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Electric Car Price Prediction System

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***Abstract*— Nowadays, the supply of fossil fuels is constantly decreasing. In this alarming situation we need eco-friendly vehicles. It is the turning point for the world to slowly adapt to electric vehicles. A lot of change needs to happen. Major car makers like Tesla and Porsche manufacture many electric vehicles. The improvement of battery technology in recent years is the main reason for the popularity of electric vehicles. Buying an electric vehicle can be a great choice for consumers because of drive quality, low noise levels, and convenience.**

I.INTRODUCTION

In car price prediction, a considerable number of distinct attributes are taken and observed for the reliable and accurate prediction.

To build a model for predicting the price of cars we have applied three machine learning techniques.

Respective performances of different algorithms are then compared to find one that best suits the available data set.

The final prediction model was integrated into the web application.

Prediction of certain attributes examining a dataset is part of Data Science.

In that context some data science techniques are required to predict the price of cars with the available independent variables.

That should help the management to understand exactly how the prices vary with the specifications of a vehicle.

So that according to those requirements management can manipulate the design of the cars, the business strategy etc. to meet certain price levels.

The technology stack of our Car Price Prediction System is:

1.FrontEnd Technology(Client Side):

- Html
- CSS

2.Backend Technology(Server Side):

- Flask

3.Database

- SQLite3

4.Machine Learning

II. EASE OF USE

A. Frontend

A Manufacturer can feed car specifications through a form page to predict the price of the car. On our client side, different web pages are created using HTML and CSS.

B. Backend

In our backend part we have used Flask. Data from the front page is passed to the server side using the 'Post' method. At the server side an app object is created .using app.rout().Here we load our Machine Learning model as .pkl file .data is passed to the model to predict the price.

C. Data Collection

We have collected a dataset which contains various factors depending on the price of the Electric Car from the Kagglee Website.

Name	Subtitle	Acceleratio	TopSpeed	Range	Efficiency	FastCharge	Drive	NumberofS
Opel Ampe	Battery Ele	7.3 sec	150 km/h	335 km	173 Wh/km	210 km/h	Front Whee	5
Renault Kar	Battery Ele	22.4 sec	130 km/h	150 km	194 Wh/km	-	Front Whee	5
Nissan Leaf	Battery Ele	7.9 sec	144 km/h	220 km	164 Wh/km	230 km/h	Front Whee	5
Audi e-tron	Battery Ele	5.7 sec	200 km/h	375 km	231 Wh/km	600 km/h	All Wheel D	5
Porsche Tay	Battery Ele	2.8 sec	260 km/h	390 km	215 Wh/km	860 km/h	All Wheel D	4
Nissan e-N'	Battery Ele	14.0 sec	123 km/h	165 km	218 Wh/km	170 km/h	Front Whee	7
Volkswager	Battery Ele	8.9 sec	160 km/h	275 km	164 Wh/km	260 km/h	Rear Whee	5
BMW iX3	Battery Ele	6.8 sec	180 km/h	385 km	192 Wh/km	520 km/h	Rear Whee	5
Nissan Leaf	Battery Ele	7.3 sec	157 km/h	325 km	172 Wh/km	390 km/h	Front Whee	5
BMW i3 120	Battery Ele	7.3 sec	150 km/h	235 km	161 Wh/km	270 km/h	Rear Whee	4
Mercedes E	Battery Ele	8.9 sec	160 km/h	355 km	187 Wh/km	420 km/h	Front Whee	5
DS 3 Crossb	Battery Ele	8.7 sec	150 km/h	250 km	180 Wh/km	330 km/h	Front Whee	5
BMW i3s 12	Battery Ele	6.9 sec	160 km/h	230 km	165 Wh/km	260 km/h	Rear Whee	4
Sono Sion	Battery Ele	9.0 sec	140 km/h	250 km	181 Wh/km	310 km/h	Front Whee	5
Audi e-tron	Battery Ele	3.3 sec	250 km/h	405 km	210 Wh/km	810 km/h	All Wheel D	4
Kia e-Soul 6	Battery Ele	7.9 sec	167 km/h	370 km	173 Wh/km	350 km/h	Front Whee	5
Renault Zoe	Battery Ele	11.4 sec	135 km/h	315 km	165 Wh/km	230 km/h	Front Whee	5
Hyundai IO	Battery Ele	9.7 sec	165 km/h	250 km	153 Wh/km	220 km/h	Front Whee	5
Lightyear O	Battery Ele	10.0 sec	150 km/h	575 km	104 Wh/km	540 km/h	All Wheel D	5
Tesla Roads	Battery Ele	2.1 sec	410 km/h	970 km	206 Wh/km	920 km/h	All Wheel D	4
Peugeot e-	Battery Ele	8.1 sec	150 km/h	275 km	164 Wh/km	370 km/h	Front Whee	5
Honda e	Battery Ele	9.0 sec	145 km/h	170 km	168 Wh/km	190 km/h	Rear Whee	4

