PROJECT 3 - ONLINE CAR SELLING / BUYING TREND RECOGNITION

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STEP 1:- PROTOTYPE SELECTION

ABSTRACT

Car manufacturers use artificial intelligence in just about every facet of the car-making process. Examples of AI in the automotive industry include industrial robots constructing a vehicle and autonomous cars navigating traffic with machine learning and vision.

PROBLEM STATEMENT

In this project we try to create a prototype which will give the price of used car based on various features like KM driven, model, manufacturer, etc.The only way to monetize this idea, is to allow the subscribed user to get exclusive insights and pricing on cars, like the AI model will take the estimated budget from the subscribed user and give them a variety of choices whereas non subscribed user will have to browse one-by-one like Amazon. This idea is solid and can be proven to work of at least 10 years, since people will keep buying/selling cars, and is always willing to get good offer.

MARKET/CUSTOMER/BUSINESS NEED ASSESSMENT

The sale and resale of automobiles have mostly been physical experiences. Although there have been a number of online platforms for automobile resale that have come up over the years, the pandemic led to exponential growth in this sector. Customers are no longer bound by physical boundaries and can demand competitive prices. Sellers, on the other hand, are benefitting from enhanced transparency as a result of competition. Car dealerships are also finding themselves adapting to the new rules of the used car market. As online car resellers become the norm, there is immense potential for AI to solidify this growth and help the sector achieve maximum potential.

TARGET SPECIFICATION AND CHARACTERIZATION

The target here is to develop a model that will forecast future sales, cut down costs.

The trend recognition has to be done by a data scientist who has some knowledge about this industry. The model should be able to handle large volumes of data, as in there will be a lot of features for the model to look at and the size of data depends on the sales of a particular month or week or years. We should also know in advance whether the customers need our model to forecast the sales for a week or for a month.

EXTERNAL SEARCH (INFORMATION AND DATA ANALYSIS)

1. **Finding the most common car sold:**

   From the dataset we can see that there are many car brands. Some of the car brands are more popular and are people's favorite choice. Finding the most common car sold is quite crucial, since it can potentially help us to identify which car are more likely to be sold or bought by customers.
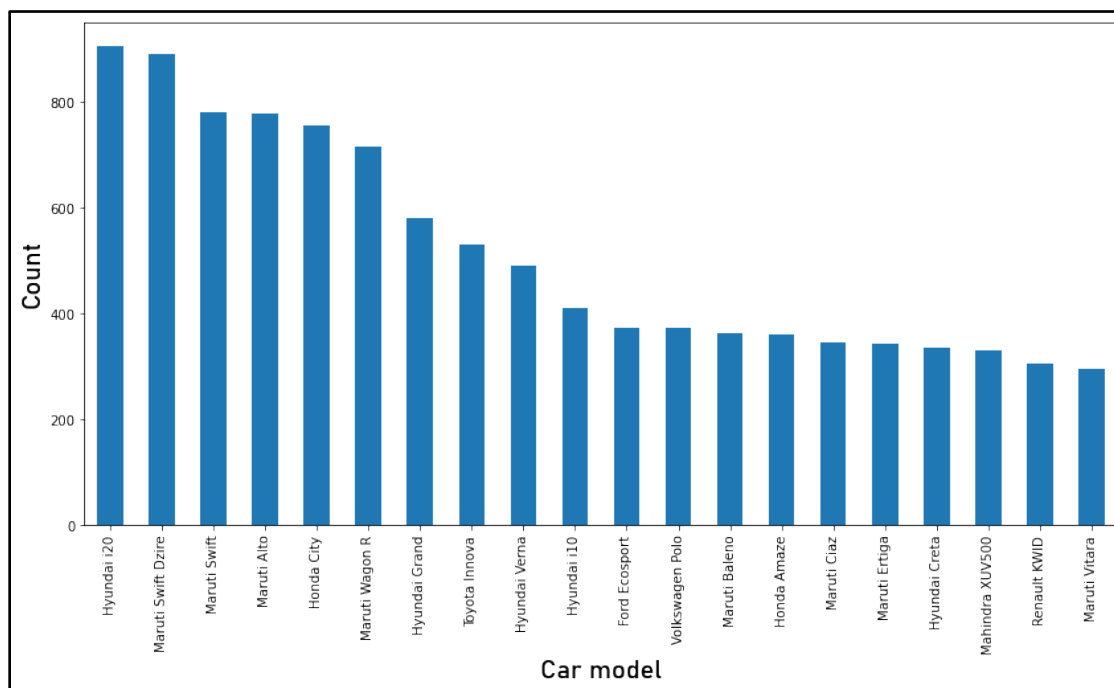

