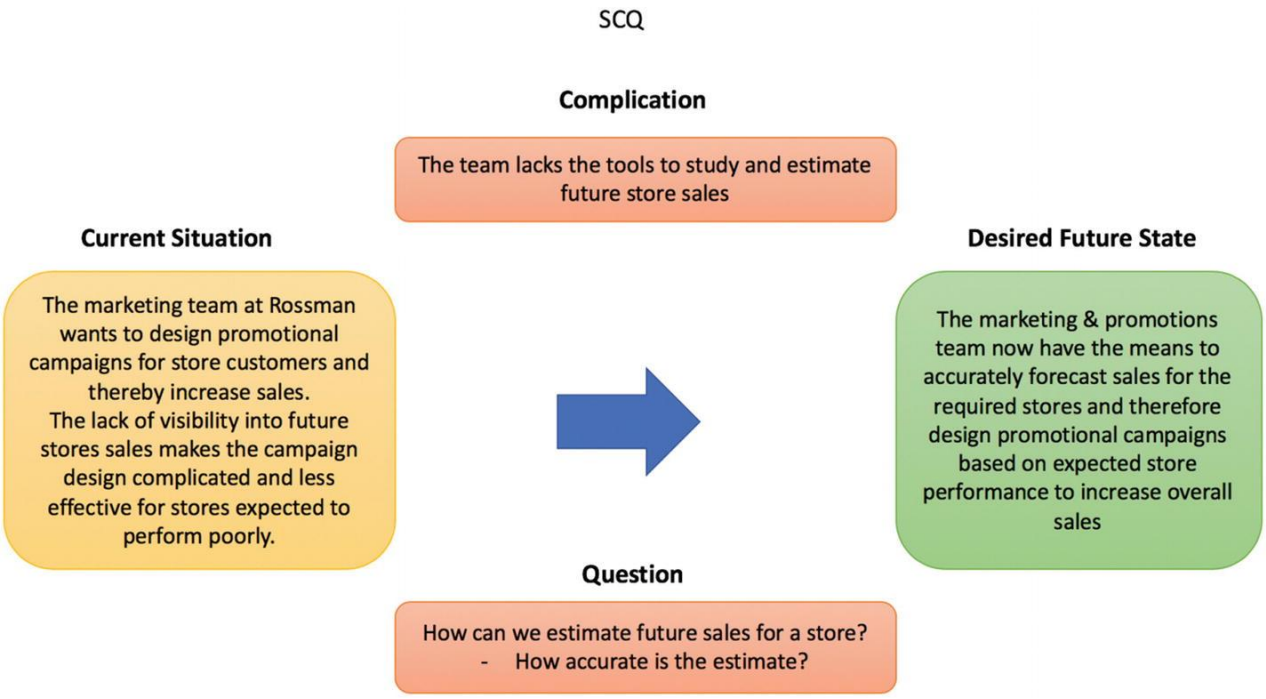
Task: Programming Test Name: Sairah Farooqui

It is essential to have a better understanding between the business and the tech team. It has been seen in the past that the lack of collaboration between both ends up in the project's failure.