D. Data Preparation

We performed pre-processing of the dataset using numpy, pandas from python where we have done null value extraction, Categorization, Missing value Detection, Feature Extraction and making the dataset ready to be used for Machine Learning Models .

What is a Random Forest Regressor?

A random forest is a meta estimator that fits a number of classifying decision trees on various sub-samples of the dataset and uses averaging to improve the predictive accuracy and control over-fitting. [6].

E. Choosing the right Architecture

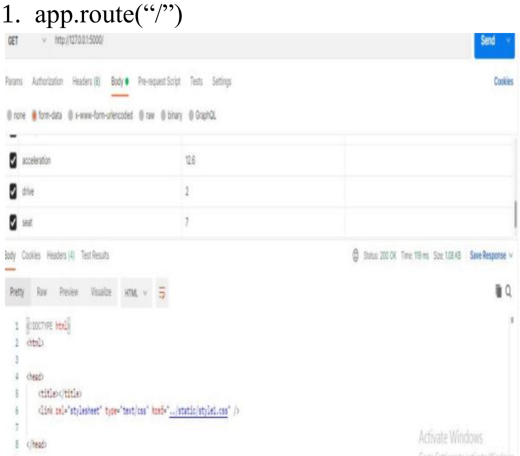
Random Forest Regression is a supervised learning algorithm that uses ensemble learning methods for regression. Ensemble learning method is a technique that combines predictions from multiple machine learning algorithms to make a more accurate prediction than a single model. Therefore, choosing the right architecture plays a valuable role in making predictions. The different architectures which we have trained are Linear Regression , Ridge , Lasso are the methods that give us the best possible accuracy and are used in our final implementation. different architectures which we have trained are Linear Regression , Ridge Lasso are the methods that give us the best possible accuracy and are used in our final implementation.

Training algorithm used - Random Forest

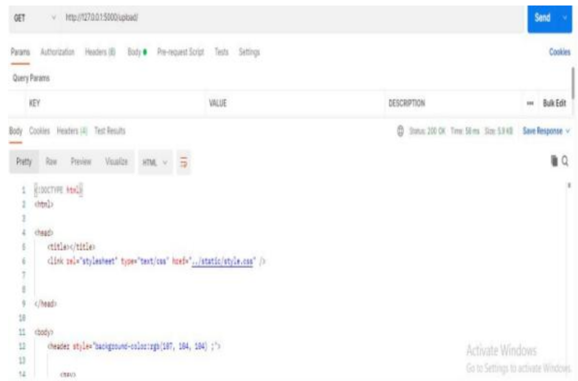
F. Testing Our Model

Url Mapping using Postman Software

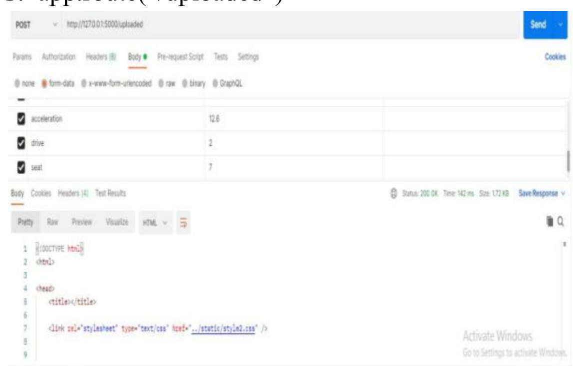
1. app.route("/")



