pandas"** and click enter.
4. Type **"pip install matplotlib"** and click enter.
5. Type **"pip install scikit-learn"** and click enter.
6. Type **"pip install Flask"** and click enter.

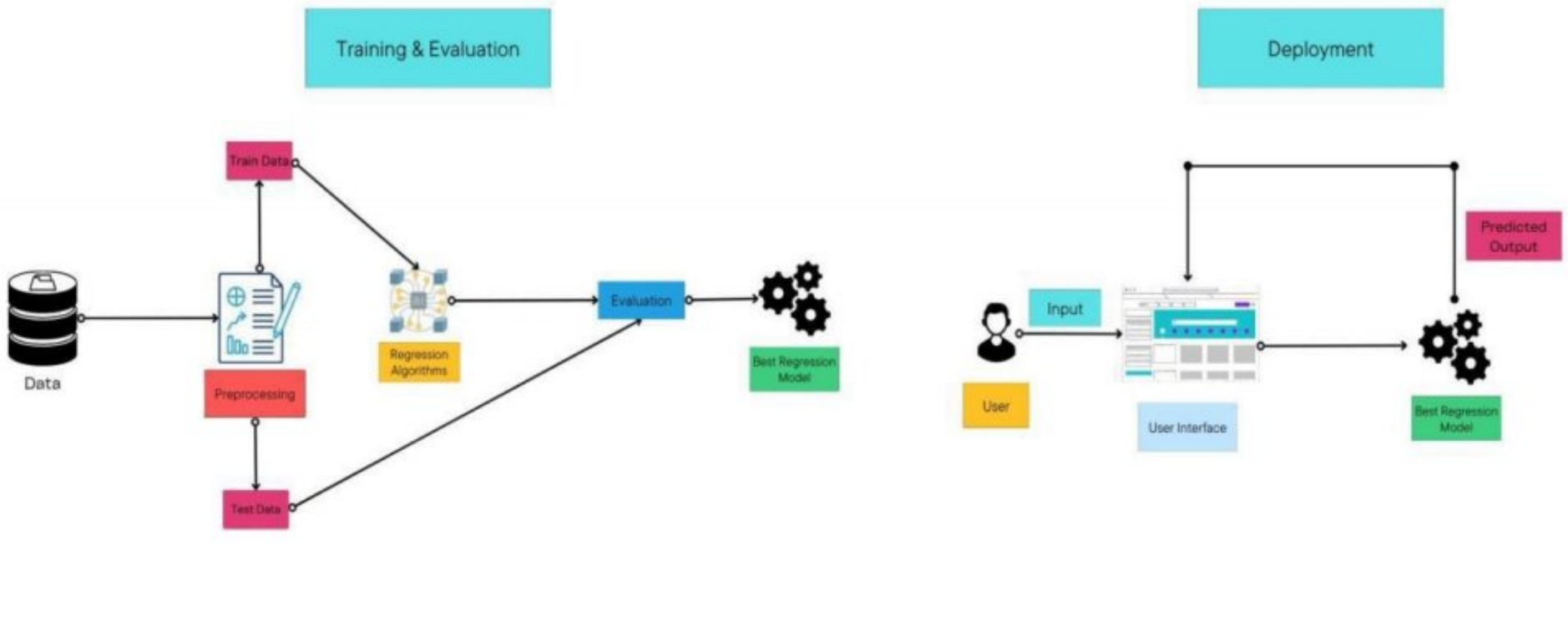
PROJECT DESIGN AND PLANNING

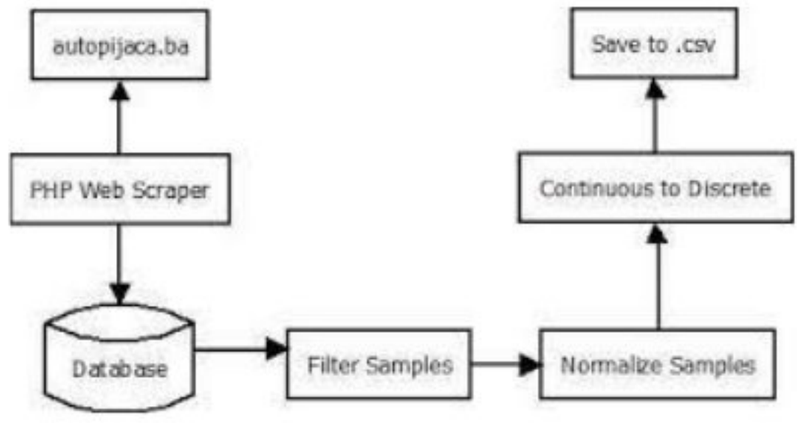
Data Flow Diagrams

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.
These diagrams are used as visualization tool to help the audience get a better idea of what exactly is going on in the system. The DFDs are use to :
(i) discuss with the user a diagrammatic interpretation of the process in the system and clarify what is currently being performed.
(ii) determine what the new system should be able to do and what information is required for each different process the should be carried out.
(iii) Check that the completed system conforms to its intended design.
(iv) provides easy presentation and communication between technical and non technical staff.