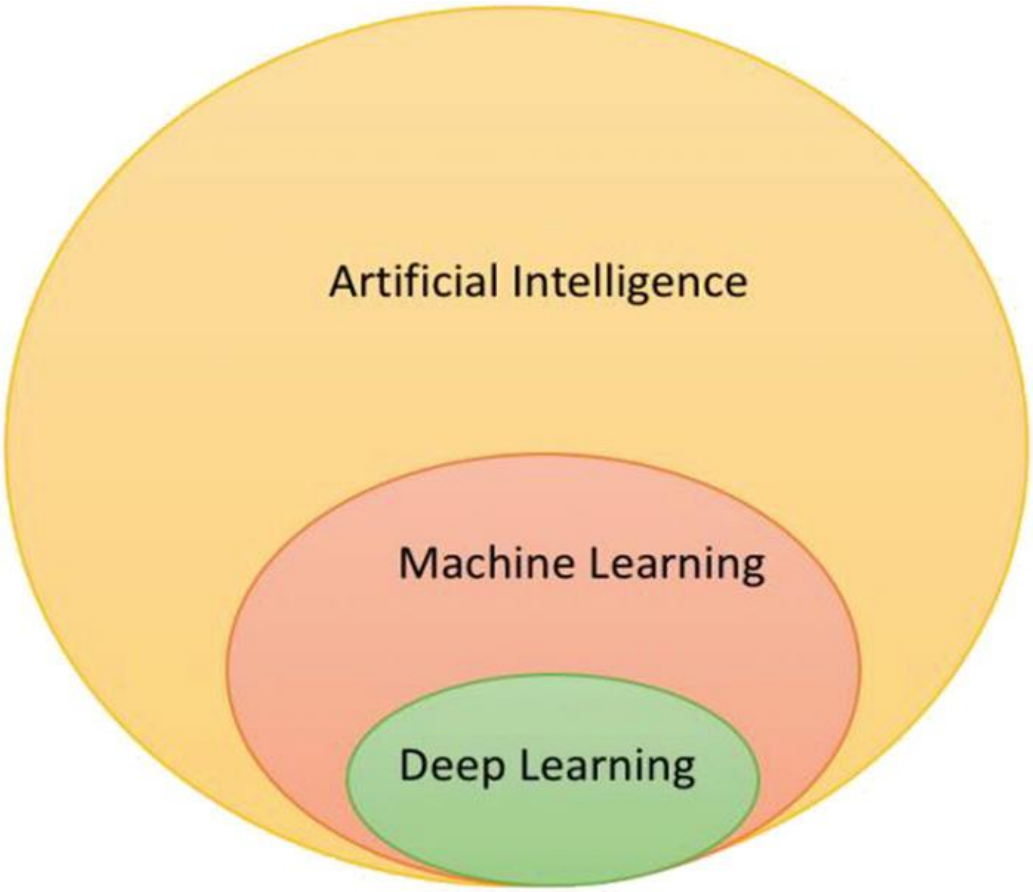
It is essential to have better communication between both. It is also important to know the stakeholders/decision maker from the business side so that they can understand each other better.

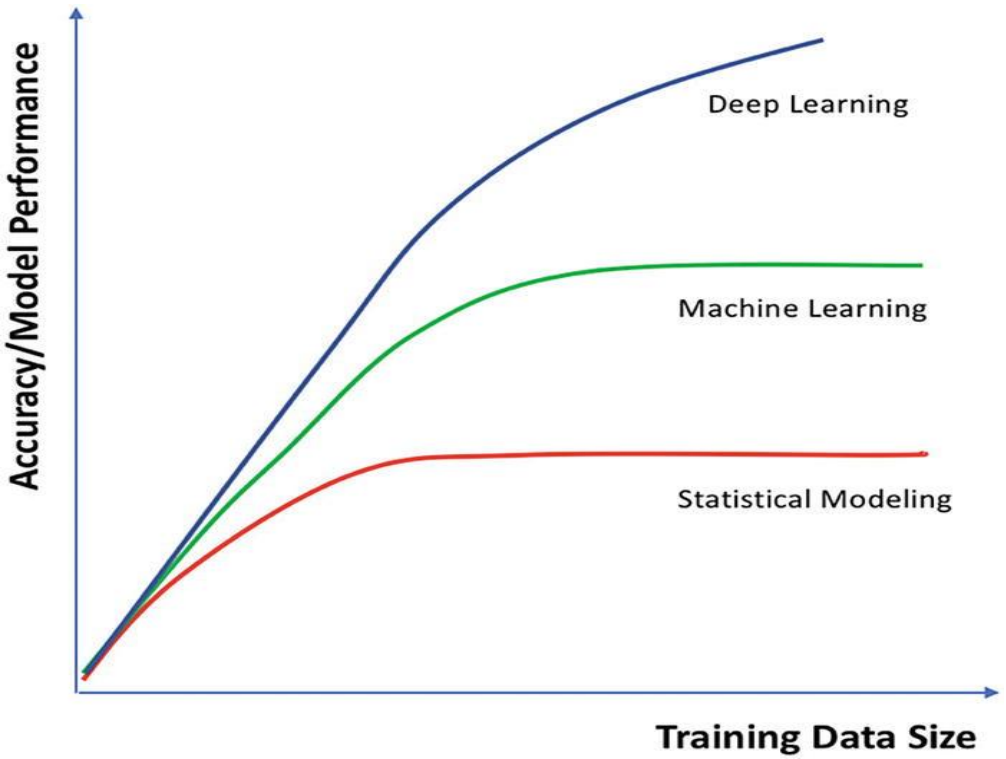
It is also found in the research that most of the time, the tech team needs help understanding the business problem, and businesspeople think that the solution can be built in a brief period, which is very difficult.

