



## **Artificial Intelligence Fullstack**

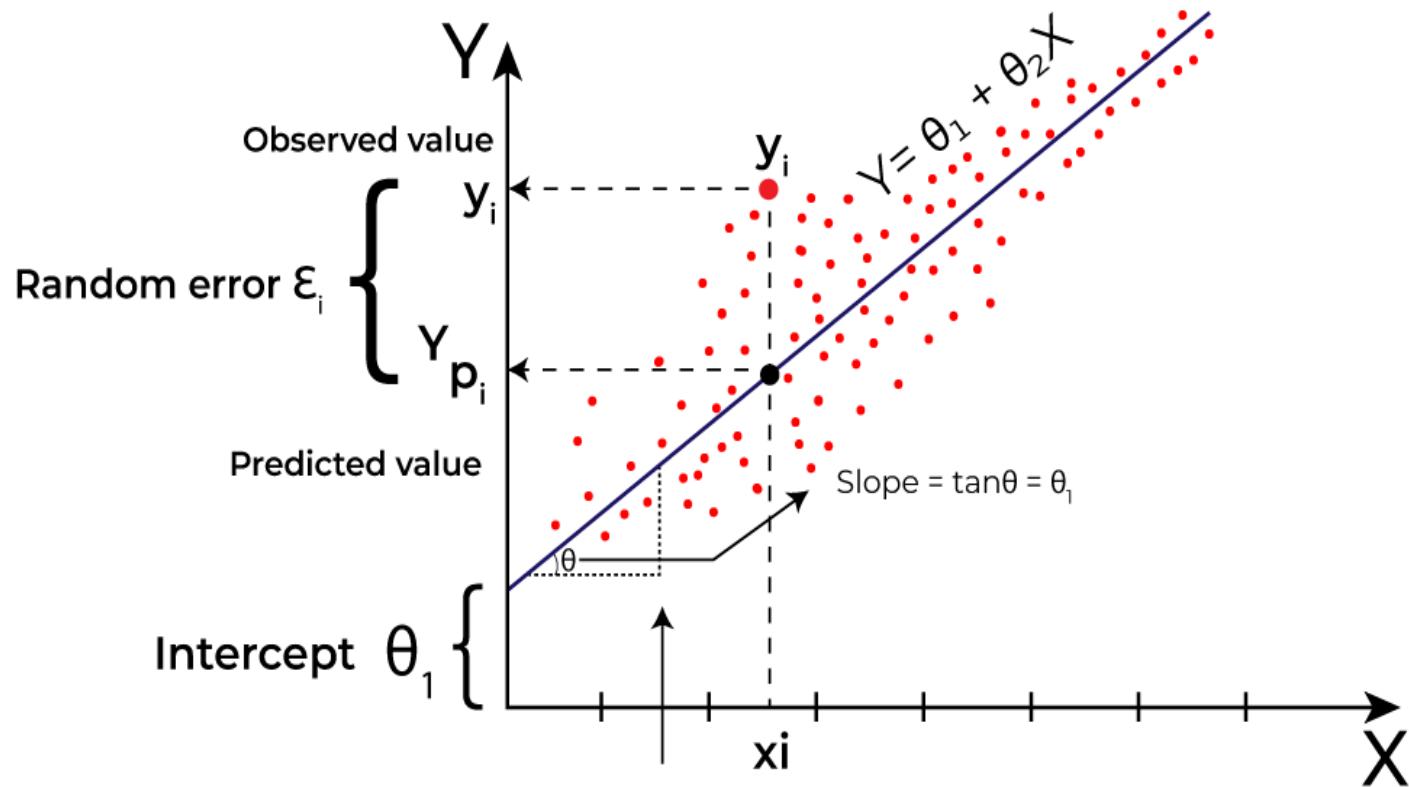
**[Course]**

**Week 8 – Machine Learning - Linear Regression**

**[See examples / code in GitHub code repository]**

**It is not about Theory, it is 20% Theory and 80% Practical –  
Technical/Development/Programming [Mostly Python based]**

# ML - What is Linear Regression



## Examples

Reference:

<https://www.geeksforgeeks.org/ml-linear-regression/>

<https://www.ibm.com/think/topics/linear-regression>

[https://www.w3schools.com/python/python\\_ml\\_linear\\_regression.asp](https://www.w3schools.com/python/python_ml_linear_regression.asp)

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# ML | Linear Regression

If you had studied longer, would your overall scores get any better?