Solution & Technical Architecture





S.No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g. Web UI, Mobile App, Chatbot etc.	HTML, CSS, JavaScript / React Js etc.
2.	Application Logic-1	Logic for a process in the application	Python
3.	Database	Data Type, Configurations etc.	NoSQL
4.	Cloud Database	Database Service on Cloud	IBM DB2
5.	File Storage	File storage requirements	IBM Block Storage
6.	Machine Learning Model	Purpose of Machine Learning Model	Regression model
7.	Infrastructure (Server / Cloud)	Application Deployment on Local System / Cloud Local Server Configuration: Cloud Server Configuration :	Local, Cloud Foundry, Kubernetes, etc.

Sprint Planning & Estimation

TITLE	DESCRIPTION	DATE
LITERATURE SURVEY	Analysis of the use case chosen by referring various journals and research papers	20 SEPTEMBER 2022
INFORMATION GATHERING	Collecting data by consulting technical documents, research articles, etc.	24 SEPTEMBER 2022
PREPARATION OF EMPATHY MAP	Prepare a list of problem statements in publications, a canvas for an empathy map to capture the user's gains and pains, etc.	25 SEPTEMBER 2022

IDEATION	List the ideas generated during the brainstorming session and rank the top three according to relevance and viability.	30 SEPTEMBER 2022
PROPOSED SOLUTION	Create a proposal for a solution that details its innovation, viability as a business idea, social impact, scalability, and other factors.	01 OCTOBER 2022
PROBLEM SOLUTION FIT	Get a problem-solution-fit document ready.	06 OCTOBER 2022
SOLUTION ARCHITECTURE	Document the solution architecture.	09 OCTOBER 2022
CUSTOMER JOURNEY	Create customer journey maps to comprehend how users engage with and use the application from entry to exit.	14 OCTOBER 2022
FUNCTIONAL REQUIREMENT	Document the functional requirements.	16 OCTOBER 2022
DATA FLOW DIAGRAMS	Create the data flow diagrams, then submit them for evaluation.	16 OCTOBER 2022
TECHNOLOGY ARCHITECTURE	Create the diagram of the technological architecture.	20 OCTOBER 2022
PREPARE MILESTONE & ACTIVITY LIST	Create a list of the project's milestones and activities.	28 OCTOBER 2022
PROJECT DEVELOPMENT - DELIVERY OF SPRINT-1, 2, 3 & 4	Create the code, develop it and submit it after testing it.	IN PROGRESS

CODING SOLUTION :

```
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.pkl'

model_rand = pickle.load(open(filename, 'rb'))


@app.route('/')

def index():

    return render_template('resaleintro.html')


@app.route('/predict')

def predict():

    return render_template('resalepredict.html')


@app.route('/y_predict', methods=['GET', 'POST'])

def y_predict():

    regyear = int(request.form['regyear'])

    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')

vehicletype = request.form.get('vehicletype')

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 = {}

for i in labels:

    mapper[i]= LabelEncoder()

    mapper[i].classes_ = np.load(str('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(X)

    y_prediction = model_rand.predict(X)

    print(y_prediction)

    return render_template('resalepredict.html',ypred = 'The resale value predicted is
{:.2f}$'.format(y_prediction[0]))


if _name== 'main_':

    app.run(host='localhost', debug=True, threaded=False).
```

```
<html>

<body>

    <p>Car Resale Value Prediction</p>

    <form action = "/login" method= "POST">


    <label for = "abtest">Choose abtest</label>

    <select name ="ab">

<option Value = "0">Control</option>

<option Value = "1">Test</option>

</select>

<br>
```

```
<label for = "vehicle">Choose Vehicle Type</label>

<select name ="vehicle">

<option Value = "0">andere </option>

<option Value = "1">bus </option>

<option Value = "2">cabrio </option>

<option Value = "3">coupe</option>

<option Value = "4">kleinwagen</option>

<option Value = "5">kombi</option>

<option Value = "6">limousine</option>

<option Value = "7">suv</option>

</select>


<p>Year Of Registeration</p>

<p><input type= "number" name = "year" /></p>


<label for = "gear">Choose Gear Box</label>

<select name ="gear">

<option Value = "0">automatik </option>

<option Value = "1">manuell</option>

</select><br>


<p>Number of PowerPS</p>

<p><input type= "number" name = "power" /></p>


<p>Number of Kilometers</p>

<p><input type= "number" name = "kilometer" /></p>
```

```
<p>Month Of Registration</p>

<p><input type= "number" name = "month" /></p>


<label for = "fuel">Choose Fuel Type</label>

<select name ="fuel">

<option Value = "0">andere</option>

<option Value = "1">benzin</option>

<option Value = "2">cng</option>

<option Value = "3">diesel</option>

<option Value = "4">elektro</option>

<option Value = "5">hybrid</option>

<option Value = "6">lpg</option>

</select><br>


<label for = "brand">Choose the brand of the Car</label>

<select name ="brand">

<option Value = "0">alfa_romeo</option>

<option Value = "1">audi</option>

<option Value = "2">bmw</option>

<option Value = "3">chevrolet</option>

<option Value = "4">chrysler</option>

<option Value = "5">citroen</option>

<option Value = "6">dacia</option>

<option Value = "7">daewoo</option>

<option Value = "8">daihatsu</option>

<option Value = "9">fiat</option>
```