Figure 1 –Bar chart showing count of car models sold

From the bar-chart above, we can see that the most common car model sold is Hyundai i20 followed by Maruti Swift Dzire and Maruti Swift. This helps us to tell that most people are selling Hyundai i20 and Swift, whereas the least re-sold car models are Renault KWID and Maruti Vitara. The plot is quite crucial as it tells us about the resell market of cars in India. Let's compare the selling price of the most sold car model vs the least sold car model:

a. **Average Selling Price of Hyundai i20:**

   The average selling price of a Hyundai i20 in India is Rs. 5,43,604 /- Whereas when we compare it with the price of a new Hyundai i20 is between Rs. 7 lacs to Rs. 11 lacs in India as of 2022.

b. **Average Selling Price of Maruti Vitara:**
The average selling price of a Maruti Vitara in India is Rs. 8,30,597 /- Whereas when we compare it with the price of a new Maruti Vitara is between Rs. 10.45 lacs to Rs. 19.65 lacs in India as of 2022.

From this analysis we can say that the car model which is being re-sold at large has marginally less value as compared to its new model. Whereas the car model which is not being sold at large has less difference in its resale value and new car model value, which can make one wonder if they should buy the car at resale price or at showroom price, since the difference is not big and one gets to enjoy their new car other than driving used car. This analysis gives us a brief insight about the selling price of each car model.

2. **Finding the common car brand:**
The most common car brand will help us to understand which car brands are being re-sold and which car brands are being bought. First we learnt about the car models that are being sold at large, and now we will look which car brands dominate the market.
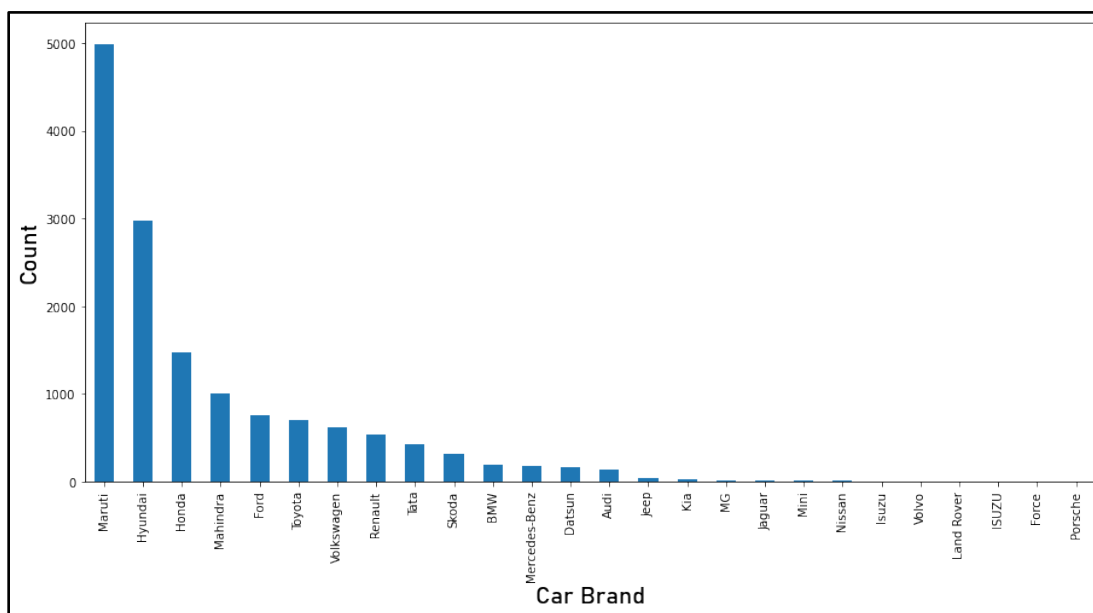

Figure 2 – *Bar chart showing count of car brand*

The bar graph easily tells us that the most dominant car brand is Maruti followed by Hyundai. Some of the exotic car companies like Porsche, Land Rover and Volvo lies at the bottom of the bar graph, this is because that their car models are usually expensive and are not favored by the Indian market.

From this analysis we can say that the most sold car model comes from the Maruti and Hyundai brands. This helps us to understand the actual resale car market requirement in

India, and can aid us to potentially identify which car models are more likely to be sold as compared to car models which are less likely to be sold.