Example of Problem Statement:

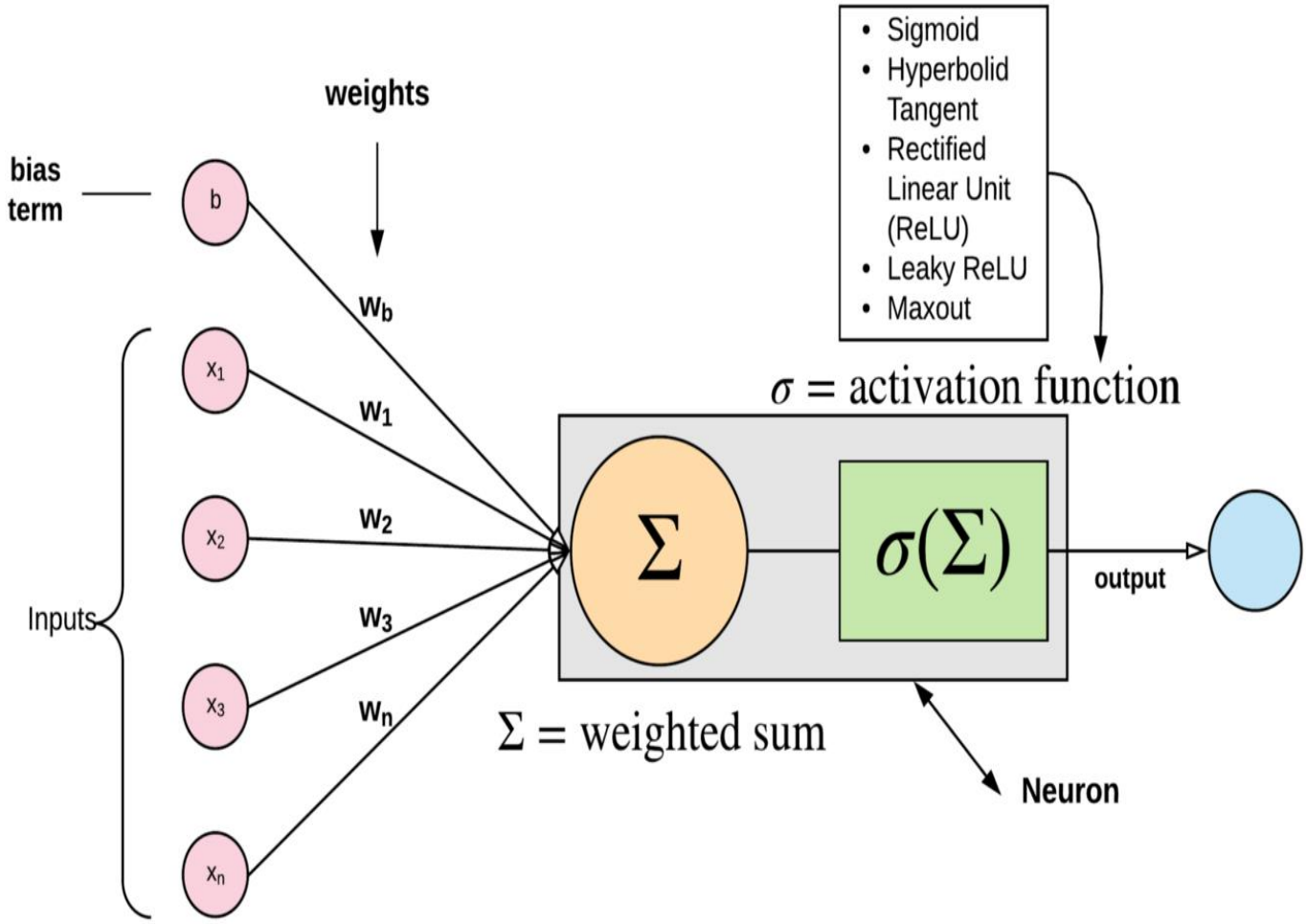


AI artificially induces intelligence into a machine or system, with or without explicit programming. ML is a subfield in AI where intelligence is generated without direct programming. Lastly, DL is a field within ML where brilliance is caused in systems without explicit programming using algorithms that the biological functioning of the human brain has inspired.