<option Value = "10">ford</option>

<option Value = "11">honda</option>

<option Value = "12">hyundai</option>

<option Value = "13">jaguar</option>

<option Value = "14">jeep</option>

<option Value = "15">kia</option>

<option Value = "16">lada</option>

<option Value = "17">lancia</option>

<option Value = "18">land_rover</option>

<option Value = "19">mazda</option>

<option Value = "20">mercedes_benz</option>

<option Value = "21">mini</option>

<option Value = "22">mitsubishi</option>

<option Value = "23">nissan</option>

<option Value = "24">opel</option>

<option Value = "25">peugeot</option>

<option Value = "26">porsche</option>

<option Value = "27">renault</option>

<option Value = "28">rover</option>

<option Value = "29">saab</option>

<option Value = "30">seat</option>

<option Value = "31">skoda</option>

<option Value = "32">smart</option>

<option Value = "33">sonstige_autos</option>

<option Value = "34">subaru</option>

<option Value = "35">suzuki</option>

<option Value = "36">toyota</option>

```
<option Value = "37">trabant</option>
<option Value = "38">volkswagen</option>
<option Value = "39">volvo</option>
</select><br>

<label for = "damage">Are the Damages Repaired</label>
<select name ="damage">
<option Value = "0">Yes</option>
<option Value = "1">No</option>
</select>

<p><input type="submit" value = "submit" /></p>
</form>

   <b>{{y}}</b>
</body>
</html>
```

TESTING :

Car Resale Value Prediction

Choose abtest Control

Choose Vehicle Type andere

Year Of Registeration

2000

Choose Gear Box automatik

Number of PowerPS

120

Number of Kilometers

15000

Month Of Registration

2

Choose Fuel Type andere

Choose the brand of the Car alfa_romeo

Are the Damages Repaired Yes

submit

The Value of the Car is : 976.3883333333333

RESULT :