3. **How old are most of the cars:**
   With the help of this analysis, we can identify the average age of car being put on resale. This will tell us how much old car people are likely to buy. Some might prefer very old car between 9-12 years or some might prefer fairly new car between 1-3 years.
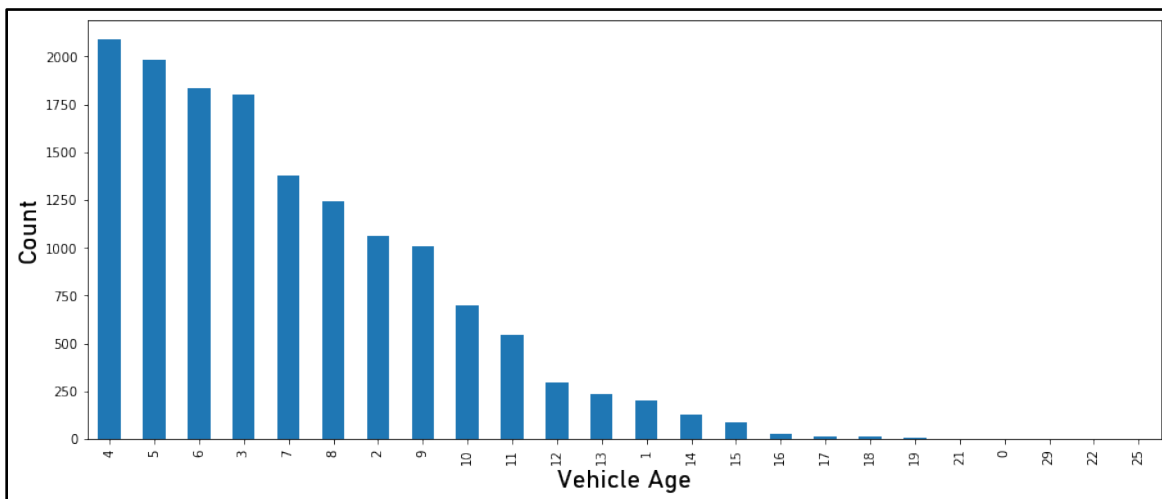

Figure 3 – Count of Vehicles w.r.t. their age

From the bar-chart above we can say that the average age of vehicle that is put on resale lie between 4-7 years, this means that people prefer to sell their cars that are as old as 4 to 7 years. People are less likely to sell their car which are 1 year old or which are way beyond 12 years old. From this we can say that, people will sell their cars which have became 3+ years old and less likely to sell their cars once it becomes 10+ years old, since it has now became an antic.

So far we know that the most car model that has being sold is Hyundai i20 along with Maruti and Hyundai being the car brands which has most number of resale cars in the market. Now we know this we can conclude that car models that are being sold by Maruti & Hyundai are more likely to be 4 to 6 years old.

4. **Finding average mileage of car brands:**
   As of the Indian car market, people like to choose a car with good mileage for the price they are paying for. This is a quite crucial feature, since not every car brand can manufacture a car model which car provide high mileage for a fair price. Cars with low cost can often have low mileage also on the other hand, cars with high prices will also

