

## Assignment 2

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**STEP FUNCTION** : A step function is a function like that used by the original Perceptron. The output is a certain value,  $A_1$ , if the input sum is above a certain threshold and  $A_0$  if the input sum is below a certain threshold. The values used by the Perceptron were  $A_1 = 1$  and  $A_0 = 0$ .

**SIGMOID FUNCTION** : The sigmoid function's ability to transform any real number to one between 0 and 1 is advantageous in data science and many other fields such as In **deep learning** as a non-linear activation function within neurons in artificial neural networks to allows the network to learn non-linear relationships between the data

**TANH FUNCTION** : In Tanh, the larger the input (more positive), the closer the output value will be to 1.0, whereas the smaller the input (more negative), the closer the output will be to -1.0.

**RELU FUNCTION** : The **rectified linear activation function** or **ReLU** for short is a piecewise linear function that will output the input directly if it is positive, otherwise, it will output zero. It has become the default activation function for many types of neural networks because a model that uses it is easier to train and often achieves better performance.

**ELU FUNCTION :** An ELU activation layer performs the identity operation on positive inputs and an exponential nonlinearity on negative inputs. The layer performs the following operation:  $f(x) = \begin{cases} x, & x \geq 0 \\ \alpha (\exp(x) - 1), & x < 0 \end{cases}$ . The default value of  $\alpha$  is 1. Specify a value of  $\alpha$  for the layer by setting the Alpha property.

**SELU FUNCTION :** SELU activation function multiplies scale ( $> 1$ ) with the output of the [tf.keras.activations.elu](#) function to ensure a slope larger than one for positive inputs.

The values of alpha and scale are chosen so that the mean and variance of the inputs are preserved between two consecutive layers as long as the weights are initialized correctly (see [tf.keras.initializers.LecunNormal](#) initializer) and the number of input units is "large enough"