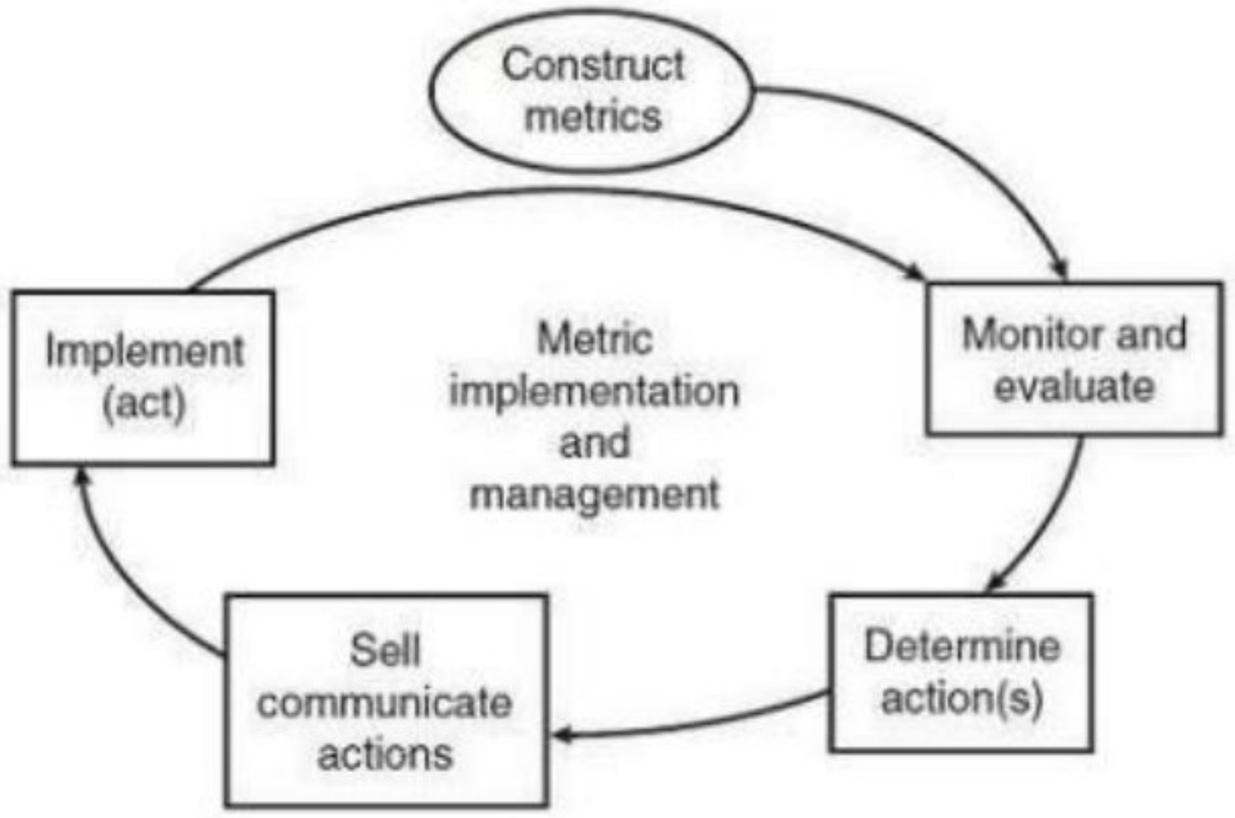
Performance Metrics

The following performance measurement necessities are the same whether you're measuring

business, service, process, or laboratory variables. Together, they constitute a measurement plan.

- **Definition of purpose: Why is a measurement being made? What process or variable is being measured? For what will the resulting data be used?**
- **Statement of the required measurement performance indicators (accuracy, precision, resolution): These may be determined by organizational policy, adherence to a published standard or an analysis of the requirements based on use, ability to measure, or more.**
- **The unit or variable being measured and a statement as to why measuring that particular variable supports the purpose of the measurement.**
- **An operational definition: A detailed, yet easily understood, description of the measurement process.**
- **An analysis plan: A typical example is a monthly report that makes comparisons to the previous month, year over year, and year to date. The different time frames provide greater context and allow the data to be presented graphically.**

o A control chart is a simple analysis plan template. It provides a graphical context that shows the continuity of changes over time, plus some analysis (control limits) that enables the viewer to differentiate among common causes, special causes, and random variation.



ADVANTAGE :

1. Easily identifies trends and patterns

Machine Learning can review large volumes of data and discover specific trends and patterns that would not be apparent to humans. For instance, for an e-commerce website like Amazon, it serves to understand the browsing behaviours and purchase histories of its users to help cater to the right products, deals, and reminders relevant to them. It uses the results to reveal relevant advertisements to them.

2. No human intervention needed (automation)

With ML, you don't need to babysit your project every step of the way. Since it means giving machines the ability to learn, it lets them make predictions and also improve the algorithms on their own. A common example of this is anti-virus softwares; they learn to filter new threats as they are recognized. ML is also good at recognizing spam.

3. Handling multi-dimensional and multi-variety data

Machine Learning algorithms are good at handling data that are multi-dimensional and multi-variety, and they can do this in dynamic or uncertain environments.

DISADVANTAGES :

1. Data Acquisition

Machine Learning requires massive data sets to train on, and these should be inclusive/unbiased, and of good quality. There can also be times where they must wait for new data to be generated

2. Time and Resources

ML needs enough time to let the algorithms learn and develop enough to fulfil their purpose with a considerable amount of accuracy and relevancy. It also needs massive resources to function. This can mean additional requirements of computer power for you

3. Interpretation of Results

Another major challenge is the ability to accurately interpret results generated by the algorithms. You must also carefully choose the algorithms for your purpose.

CONCLUSION:

By performing different ML models, we aim to get a better result or less error with max accuracy. Our purpose was to predict the price of the used cars having 25 predictors and 509577

data entries.

Initially, data cleaning is performed to remove the null values and outliers from the dataset then ML models are implemented to predict the price of cars.

Next, with the help of data visualization features were explored deeply. The relation between the

features is examined.

From the below table, it can be concluded that XGBoost is the best model for the prediction for used car prices. XGBoost as a regression model gave the best MSLE and RMSLE

values.