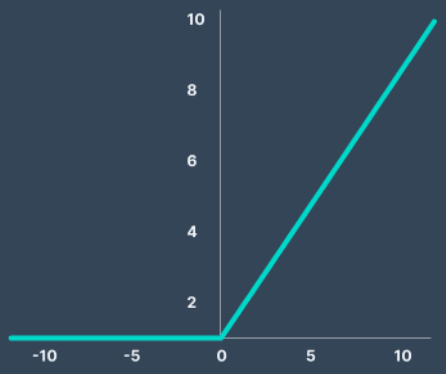




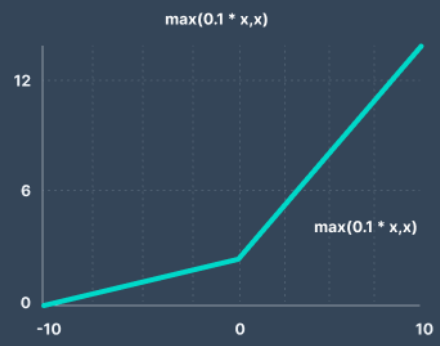
1. Activation Function: An Activation Function decides whether a neuron should be activated. This means that it will determine whether the neuron's input to the network is essential or not in the process of prediction using simpler mathematical operations.


weights
bias term
b
w_b
x_1
w_1
x_2
w_2
Inputs
w_3
x_3
w_n
x_n
• Sigmoid
• Hyperbolid Tangent
• Rectified Linear Unit (ReLU)
• Leaky ReLU
• Maxout
σ = activation function
Σ
$\sigma(\Sigma)$
output
Σ = weighted sum
Neuron

