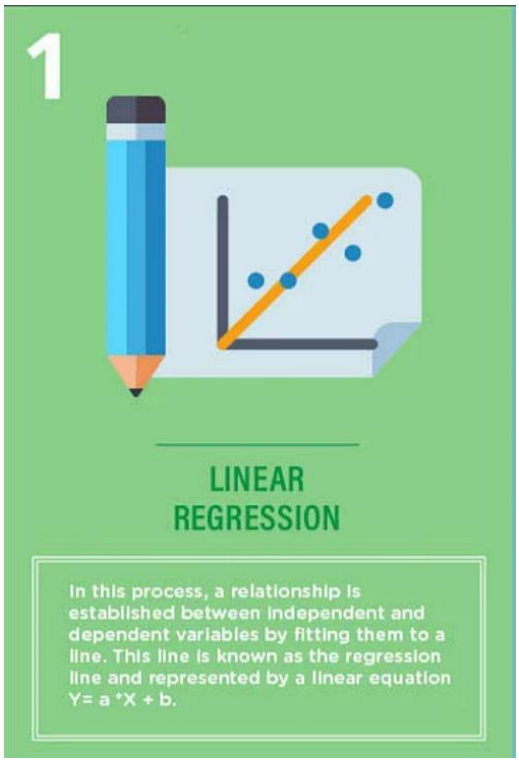
Machine Learning HLT

The machine learning algorithm I've decided to research are Linear Regression models.



To understand how a linear regression model works, imagine how you would arrange random logs of wood in ascending order of their weight without actually weighing any logs whatsoever. You'd have to make a reasonable guess based on the height and girth of each log. The end result would be an arrangement of the logs based on these visible parameters. This is essentially what linear regression in machine learning is like.

Via this process, a relationship is determined between independent and dependent variables by fitting them on a line. This line is known as the regression line and is represented by the linear y = ax +b.

In this equation:

- y − Dependent Variable
- a − Slope
- x − Independent variable
- b − Intercept

The coefficients a & b are derived by minimizing the sum of the squared difference of distance between data points and the regression line.

1. Is it Supervised/Unsupervised/Reinforcement learning?

It is Supervised learning. In supervised learning, models are trained on labelled data, the output variable (dependent variable) is provided in these types of problems. Here, the models find the mapping function to map input variables (x values) with the output variable (y values) or the labels. In the case of the logs, we would determine which variables are independent/dependent and then form a regression model based on these relationships.

2. What does the algorithm do?

A Linear Regression model's main aim is to find the best fit linear line and the optimal values of intercept and coefficients such that the error is minimized.

The Error is the difference between the actual value and Predicted value, and the goal is to reduce this difference.

3. In which situations will it be most useful?

A linear regression model is most useful when there is clear relationship between to two variables. An independent and a dependent variable, that way a model can be expressed through a linear equation and then be able to make predictions.

4. (Optional) Can you find any examples of where this algorithm has been used?

There are many different examples of a linear regression model being used. Here are some:

Economic Growth

Linear regression is used to determine the economic growth of a country or a state in the upcoming quarter. It can also be used to predict a nation's gross domestic product (GDP).

Product Price

Linear regression can be used to predict what the price of a product will be in the future, whether prices will go up or down.

Housing Sales

Linear regression can be used to estimate the number of houses a builder will sell in the coming months and at what price.

Score Predictions

Linear regression can be used to predict the number of runs a baseball player will score in upcoming games based on previous performance.