Result of Models:

Model	MSLE	RMSLE	Accuracy
Linear regression	0.00243399	0.04933557	59.3051%
Ridge regression:	0.00243399	0.04933553	59.3051%
Lasso regression	0.00243400	0.04933566	59.305%
KNN	0.00144004	0.03794796	76.4681%
Random Forest	0.00077811	0.00077811	87.5979%
Bagging Regressor	0.00143192	0.03784080	76.809%
Adaboost Regressor	0.00084475	0.02906475	86.4084%
XGBoost Regressor	0.00065047	0.02550431	89.6623%

FUTURE SCOPE:

✓ Thus, the Random Forest Regressor Regression model trained by us using IBM Watson Studio with the dataset provided by the mentor gives 95% exact resale value of the car.

✓ Need to collect more data and develop the dataset and train more in the model for best results and to consider all the models that are present in the real world.

✓ 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

APPENDIX:

1 Source Code

Car.html

```
<!DOCTYPE html>

<html lang="en" dir="ltr">

 <head>

 <meta charset="utf-8">

 <title>Car resale value </title>

 <link rel="stylesheet" href="../static/css/style.css">

 <link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-
awesome/4.7.0/css/font  awesome.min.css">

 </head>

 <body>

 <section class="header">

 <nav>

 <a href="/"><img src="../static/Images/roh.png" width="100" height="100"></a>


 </nav>

 <div class="text-box">

 <h1>Car resale value Predictor</h1>

 <p>Best system to predict the amount of resale value based on the parameters provided
by
```

```
the user .</p>
 <a href="./predict_page" class="visit-btn ">Check price</a>
 </div>
 </section>


 </body>
</html>
```

Predict.html

```
<!DOCTYPE html>
<html lang="en">
<head>
 <meta charset="UTF-8">
 <meta http-equiv="X-UA-Compatible" content="IE=edge">
 <meta name="viewport" content="width=device-width, initial-scale=1.0">
 <link rel="stylesheet" href="../static/css/predict.css">
 <title>Car Resale Predicted Value</title>
</head>
<body>
<section class="header">
 <nav>
 <a href="/"><img src="../static/Images/roh.png" width="100" height="100"></a>
 </nav>
<div class="text-box">
<h1>The Predicted Car Resale Value is </h1>
<h1>{{predict}}</h1>
</div>
```

```
 </section>
</body>
</html>
```

Value.html

```
<!DOCTYPE html>
<html lang="en" dir="ltr">
<head>
<link rel="stylesheet" href="../static/css/value.css">
<title>Car resale value</title>
</head>
<body>
<section class="form">
<form action="http://localhost:5000/predict" method="GET">
 <table border="0" align="center">
 <tbody>
<h1>Get the Accurate Resale Value of Your Car</h1>
 <tr>
<td><label for="year" padding:10px>Registration year : </label></td>
<td><input id="year" maxlength="50" name="regyear" type="text" />
<br>
<br>
</td>
</tr>
<tr>
<td><label for="month">Registration Month : </label></td>
<td><input id="month" maxlength="50" name="regmonth" type="text" />
```

```
<br>

<br>

</td>

</tr>

<tr>

<td><label for="power">Power of car in PS: </label></td>

<td><input id="power" maxlength="50" name="powerps" type="text" />

<br>

<br>

</td>

</tr>

<tr>

<td><label for="kilometer">Kilometers that car have driven : </label></td>

<td><input id="kilometer" maxlength="50" name="kms" type="text" />

<br>

<br>

</td>

</tr>

<tr>

<td><label for="geartype">Gear type : </label></td>

<td><input type="radio" name="geartype" value="manual"/> Manual

<input type="radio" name="geartype" value="automatic"/> Automatic

<input type="radio" name="geartype" value="not-declared"/> Not declared

<br>

<br>

</td>
```

```
</tr>

<tr>

<td><label for="damage">Your car is repaired or damaged : </label></td>

<td><input type="radio" name="damage" value="yes"/> Yes

<input type="radio" name="damage" value="no"/> No

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

<br>

<br>

</td>

</tr>

<tr>

<td><label for="model">Model Type : </label></td>

<td>

<select name="model" id="model">

<option value="" disabled selected hidden>Choose Model Name...</option>

 <option value="golf">Golf </option>

<option value="grand">Grand </option>

<option value="fabia">Fabia </option>

<option value="3er">3er </option>

<option value="2_reihe">2 Reihe </option>

<option value="andere">Andere </option>

<option value="c_max">C Max </option>

<option value="3_reihe">3 Reihe </option>

<option value="passat">Passat </option>

<option value="navara">Navara </option>

<option value="ka">Ka </option>
```