have low mileage due to the high power of their engines and other similar factors. To find a car with fair price and fair amount of mileage is quite challenging and crucial for the Indian market.
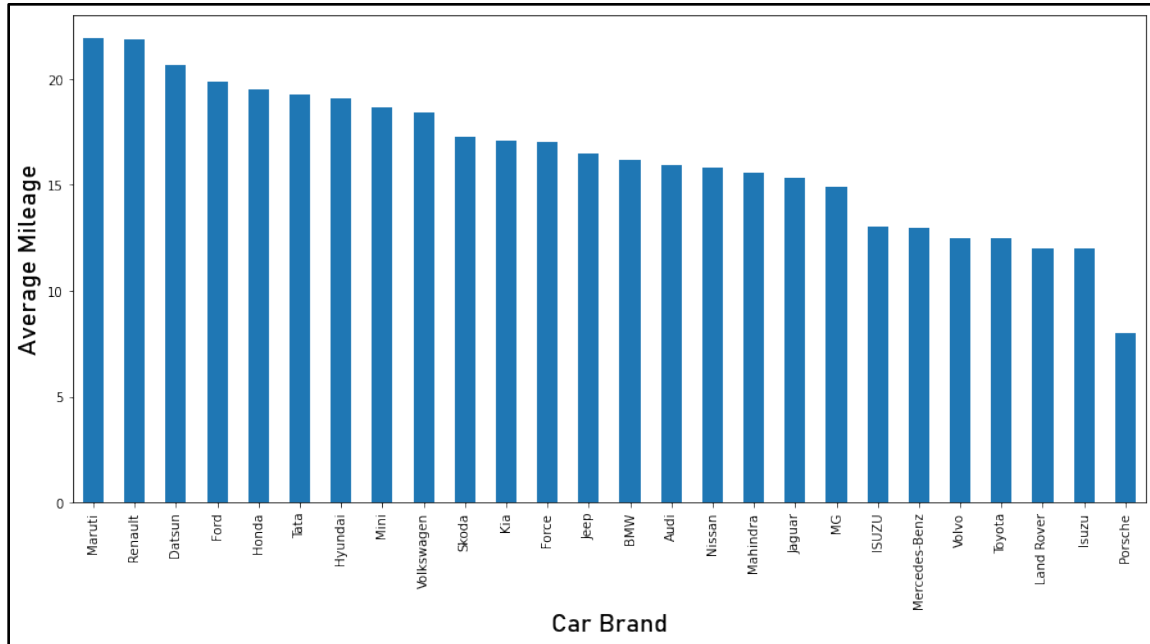

Figure 4 – Average mileage of each car brands

From the analysis above we can say that the car models manufactured by Maruti, Renault and Datsun have the highest mileage as compared to other car brands. Hyundai lies at 7th position when it comes to mileage. From the analysis so far, we came to know about the car models and the car brands that dominates the resale market in India, now looking at the bar-chart above we can say that even though the car models manufactured by the Hyundai does not have a high mileage as compared to Marutibut still people will buy it due to its popularity and other factors like value for money.

5. **Top 10 car model with highest mileage:**
   Now we know that which car brands can produce highest mileage cars, now let's look at which car model actually have the highest mileage.

car_name	brand	model	min_cost_price	max_cost_price	vehicle_age
Maruti Wagon R	Maruti	Wagon R	545348	691769	4
Maruti Alto	Maruti	Alto	497000	502000	4
Maruti Wagon R	Maruti	Wagon R	610000	618000	5
Maruti Wagon R	Maruti	Wagon R	545348	691769	3
Maruti Alto	Maruti	Alto	497000	502000	5

From the char above we come to know that Maruti Wagon R has the highest mileage as compared to other car models. When we take a more closer look at the car model details, we came to know that the Maruti Wagon R with Fuel type as Petrol has the highest sold model as compared to other fuel types like CNG and LPG. But we also came to know that Petrol has mileage of 19.2 km/lit whereas CNG has mileage of 28 km/lit. This means that even though CNG fuel type can have high mileage but people will still opt for petrol fueled vehicles.

6. **Comparison between dominating car models:**
Now we know which car models and car brands has been dominating the market, lets take a short comparison between these brands/models.
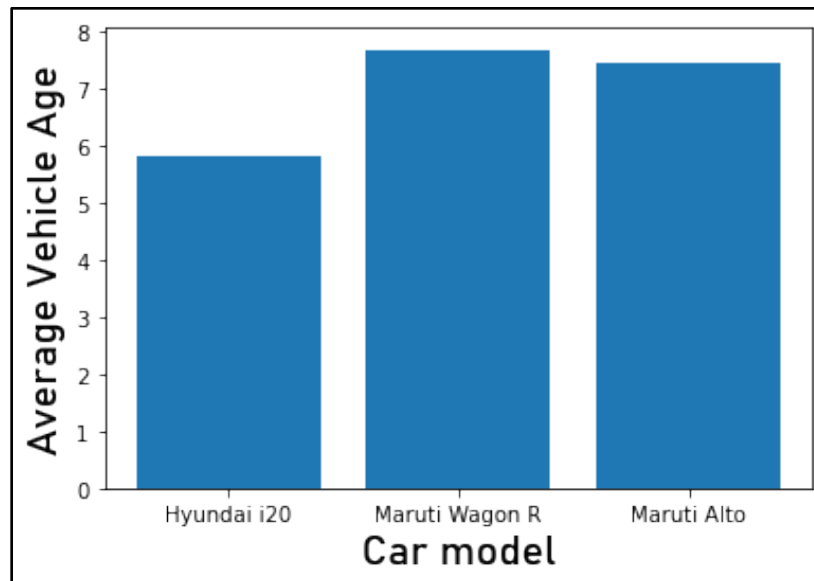
Figure 5 – Average car age between dominating car models

From the analysis above we came to know that the average of Maruti Wagon R is 7 to 8 years, for Hyundai i20 it is 5 to 6 years whereas for Maruti Alto it is also 7 to 8 years.
This help us to tell that even though Maruti Wagon R are 7 to 8 years old, but still they manage to give more mileage than any other car model. This gives a good view of the India resale car market. People like to buy cars with high mileage, fair price and fair amount of features.

