FUEL PREDICTION EFFICIENCY

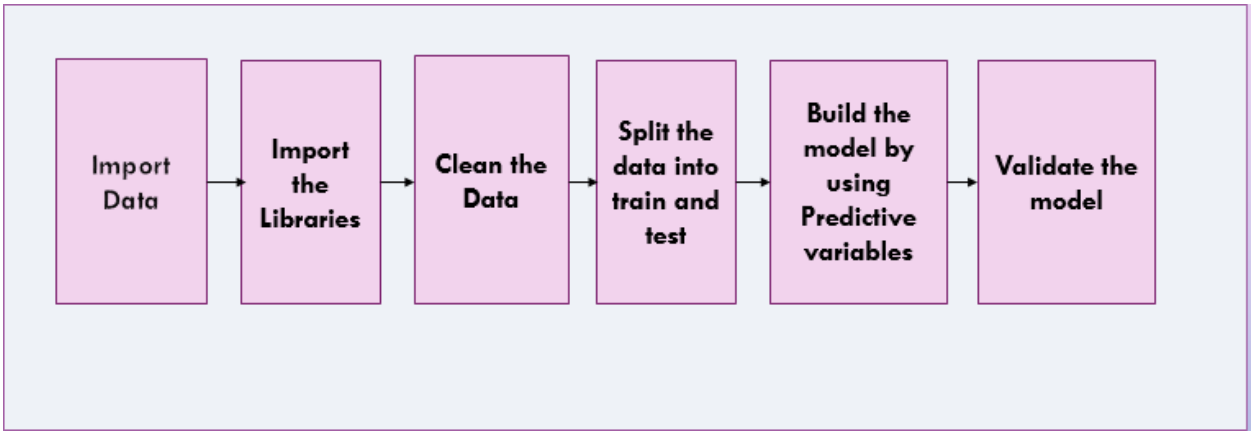
Halak Jigneshbhai Vyas **GitHub:** [Click Here]

DataSet

- This dataset consist of 9 attributes,
    1. mpg: continuous
    2. cylinders: multi-valued discrete
    3. displacement: continuous
    4. horsepower: continuous
    5. weight: continuous
    6. acceleration: continuous
    7. model year: multi-valued discrete
    8. origin: multi-valued discrete
    9. car name: string (unique for each instance)

Algorithm: Regression

Regression Progress:



Application:

This algorithm is used to analysis the fuel efficiency using regression algorithm. Ability to model and predict the fuel consumption is vital in enhancing fuel economy of vehicles and preventing fraudulent activities in fleet management. Fuel consumption of a vehicle depends on several internal factors such as distance, load, vehicle characteristics, and driver behavior, as well as external factors such as road conditions, traffic, and weather. However, not all these factors may be measured or available for the fuel

consumption analysis. We consider a case where only a subset of the aforementioned factors is available as a multi-variate time series from a long distance, public bus. Hence, the challenge is to model and/or predict the fuel consumption only with the available data, while still indirectly capturing as much as influences from other internal and external factors. Machine Learning (ML) is suitable in such analysis, as the model can be developed by learning the patterns in data.

Steps & Output

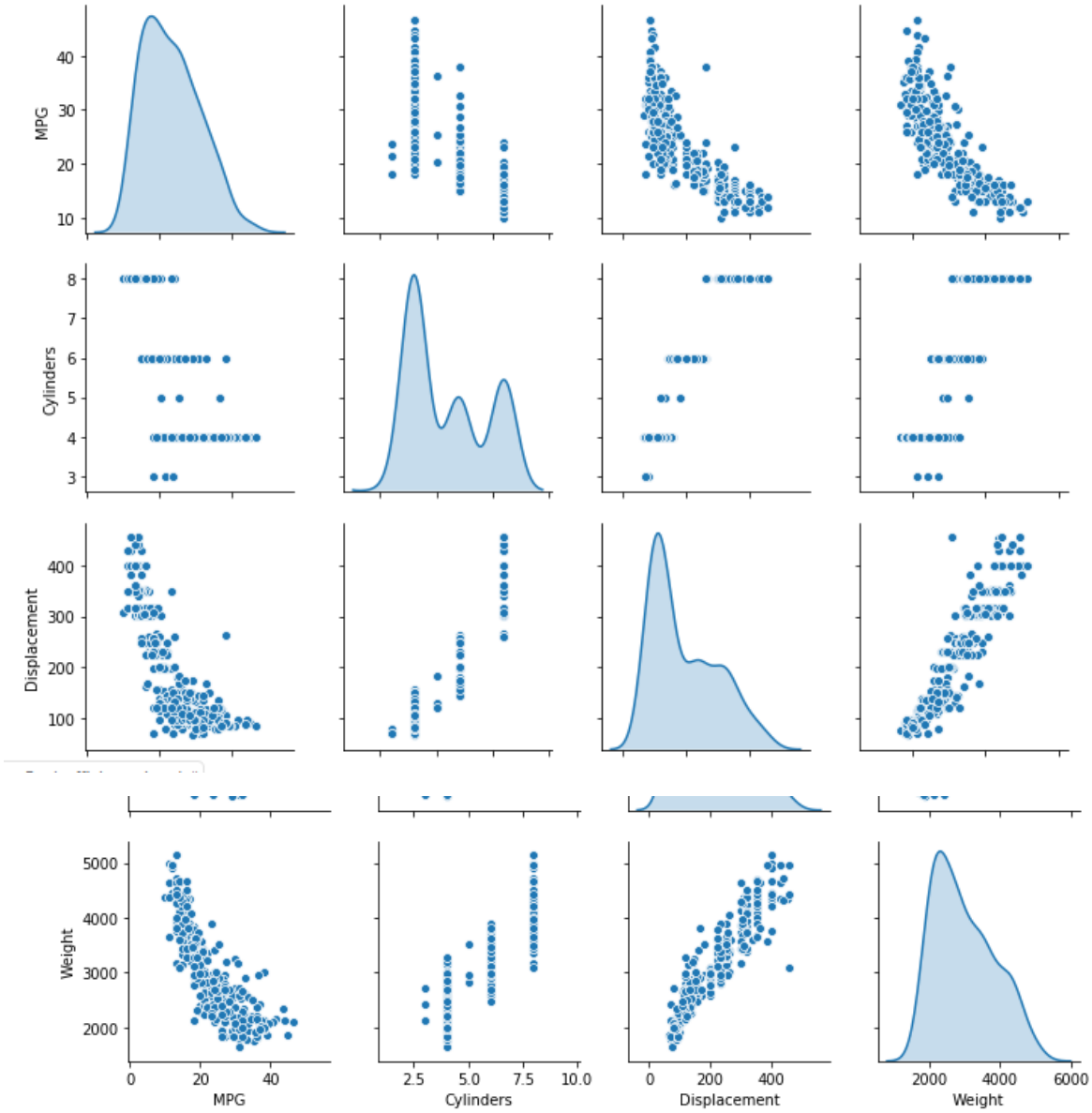
- Install and set up environment by downloading Anaconda and install Tensorflow package along with CUDA toolkit for tensorflow.
- Launch Juypter Notebook.
- Import Matplot, Panda and Seaborn packages in Juypter Notebook.
- Import 2 Datasets.