<option value="polo">Polo </option>

<option value="twingo">Twingo </option>

<option value="a_klasse">A klasse </option>

<option value="scirocco">Scirocco </option>

<option value="5er">5er </option>

<option value="meriva">Meriva </option>

<option value="arosa">Arosa </option>

<option value="c4">C4 </option>

<option value="civic">Civic </option>

<option value="transporter">Transporter </option>

<option value="punto">Punto </option>

<option value="e_klasse">E Klasse </option>

<option value="clio">Clio </option>

<option value="kadett">Kadett </option>

<option value="kangoo">Kangoo </option>

<option value="corsa">Corsa </option>

<option value="one">One </option>

<option value="fortwo">Fortwo </option>

<option value="1er">1er </option>

<option value="b_klasse">B Klasse </option>

<option value="signum">Signum </option>

<option value="astra">Astra </option>

<option value="a8">A8 </option>

<option value="jetta">Jetta </option>

<option value="fiesta">Fiesta </option>

<option value="c_klasse">C Klasse </option>

<option value="micra">Micra </option>

<option value="vito">Vito </option>

<option value="sprinter">Sprinter </option>

<option value="156">156 </option>

<option value="escort">Escort </option>

<option value="forester">Forester </option>

<option value="xc_reihe">Xc Reihe </option>

<option value="scenic">Scenic </option>

<option value="a4">A4 </option>

<option value="a1">A1 </option>

<option value="insignia">Insignia </option>

<option value="combo">Combo </option>

<option value="focus">Focus </option>

<option value="tt">Tt </option>

<option value="a6">A6 </option>

<option value="jazz">Jazz </option>

<option value="omega">Omega </option>

<option value="slk">Slk </option>

<option value="7er">7er </option>

<option value="80">80 </option>

<option value="147">147 </option>

<option value="glk">Glk </option>

<option value="100">100 </option>

<option value="z_reihe">Z Reihe </option>

<option value="sportage">Sportage </option>

<option value="sorento">Sorento </option>

<option value="v40">V40 </option>

<option value="5er">5er </option>

<option value="ibiza">Ibiza </option>

<option value="3er">3er </option>

<option value="mustang">Mustang </option>

<option value="eos">Eos </option>

<option value="touran">Touran </option>

<option value="getz">Getz </option>

<option value="a3">A3 </option>

<option value="almera">Almera </option>

<option value="megane">Megane </option>

<option value="7er">7er </option>

<option value="1er">1er </option>

<option value="lupo">Lupo </option>

<option value="r19">R19 </option>

<option value="zafira">Zafira </option>

<option value="caddy">Caddy </option>

<option value="2_reihe">2 Reihe </option>

<option value="mondeo">Mondeo </option>

<option value="cordoba">Cordoba </option>

<option value="colt">Colt </option>

<option value="impreza">Impreza </option>

<option value="vectra">Vectra </option>

<option value="berlingo">Berlingo </option>

<option value="80">80 </option>

<option value="m_klasse">M Klasse </option>

<option value="tiguan">Tiguan </option>

<option value="i_reihe">I Reihe </option>

<option value="espace">Espace </option>

<option value="sharan">Sharan </option>

<option value="6_reihe">6 Reihe </option>

<option value="panda">Panda </option>

<option value="up">Up </option>

<option value="seicento">Seicento </option>

<option value="ceed">Ceed </option>

<option value="5_reihe">5 Reihe </option>

<option value="yeti">Yeti </option>

<option value="octavia">Octavia </option>

<option value="mii">Mii </option>

<option value="rx_reihe">Rx Reihe </option>

<option value="6er">6er </option>

<option value="modus">Modus </option>

<option value="fox">Fox </option>

<option value="matiz">Matiz </option>

<option value="beetle">Beetle </option>

<option value="c1">C1 </option>

<option value="rio">Rio </option>

<option value="touareg">Touareg </option>

<option value="logan">Logan </option>

<option value="spider">Spider </option>

<option value="cuore">Cuore </option>

<option value="s_max">S Max </option>

<option value="a2">A2 </option>

<option value="x_reihe">X Reihe </option>

<option value="a5">A5 </option>

<option value="galaxy">Galaxy </option>

<option value="c3">C3 </option>

<option value="viano">Viano </option>

<option value="s_klasse">S Klasse </option>

<option value="1_reihe">1 Reihe </option>

<option value="avensis">Avensis </option>

<option value="sl">Sl </option>

<option value="roomster">Roomster </option>

<option value="q5">Q5 </option>

<option value="kaefer">Kaefer </option>

<option value="santa">Santa </option>

<option value="cooper">Cooper </option>