7. **Automatic vs Manual Transmission:**

This is yet another important aspect of buying/selling a car. This tells us that whether people like sell/buy cars with automatic transmission or manual transmission. This analysis totally depends upon the interest of customers. It is important to note that cars with manual transmission can have higher mileage as compared to cars with automatic transmission.

BENCHMARKING

Lot of online sites like Zigwheels, cardekho , cars24use these techniques to improvisetheir sales and to also create a smooth experience for customers. Generally, benchmarking involves comparing project processes and performance metrics to either industry best standards and practices or successful completed projects. For this there is a need to continuously search for implementation of better techniques which lead to better results or outputs.

APPLICABLE REGULATIONS
- Rules against False Marketing.
- Data protection and privacy rules.
- Employment Schemes and laws created by government.

APPLICABLE CONSTRAINTS
- Convincing clients/authorities to implement our system
- Need to continuously update and manage the data and model.

BUSINESS MODEL
The first is, of course, the basic C2C/B2C marketplace that serves as a platform connecting sellers and buyers, where both interact directly to complete the transaction. The online used car platforms generate steady revenues by charging subscription fees either to list or view the used cars for sale. The interesting aspect of these marketplaces is their ability to enable a complete online journey from booking to buying a used car.

FINAL PRODUCT PROTOTYPE/ PRODUCT DETAILS
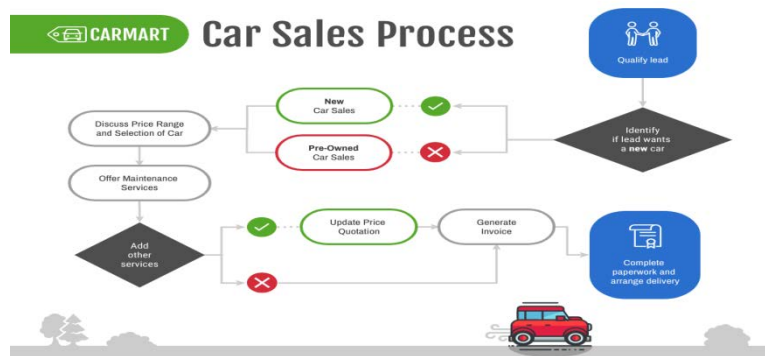
FEASIBILITY: -The target market for the auto sales business is comprehensive. Basically, the target market cannot be limited to just a group of people, but all those who want to own a car.

VIABILITY: -With changing consumer expectations, suppliers will need to consider the tools that enable and deepen their relationships with their customers. Profitability is directly proportional to creating a seamless customer experience like leveraging vehicle connectivity to "loyalize" their customers and "automate" decision making related to service and repair.

MONETIZATION: -This service is directly monetizable as it can be directly released as a service on completion which can be used by businesses.

STEP 2:- PROTOTYPE DEVELOPMENT

Github link:- https://github.com/Sahil-Naik/Feynn_Lab/tree/main/T3

Here is the code for the main.py file: -

https://github.com/bipro235/Car_Price_Predictions/blob/main/main.py

Here is the github link complete code for the model:-

https://github.com/bipro235/Car_Price_Predictions

STEP 3:- BUSINESS MODELLING

For this service, it is beneficial to use a Subscription Based Model, where

A) Case-I non Subscribed Users:

i. Looking to buy a car - These users will have to find their desired car one-by-one like amazon shopping, they will not get any assists from the prototype model.

ii. Looking to sell a car - These user will have to set their own price and will have to find on their own about optimal value of their car

B) Case-II Subscribed Users:

i. Looking to buy a car - These users will simply have to input their minimum budget and maximum budget. Based on these parameters this model will give them optimal results, they can then filter out based on transmission type, fuel type and many such options.

ii. Looking to sell a car - These users just have to input car parameters like km_driven, transmission type and many such, then this model will give them the optimal pricing for their car. Hence our model will save their times and effort.