	MPG	Cylinders	Displacement	Horsepower	Weight	Acceleration	Model Year	Origin
393	27.0	4	140.0	86.0	2790.0	15.6	82	1
394	44.0	4	97.0	52.0	2130.0	24.6	82	2
395	32.0	4	135.0	84.0	2295.0	11.6	82	1
396	28.0	4	120.0	79.0	2625.0	18.6	82	1
397	31.0	4	119.0	82.0	2720.0	19.4	82	1

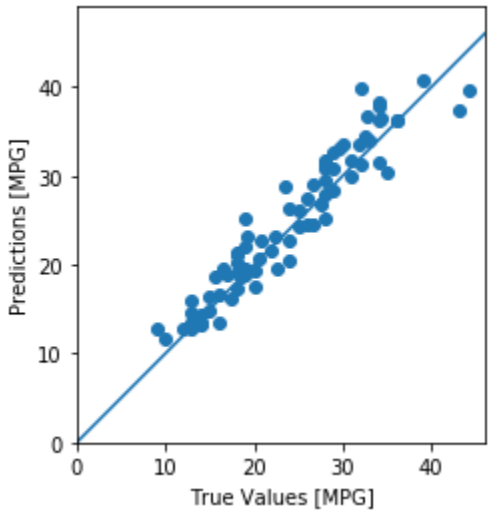
Split the data into train and test

	MPG	Cylinders	Displacement	Horsepower	Weight	Acceleration	Model Year	USA	Europe	Japan
393	27.0	4	140.0	86.0	2790.0	15.6	82	1.0	0.0	0.0
394	44.0	4	97.0	52.0	2130.0	24.6	82	0.0	1.0	0.0
395	32.0	4	135.0	84.0	2295.0	11.6	82	1.0	0.0	0.0
396	28.0	4	120.0	79.0	2625.0	18.6	82	1.0	0.0	0.0
397	31.0	4	119.0	82.0	2720.0	19.4	82	1.0	0.0	0.0

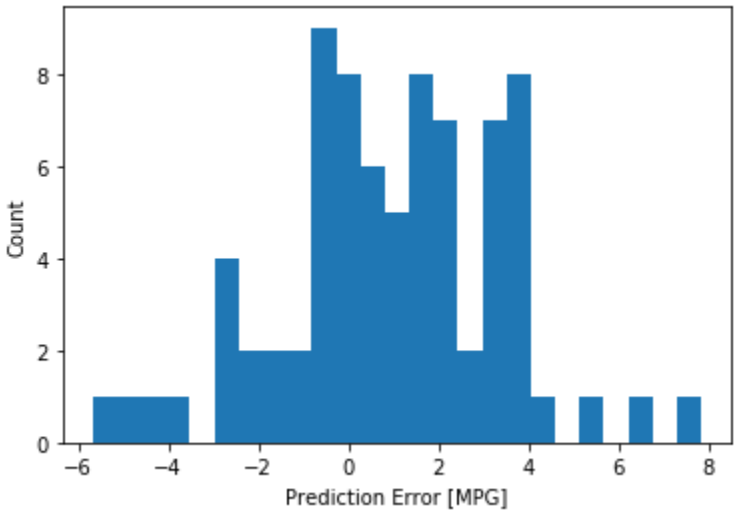
- Plotting the trained dataset,



- Make Prediction,



- Prediction error,



Conclusion

- Mean Squared Error (MSE) is a common loss function used for regression problems (different loss functions are used for classification problems).

- Similarly, evaluation metrics used for regression differ from classification. A common regression metric is Mean Absolute Error (MAE).
- When numeric input data features have values with different ranges, each feature should be scaled independently to the same range.
- If there is not much training data, one technique is to prefer a small network with few hidden layers to avoid overfitting.
- Early stopping is a useful technique to prevent overfitting.

Reference:

https://www.tensorflow.org/tutorials/keras/basic_regression#the_auto_mpg_dataset

https://archive.ics.uci.edu/ml/datasets/Auto+MPG

https://www.pugetsystems.com/labs/hpc/The-Best-Way-to-Install-TensorFlow-with-GPU-Support-on-Windows-10-Without-Installing-CUDA-1187/