<option value="leon">Leon </option>

<option value="4_reihe">4 Reihe </option>

<option value="500">500 </option>

<option value="laguna">Laguna </option>

<option value="ptcruiser">Ptcruiser </option>

<option value="clk">Clk </option>

<option value="primera">Primera </option>

<option value="exeo">Exeo </option>

<option value="159">159 </option>

<option value="transit">Transit </option>

<option value="juke">Juke </option>

<option value="qashqai">Qashqai </option>

<option value="carisma">Carisma </option>

<option value="accord">Accord </option>

<option value="corolla">Corolla </option>

<option value="lanos">Lanos </option>

<option value="phaeton">Phaeton </option>

<option value="boxster">Boxster </option>

<option value="verso">Verso </option>

<option value="swift">Swift </option>

<option value="rav">Rav </option>

<option value="kuga">Kuga </option>

<option value="picanto">Picanto </option>

<option value="kalos">Kalos </option>

<option value="superb">Superb </option>

<option value="stilo">Stilo </option>

<option value="alhambra">Alhambra </option>

<option value="911">911 </option>

<option value="mx_reihe">Mx Reihe </option>

<option value="m_reihe">M Reihe </option>

<option value="roadster">Roadster </option>

<option value="ypsilon">Ypsilon </option>

<option value="cayenne">Cayenne </option>

<option value="galant">Galant </option>

<option value="justy">Justy </option>

<option value="90">90 </option>

<option value="sirion">Sirion </option>

<option value="crossfire">Crossfire </option>

<option value="6_reihe">6 Reihe </option>

<option value="agila">Agila </option>

<option value="duster">Duster </option>

<option value="cr_reihe">Cr Reihe </option>

<option value="v50">V50 </option>

<option value="discovery">Discovery </option>

<option value="c_reihe">C Reihe </option>

<option value="v_klasse">V Klasse </option>

<option value="yaris">Yaris </option>

<option value="c5">C5 </option>

<option value="aygo">Aygo </option>

<option value="cc">Cc </option>

<option value="carnival">Carnival </option>

<option value="fusion">Fusion </option>

<option value="bora">Bora </option>

<option value="forfour">Forfour </option>

<option value="100">100 </option>

<option value="cl">Cl </option>

<option value="tigra">Tigra </option>

<option value="156">156 </option>

<option value="300c">300c </option>

<option value="100">100 </option>

<option value="147">147 </option>

<option value="q3">Q3 </option>

<option value="spark">Spark </option>

<option value="v70">V70 </option>

<option value="x_type">X Type </option>

<option value="5_reihe">5 Reihe </option>

<option value="ducato">Ducato </option>

<option value="s_type">S Type </option>

<option value="x_trail">X Trail </option>

<option value="toledo">Toledo </option>

<option value="altea">Altea </option>

<option value="7er">7er </option>

<option value="voyager">Voyager </option>

<option value="calibra">Calibra </option>

<option value="bravo">Bravo </option>

<option value="range_rover">Range Rover </option>

<option value="antara">Antara </option>

<option value="tucson">Tucson </option>

<option value="q7">Q7 </option>

<option value="citigo">Citigo </option>

<option value="jimny">Jimny </option>

<option value="cx_reihe">Cx Reihe </option>

<option value="wrangler">Wrangler </option>

<option value="lybra">Lybra </option>

<option value="range_rover_sport">Range Rover Sport </option>

<option value="lancer">Lancer </option>

<option value="159">159 </option>

<option value="freelander">Freelander </option>

<option value="captiva">Captiva </option>

<option value="c2">C2 </option>

<option value="500">500 </option>

<option value="range_rover_evoque">Range Rover Evoque </option>

<option value="sandero">Sandero </option>

<option value="note">Note </option>

<option value="900">900 </option>

<option value="147">147 </option>

<option value="defender">Defender </option>

<option value="cherokee">Cherokee </option>

<option value="clubman">Clubman </option>

<option value="samara">Samara </option>

<option value="2_reihe">2 Reihe </option>

<option value="1er">1er </option>

<option value="3er">3er </option>

<option value="601">601 </option>

<option value="3_reihe">3 Reihe </option>

<option value="4_reihe">4 Reihe </option>

<option value="5er">5er </option>

<option value="6_reihe">6 Reihe </option>

<option value="legacy">Legacy </option>

<option value="pajero">Pajero </option>

<option value="auris">Auris </option>

<option value="niva">Niva </option>

<option value="5_reihe">5 Reihe </option>

<option value="s60">S60 </option>

<option value="nubira">Nubira </option>