STEP 4: - FINANCIAL MODELLING

Financial equation used in this model

Y=X+ (Z*0.012)

Where

Y = profit,

X= subscription charges per month,
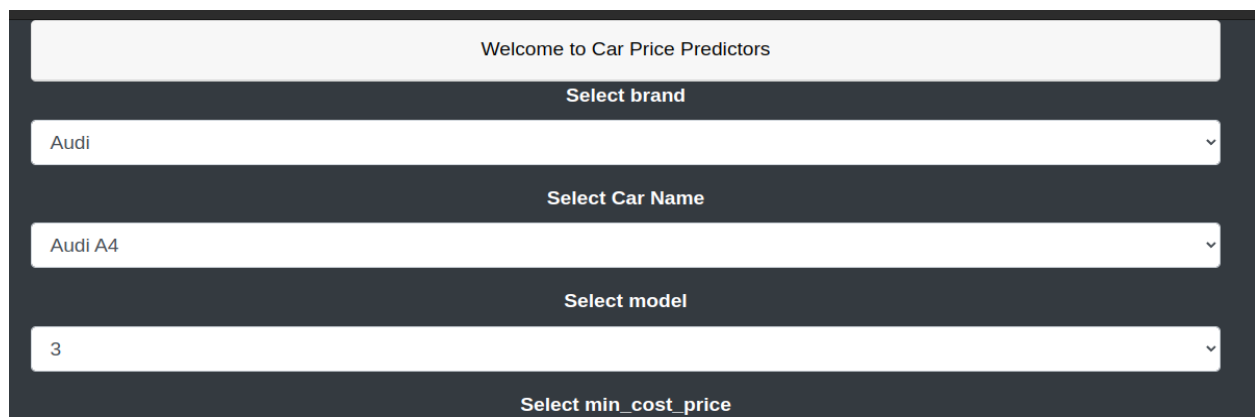
Z = price of car sold at in INR

MODEL DEPLOYMENT

The Deployment of the model is done using Flask. At first a pickle file is created using the pickle module. The model is dumped using pickle as "Price_predictor_model_2.pkl" in binary mode.

```
import pickle
pickle.dump(pipe,open('Price_predictor_model_2.pkl','wb'))
```

Once the pickle file is created, in the next step a main.py file is created. In this the pickle file is accessed to a model object. Then using the Flask module the data are sent and received to and from the site and server. In this request and render_templates are used.

The index.html file is created which is the front end. The user interface is created to take the user input. The index.html file is created inside the templates folder. Then a style.css file is created to enhance our html page. It is created inside the static folder inside the css folder.

Welcome to Car Price Predictors

Select brand

Audi

Select Car Name

Audi A4

Select model

3

Select min_cost_price

Enter the Maximum price for your Car

Select vehicle_age

Enter the vehicle age

Enter the kilo meter driven

Enter the kilometer driven

Select seller_type

Dealer

Select fuel_type

CNG

Select transmission_type

Automatic

Enter the mileage in km

Enter the Mileage

Select engine

Enter the Engine CC

Enter the Engine CC

Select max_power

Enter the max_power

Select seats

Enter the number of seats

Predict Price

Here is the code for the index.html folder.

https://github.com/bipro235/Car_Price_Predictions/blob/main/index.html

Once the details of the form is filled, on pressing the predict button which is attached with onclick listener. The onclick listener calls the send function which sends a request to the server to access the model in the server that is the main.py file. The model then computes the data and sends it to the html file. The result is then displayed in the html page. The sending and receiving of the request and data are done using a XMLHttpRequest module object.

Here is a demo for the deployment of the model.

Welcome to Car Price Predictors

Select brand

Datsun

Select Car Name

Datsun GO

Select model

GO

Select min_cost_price

250000

Select max_cost_price

450000

Select vehicle_age

4

Enter the kilo meter driven

23434

Select seller_type

Individual

Select fuel_type

CNG

Select transmission_type

Automatic

Enter the mileage in km

389

Select engine

23

Select max_power

242

Select seats

2

Predict Price

Prediction : Rupees 567324.5537163955

CONCLUSION

Artificial intelligence can utilize the web and disconnected conduct and lifestyle data to signal car clients whose movement shows that they are prepared to purchase and educate the salesman about what stock they will react to. As AI progresses, it vows to give new modified

leads to help them along with the purchasing procedure, and to keep in contact with past purchasers with vehicle buyers, and service reminders.

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