

Study Notes for Neural Networks

'Machine Learning' is a way for computers to learn from examples and improve their performance on a specific task without being explicitly programmed. If there is no certainty in the task, we can just write an explicit program to get it done. But if there is uncertainty like whether there will be rain or not, whether traffic will be high or not, then 'machine learning' is what we go for.

What is a Neural Network?:

A neural network is a type of machine learning algorithm that is inspired by the structure and function of the human brain. It consists of interconnected nodes, called neurons, which are organized into layers. Neural networks are typically used for tasks such as pattern recognition, classification, and prediction. They are particularly effective when dealing with complex, high-dimensional data, such as images or speech.

What does a single neuron do? :

A single neuron takes input from other neurons, performs a computation, and produces an output, which is then passed on to other neurons in the network. The inputs to a neuron are multiplied by weights, which determine the strength of the connection between the input and the neuron. These weighted inputs are then summed up, and an activation function is applied to the sum to produce the output of the neuron.

The activation function determines whether the neuron should "fire" and produce an output based on the inputs it receives. Common activation functions include the sigmoid function, the ReLU (rectified linear unit) function, and the softmax function.

What does a single layer of neurons do? :

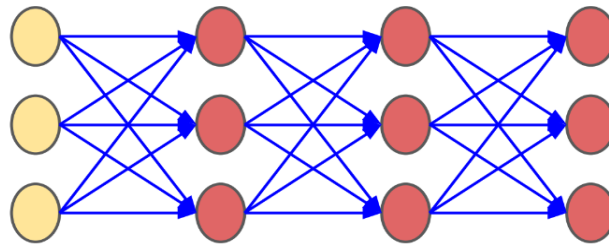
A single layer of neurons is a basic building block of a neural network. It consists of a set of neurons arranged in a single layer, with each neuron taking input from the same set of inputs and producing a single output. The output of the layer is then used as input to the next layer in the network, or as the final output of the network if it is a single-layer network. Single-layer networks are typically used for simple classification tasks, while multi-layer networks are used for more complex tasks that require the network to learn hierarchical representations of the input data.

Multiple Layers learning

When we go to more than one layer, the model is called the multiple layer learning model. The output of a layer is used as an input to the next layer. This successive layers end up producing a better output.

Deep Learning:

It is an extension of the multiplier layer learning. When the layers are sufficiently high (e.g. more than 30), we call it deep learning.



It's called a *deep* neural network when you use multiple layers

Deep learning works extraordinarily well on complex high dimensional data such as image or speech.