<option value="vivaro">Vivaro </option>

<option value="g_klasse">G Klasse </option>

<option value="lodgy">Lodgy </option>

<option value="850">850 </option>

<option value="serie_2">Serie 2 </option>

<option value="6er">6er </option>

<option value="charade">Charade </option>

<option value="croma">Croma </option>

<option value="outlander">Outlander </option>

<option value="gl">Gl </option>

<option value="doblo">Doblo </option>

<option value="musa">Musa </option>

<option value="amarok">Amarok </option>

<option value="156">156 </option>

<option value="move">Move </option>

<option value="9000">9000 </option>

<option value="v60">V60 </option>

<option value="145">145 </option>

<option value="aveo">Aveo </option>

<option value="200">200 </option>

<option value="300c">300c </option>

<option value="b_max">B Max </option>

<option value="delta">Delta </option>

<option value="terios">Terios </option>

<option value="rangerover">RangeRover </option>

<option value="90">90 </option>

<option value="materia">Materia </option>

<option value="kalina">Kalina </option>

<option value="elefantino">Elefantino </option>

<option value="i3">I3 </option>

<option value="kappa">Kappa </option>

<option value="serie_3">Serie 3 </option>

<option value="48429">48429 </option>

<option value="serie_1">Serie 1 </option>

<option value="discovery_sport">Discovery Sport </option>

</select>

</td>

</tr>

<tr>

<td><label for="brand">Brand :</label></td>

<td>

<select name="brand" id="brand">

<option value="" disabled selected hidden>Choose Brand Name...</option>

<option value="volkswagen">Volkswagen </option>

<option value="audi">Audi </option>

<option value="jeep">Jeep </option>

<option value="skoda">Skoda </option>

<option value="bmw">Bmw </option>

<option value="peugeot">Peugeot </option>

<option value="ford">Ford </option>

<option value="mazda">Mazda </option>

<option value="nissan">Nissan </option>

<option value="renault">Renault </option>

<option value="mercedes_benz">Mercedes Benz </option>

<option value="opel">Opel </option>

<option value="seat">Seat </option>

<option value="citroen">Citroen </option>

<option value="honda">Honda </option>

<option value="fiat">Fiat </option>

<option value="mini">Mini </option>

<option value="smart">Smart </option>

<option value="hyundai">Hyundai </option>

<option value="sonstige_autos">Sonstige Autos </option>

<option value="alfa_romeo">Alfa Romeo </option>

<option value="subaru">Subaru </option>

<option value="volvo">Volvo </option>

<option value="mitsubishi">Mitsubishi </option>

<option value="kia">Kia </option>

<option value="suzuki">Suzuki </option>

<option value="lancia">Lancia </option>

<option value="porsche">Porsche </option>

<option value="toyota">Toyota </option>

<option value="chevrolet">Chevrolet </option>

<option value="dacia">Dacia </option>

<option value="daihatsu">Daihatsu </option>

<option value="trabant">Trabant </option>

```
<option value="saab">Saab </option>

<option value="chrysler">Chrysler </option>

<option value="jaguar">Jaguar </option>

<option value="daewoo">Daewoo </option>

<option value="rover">Rover </option>

<option value="land_rover">Land Rover </option>

<option value="lada">Lada </option>

</select>

<br>

<br>

</td>

</tr>

<tr>

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

<td>

<select name="fuelType" id="brand">

<option value="" disabled selected hidden>Choose Fuel Type...</option>

<option value="petrol"> Petrol </option>

<option value="diesel"> Diesel </option>

<option value="not-declared"> Not Declared </option>

<option value="lpg">LPG </option>

<option value="cng">CNG </option>

<option value="hybrid">Hybrid </option>

<option value="others">Others </option>

<option value="electric">Electric </option>

</select>
```

```
<br>

<br>

</td>

</tr>

<tr>

<td><label for="vehicletype">Vehicle type:</label></td>

<td>

<select name="vehicletype" id="vehicle" >

<option value="" disabled selected hidden>Choose Vehicle Type...</option>

<option value="coupe">Coupe </option>

 <option value="suv">SUV </option>

 <option value="kleinwagen">Kleinwagen </option>

 <option value="limousine">Limousine </option>

<option value="cabrio">Cabrio </option>

<option value="bus">Bus </option>

<option value="kombi">Kombi </option>

<option value="andere">Andere </option>

<option value="volkswagen">Volkswagen </option>

</select>

<br>

<br>

</td>

</tr>

</tbody>

</table>

<input name="Submit" type="Submit" value="Submit" id="button"/>
```

```
</form>

 </section>

</body

</html>
```

https://github.com/IBM-EPBL/IBM-Project-34858-1660278180