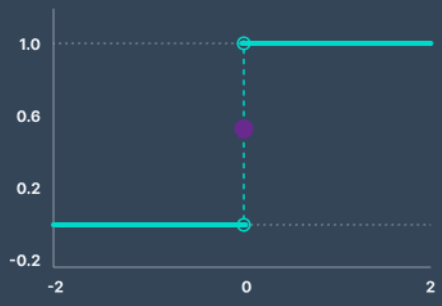
ReLU



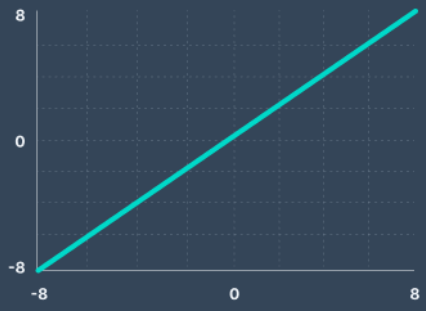
Leaky ReLU



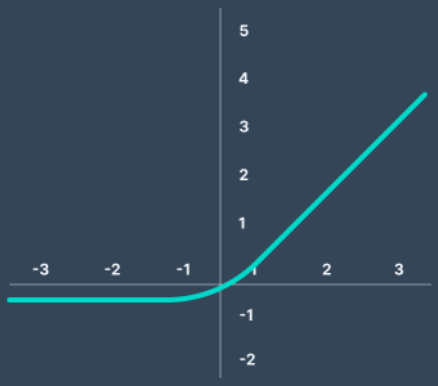
Binary Step Function



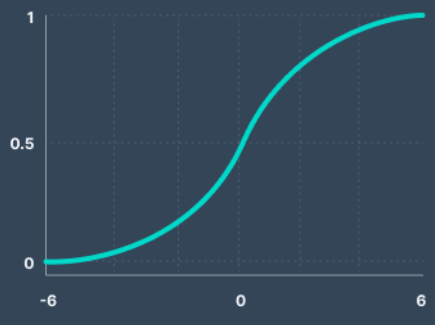
Linear

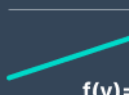


ELU



Sigmoid / Logistic



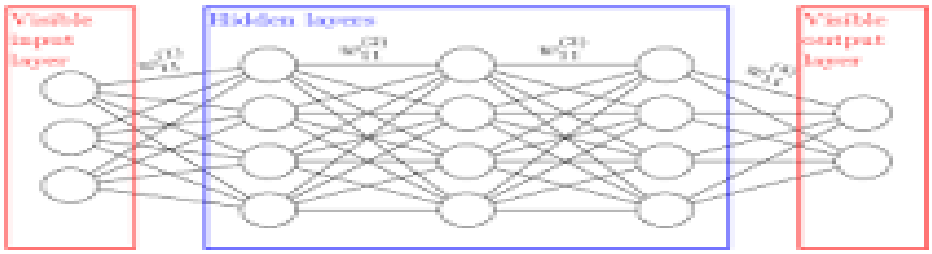


2. Softmax activation: The softmax activation function transforms the raw outputs of the neural network into a vector of probabilities, essentially a probability distribution over the input classes. Consider a multi-class classification problem with N classes.

$$\sigma(z) = \frac{1}{1+e^{-z}} = \frac{e^z}{1+e^z}$$
$$where,\ \sigma(z) \to 0\ as\ z \to -\infty$$
$$and\ \sigma(z) \to 1\ as\ z \to \infty$$

3. Artificial Neural Network: A deep neural network (DNN) is an artificial neural network (ANN) with multiple layers between the input and output layers. Different types of neural networks always consist of the same components: neurons, synapses, weights, biases, and functions.

4. 1-hidden layer neural network: n neural networks, a hidden layer is located between the input and output of the algorithm, in which the function applies weights to the information and directs them through an activation function as the output. In short, the hidden layers perform nonlinear transformations of the information entered into the network.



5. Loss function: A loss function is a function that compares the target and predicted output values; measures how well the neural network models the training data. When training, we aim to minimise this loss between the expected and target outputs

6. Epochs: An epoch is when all the training data is used at once and is defined as the total number of iterations of all the training data in one cycle for training the machine learning model. Another way to define an epoch is the number of passes a training dataset takes around an algorithm.

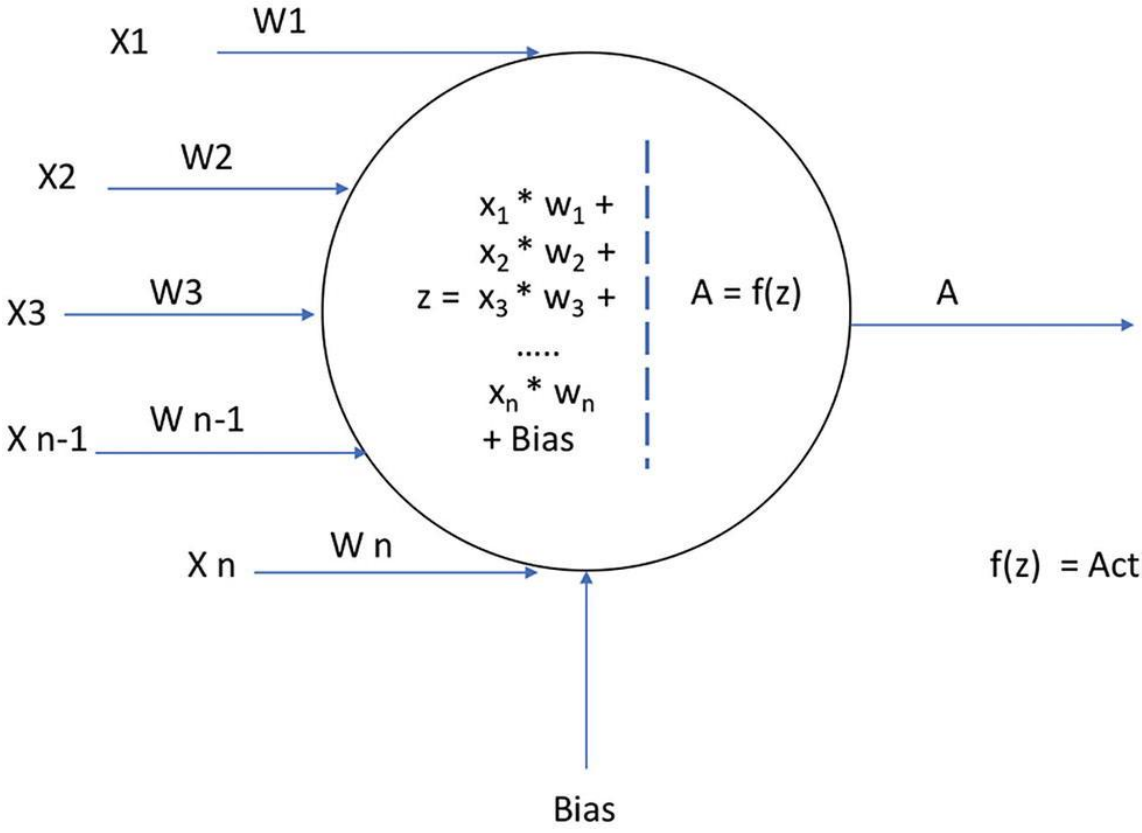
7. F1 -Score: The F1 score is the harmonic mean of precision and recall. As a short reminder, the harmonic mean is an alternative metric for the more common arithmetic mean. It is often useful when computing an average rate. In the F1 score, we add the average precision and recall.