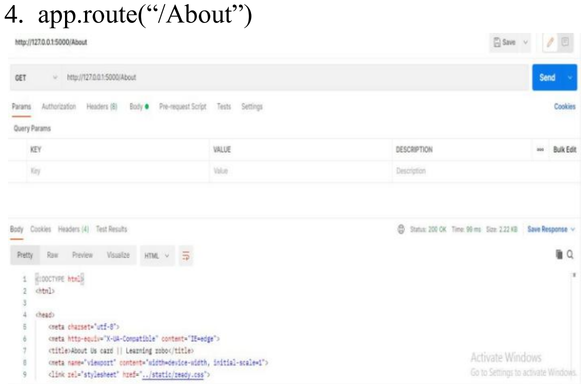
2. app.route("/upload/")



3. app.route("/uploaded")



4. app.route("/About")



ML model testing

- Whole dataset is divided into training and testing dataset in the ratio of 70:30.
- Algorithm is then applied to the testing data and the mean squared error is calculated.

G. Comparative analysis

Our project is a web based application which uses a machine learning model for predicting the output. The website gives us the user interface for giving the data for predicting the output (done by the trained ml model).

Client side takes the data as input, then the server side accepts the data. Data is provided to the ml model and the price is fetched. This data is stored in the database and then it is fetched from the client side.

III. DEFINING THE DATA STORAGE

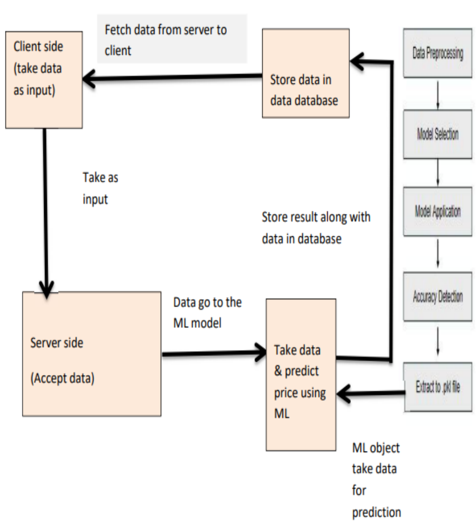
We have used SQLite 3 as our database.

A. Schema of Database

create table Car_Specifications_tab(Sino INTEGER PRIMARY KEY AUTOINCREMENT, name1 TEXT NOT NULL, email TEXT UNIQUE NOT NULL,
level1 DECIMAL(5,a2) NOT NULL, speed DECIMAL(5,2) NOT NULL, efficiency DECIMAL(5,2) NOT NULL, range1 DECIMAL(5,2) NOT NULL, battery DECIMAL(5,2) NOT NULL, acceleration DECIMAL(3,1) NOT NULL, drive integer NOT NULL, seat integer NOT NULL, Predicted_Price integer NOT NULL
)