For instance, say you have an hour-score dataset, which contains entries such as 1.5h and 87.5% score. It could also contain 1.61h, 2.32h and 78%, 97% scores. The kind of data type that can have any intermediate value (or any level of 'granularity') is known as **continuous** data.

Another scenario is that you have an hour-score dataset which contains letter-based grades instead of number-based grades, such as A, B or C. Grades are clear values that can be isolated, since you can't have an A.23, A++++++++++ (and to infinity) or A \* e^12. The kind of data type that cannot be partitioned or defined more granularly is known as **discrete** data.

Regression is performed on continuous data, while classification is performed on discrete data. Regression can be anything from predicting someone's age, the house of a price, or value of any variable. Classification includes predicting what *class* something belongs to (such as whether a tumor is benign or malignant).

Reference:

<https://stackabuse.com/linear-regression-in-python-with-scikit-learn/>



# ML | Linear Regression - Exercises

See code here: <https://github.com/ShahzadSarwar10/Fullstack-WITH-AI-B-3-SAT-SUN-6Months-Explorer/blob/main/Week6/Case6-1-LinearRegressionViaSciKitLearn.py>

You should be able to analyze – each code statement, you should be able to see trace information – at each step of debugging.

“DEBUGGING IS BEST STRATEGY TO LEARN A LANGUAGE.” So debug code files, line by line, analyze the values of variable – changing at each code statement. BEST STRATEGY TO LEARN DEEP.

Let's put best efforts.

Thanks.

Shahzad – Your AI – ML Instructor

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## Exercises



# ML | Multiple Linear Regression

Where we can predict using *many variables* instead of one, and this is also a much more common scenario in real life, where many things can affect some result.

For instance, if we want to predict the gas consumption in US states, it would be limiting to use only one variable, for instance, gas taxes to do it, since more than just gas taxes affects consumption. There are more things involved in the gas consumption than only gas taxes, such as the per capita income of the people in a certain area, the extension of paved highways, the proportion of the population that has a driver's license, and many other factors. Some factors affect the consumption more than others - and here's where correlation coefficients really help!

