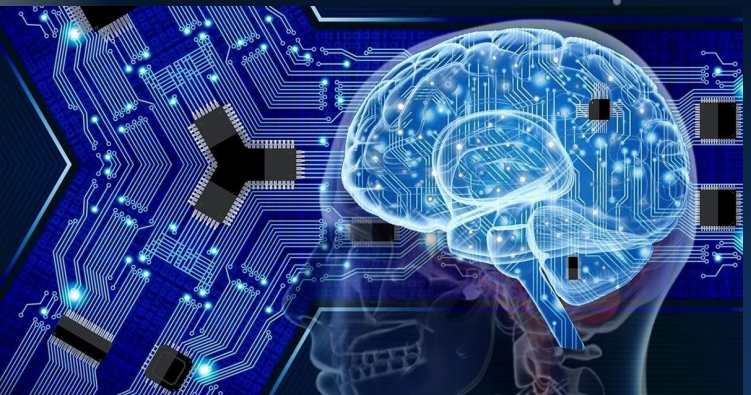
Neural Networks

Aditya Anand, Flint Mueller, Jason Chao

What is a Neural Network?

According to IBM, “a neural network is a machine learning program, or model, that makes decisions in a manner similar to the human brain, by using processes that mimic the way biological neurons work together to identify phenomena, weigh options and arrive at conclusions.” In other words, a neural network simulates decisions from a human perspective. It comprised of a collection of nodes with an input, output, and hidden layers.



Example

Let's break down what one single node might look like using binary values. We can apply this concept to a more tangible example, like whether you should go to McDonald's (Yes: 1, No: 0). The decision to go or not to go is our predicted outcome, $\hat{y}$ (pronounced y-hat). Let's assume that there are three factors influencing your decision-making:

1. Are you hungry? (Yes: 1, No: 0)
2. Do you like McDonald's? (Yes: 1, No: 0)
3. Is there a McDonald's close to you? (Yes: 1, No: 0)

Take for example a Stuyvesant student. Let's name him Cam. Then, let's assume the following for Cam, giving us the following inputs:

4. X1 = 1, since Cam is hungry
5. X2 = 0, since Cam isn't a fan of junk food
6. X3 = 1, since there is a McDonald's one block away from Stuyvesant

Now, we need to assign some weights to determine importance. Larger weights signify that particular variables are of greater importance to the decision or outcome.

1. W1 = 5, since Cam doesn’t want to go to eat unless he is hungry
2. W2 = 2, since Cam doesn’t mind junk food once in a while
3. W3 = 4, since Cam does not like to travel far