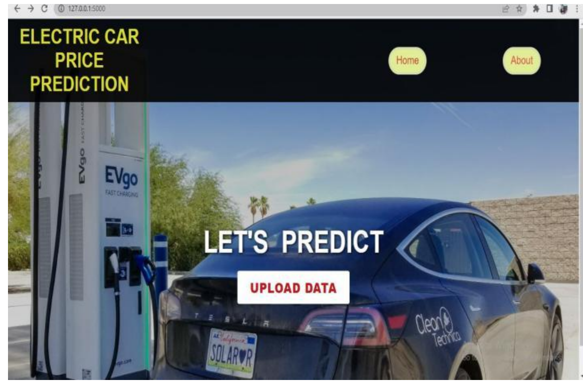
Name	Subtitle	Acceleratio	TopSpeed	Range	Efficiency	FastCharge	Drive	NumberofS	PriceinUK
Opel Ampe	Battery Ele	7.3 sec	150 km/h	335 km	173 Wh/km	210 km/h	Front Whee	5	N/A
Renault Ka	Battery Ele	22.4 sec	130 km/h	160 km	194 Wh/km	-	Front Whee	5	£31,680
Nissan Leaf	Battery Ele	7.9 sec	144 km/h	220 km	164 Wh/km	230 km/h	Front Whee	5	£25,995
Audi e-tron	Battery Ele	5.7 sec	200 km/h	375 km	231 Wh/km	600 km/h	All Wheel D	5	£79,900
Porsche Ta	Battery Ele	2.8 sec	260 km/h	390 km	215 Wh/km	860 km/h	All Wheel D	4	£138,830
Nissan e-N	Battery Ele	14.0 sec	123 km/h	165 km	218 Wh/km	170 km/h	Front Whee	7	£30,255
Volkswage	Battery Ele	8.9 sec	160 km/h	275 km	164 Wh/km	260 km/h	Rear Whee	5	£27,120
BMW iX3	Battery Ele	6.8 sec	180 km/h	385 km	192 Wh/km	520 km/h	Rear Whee	5	£58,850
Nissan Leaf	Battery Ele	7.3 sec	157 km/h	325 km	172 Wh/km	390 km/h	Front Whee	5	£30,445
BMW i3 120	Battery Ele	7.3 sec	150 km/h	235 km	161 Wh/km	270 km/h	Rear Whee	4	£31,305
Mercedes E	Battery Ele	8.9 sec	160 km/h	355 km	187 Wh/km	420 km/h	Front Whee	5	£43,495
DS 3 Crossb	Battery Ele	8.7 sec	150 km/h	250 km	180 Wh/km	330 km/h	Front Whee	5	£31,500
BMW i3s 12	Battery Ele	6.9 sec	160 km/h	230 km	165 Wh/km	260 km/h	Rear Whee	4	£32,305
Sono Sion	Battery Ele	9.0 sec	140 km/h	260 km	181 Wh/km	310 km/h	Front Whee	5	N/A
Audi e-tron	Battery Ele	3.3 sec	250 km/h	405 km	210 Wh/km	810 km/h	All Wheel D	4	£110,950
Kia e-Soul 6	Battery Ele	7.9 sec	167 km/h	370 km	173 Wh/km	350 km/h	Front Whee	5	£37,545

IV. FLOWCHART

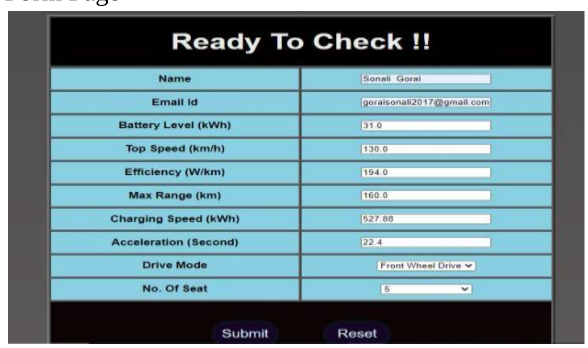


V. RESULTS

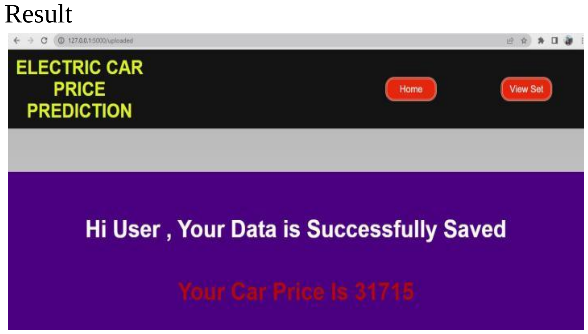
Home Page



Form Page



Result



VI. CONCLUSION

As we know petrol is a non biodegradable fuel, it is decreasing and becoming more expensive day by day.

So to save those fuels and maintain a pollution free environment, battery oriented cars are being promoted in most of the nations.

This type of software is of great use for the manufactures as well as users to estimate the cost of electric vehicles.

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