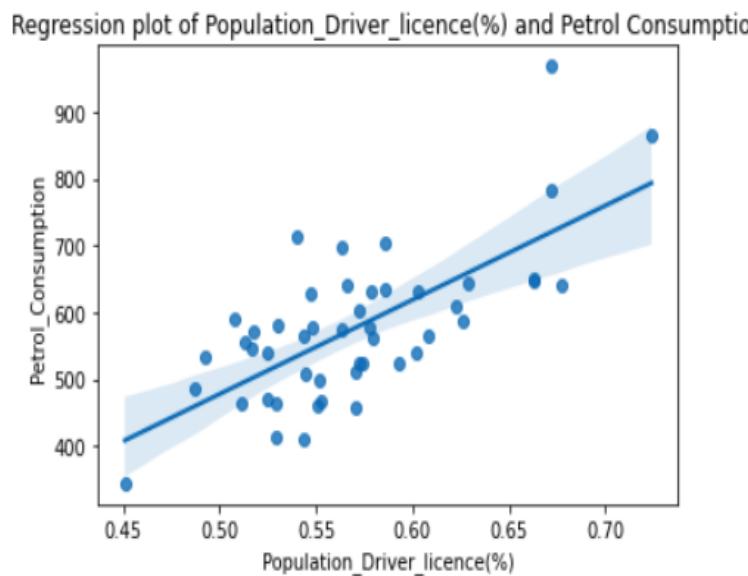
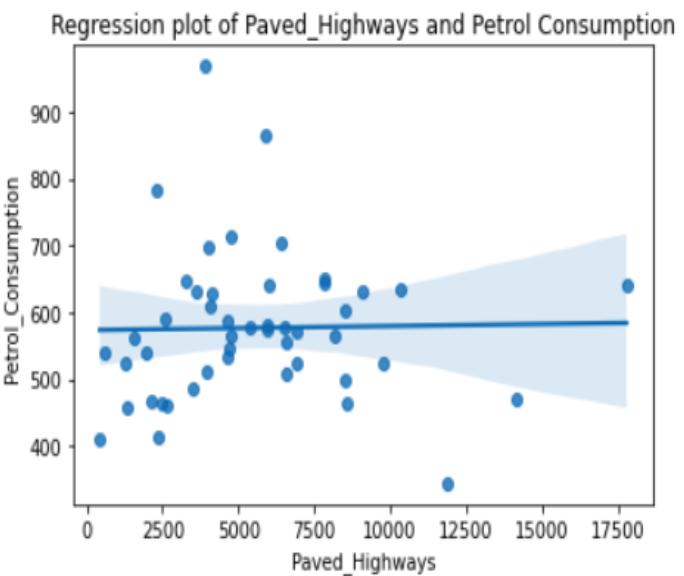
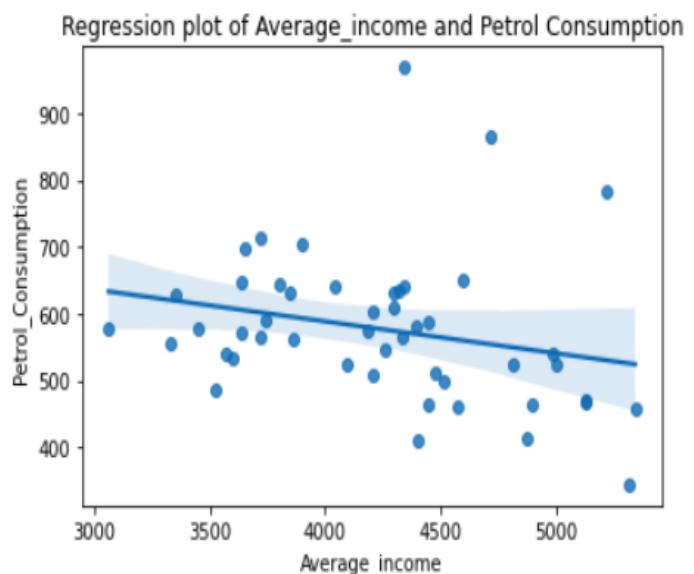
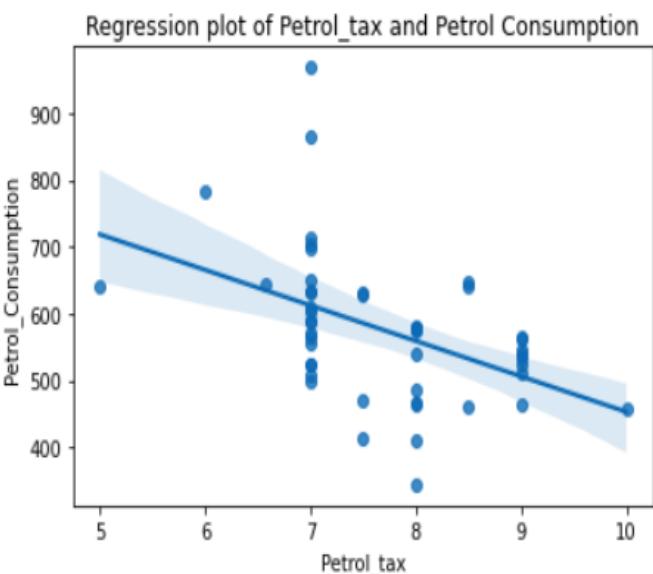
**Usually, real world data, by having much more variables with greater values range, or more variability, and also complex relationships between variables - will involve multiple linear regression instead of a simple linear regression.**

Reference:

<https://stackabuse.com/linear-regression-in-python-with-scikit-learn/>



# ML | Multiple Linear Regression - Graphs



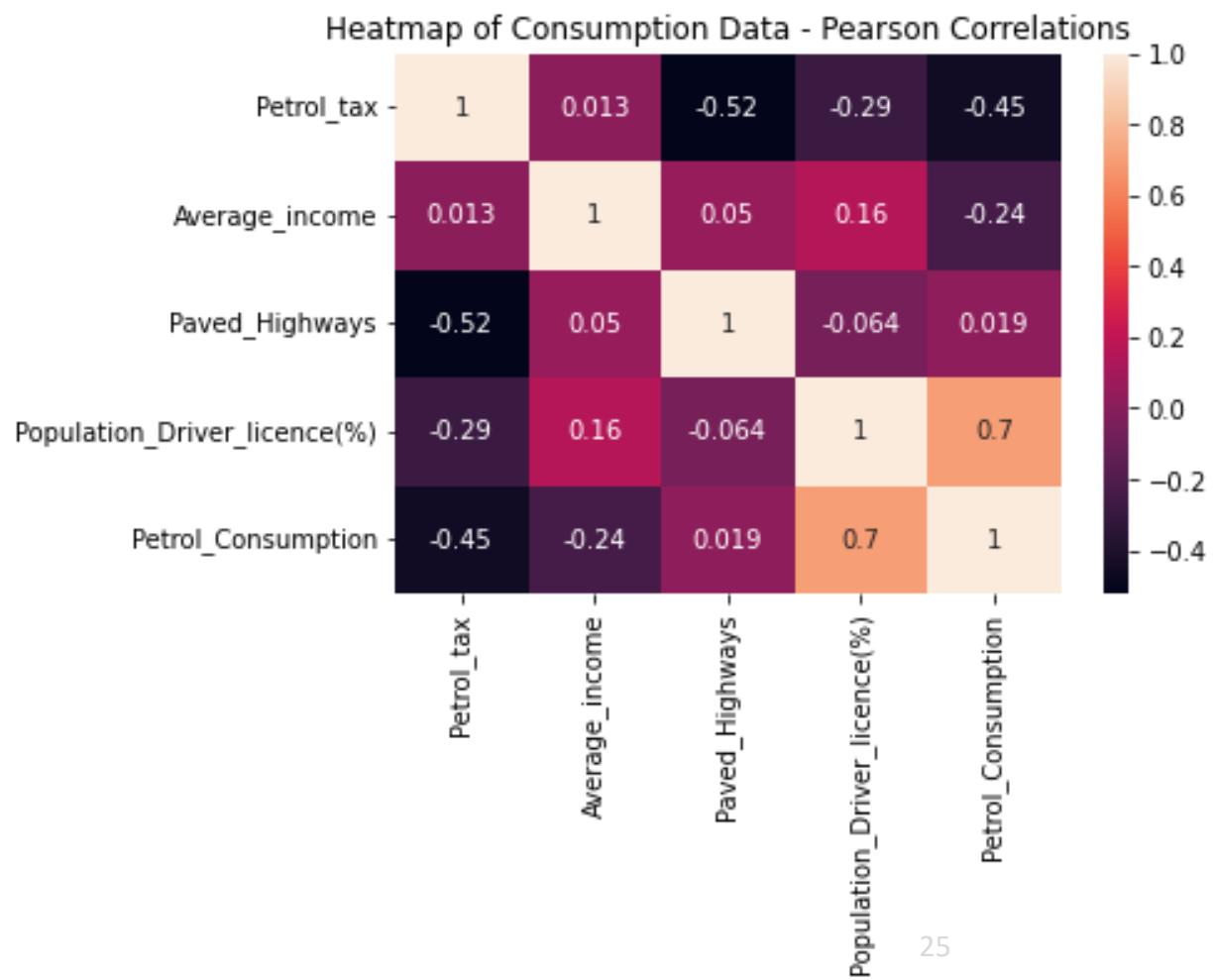
Reference:

<https://stackabuse.com/linear-regression-in-python-with-scikit-learn/>



python

# ML | Multiple Linear Regression – Heatmap



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Reference:

<https://stackabuse.com/linear-regression-in-python-with-scikit-learn/>

# Multiple Linear Regression - Exercises

See code here: <https://github.com/ShahzadSarwar10/Fullstack-WITH-AI-B-3-SAT-SUN-6Months-Explorer/blob/main/Week7/Case7-1-DecisionTreeClassificationViaSciKitLearn.py>

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Thanks.

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## Exercises





Thank you - for listening and participating

- Questions / Queries
- Suggestions/Recommendation
- Ideas.....?

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