**Linear Regression**

Supervised Learning ML Algorithm.

**Regression:**

* A process of **finding the correlations** between **dependent** and **independent** variables. It helps in predicting the continuous variables such as prediction of Market Trends, prediction of House prices, etc.
* **Models a target prediction value based on independent variables**
* **Task** = to **find the mapping function to map the input variable(x) to the continuous output variable(y) (finding out the relationship between variables and forecasting)**
* **Task** = **predict a dependent variable value (y) based on a given independent variable (x)** (**find out a linear relationship between x (input) and y(output))**

**Hypothesis function for Linear Regression:**

x = Input Training Data (univariate – one input variable(parameter))

y = Labels to Data (supervised learning)

The model gets the best regression fit line by finding the best θ1 and θ2 values.  
**θ1:** intercept  
**θ2:** coefficient of x

Once we find the best θ1 and θ2 values, we get the best fit line. So, when we are finally using our model for prediction, it will predict the value of y for the input value of x.

How to update θ1 and θ2 values to get the best fit line?

**Cost Function (J):**

The Cost function(J) of Linear Regression is the **Root Mean Squared Error (RMSE)** between **predicted y**-value (pred) and **true** **y-value (y)**.

n = Number of x values

predi = Predicted y-value

yi = True y-value

Now, we need to apply Gradient Descent to find the best fitted weights (θ)

Cost Function:

Gradient Descent:

So:

Thus,

**θj:** Weights of the hypothesis.

**hθ(xi):** predicted y value for ith input.

**j:** Feature index number (can be 0, 1, 2, ......, n).

**α:** Learning Rate of Gradient Descent.

Sources:

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

https://www.javatpoint.com/regression-vs-classification-in-machine-learning#:~:text=The%20task%20of%20the%20regression%20algorithm%20is%20to%20map%20the,are%20used%20with%20continuous%20data.