8. Backpropagation: Backpropagation is a process involved in training a neural network. It consists of taking forward propagation's error rate and feeding this loss backwards through the neural network layers to fine-tune the weights. Backpropagation is the essence of neural net training.

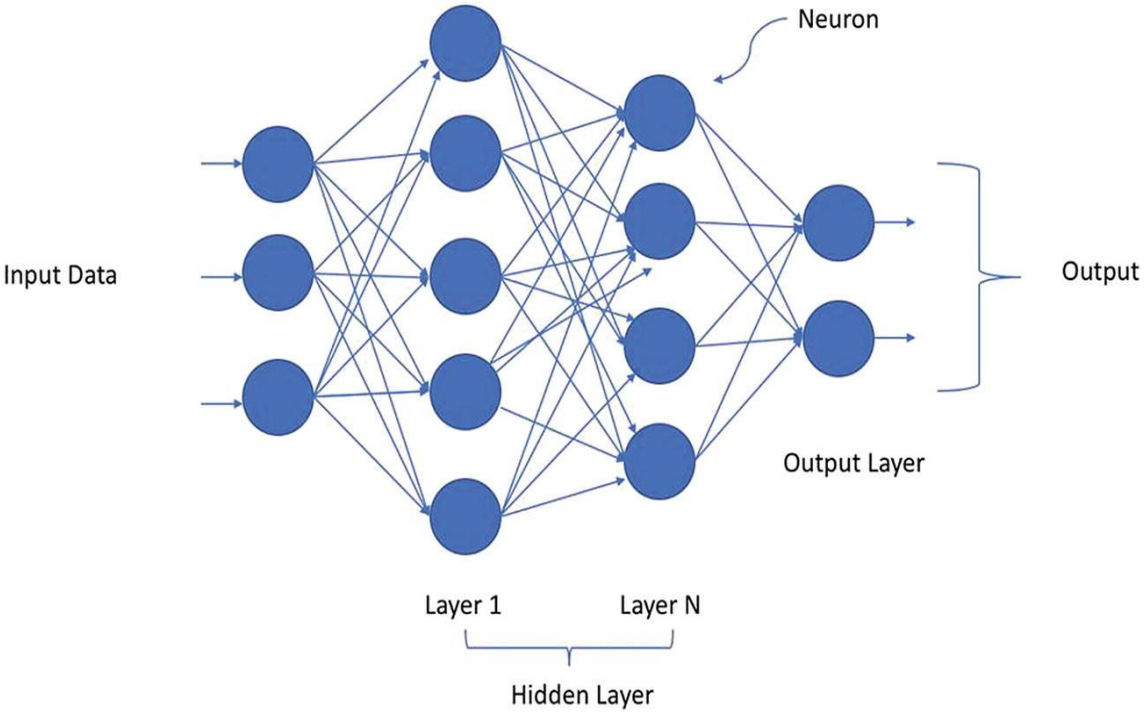
9. Cross Entropy Loss: Cross entropy loss is a metric used to measure how well a classification model in machine learning performs. The loss (or error) is calculated as a number between 0 and 1, with 0 being a perfect model. The goal is generally to get your model as close to 0 as possible.

10. Neuron: Neurons in deep learning models are nodes through which data and computations flow. Neurons work like this: They receive one or more input signals. These input signals can come from the raw data set or neurons positioned at a previous neural net layer.

A Single Neuron



f(z) = Activation Function


Neuron
Input Data
Output
Output Layer
Layer 1
Layer N
Hidden Layer