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Neural Networks

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Bases of the Neural Networks

Neurons and the Method of Direct Distribution

So what is a "neural network"? First, we should understand what is a "neuron". The neuron is similar to the function: it takes a few values and returns one. The circle below denotes the artificial neuron. It gets 5 and returns 1. The input is the sum of three synapses connected with a neuron (three arrows on the left).

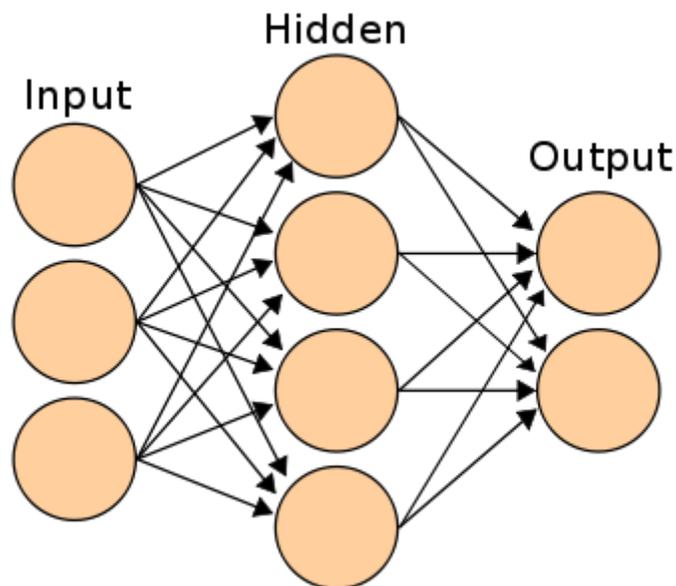


We see two input values (green color) and the offset (highlighted in brown) on the left side of the picture. The input data can be the numerical representations of two different properties. For example, when you create a spam filter it can indicate the presence of more than one word in capital letters, and the presence of the word "Viagra". The input values are multiplied by their so-called "weight", 7 and 3 (highlighted in blue). We add up the values obtained with the displacement and now we get the number, in this case, 5 (highlighted in red). This is an input of our artificial neuron.

$$1 * 7 + 0 * 3 - 2 = 5$$

Then the neuron produces some computation and outputs some value. We got 1 because the rounded value of the sigmoid at the point 5 is 1. If it is a spam filter, the fact that the output is equal to 1 means that the text has been flagged by a neuron as spam.

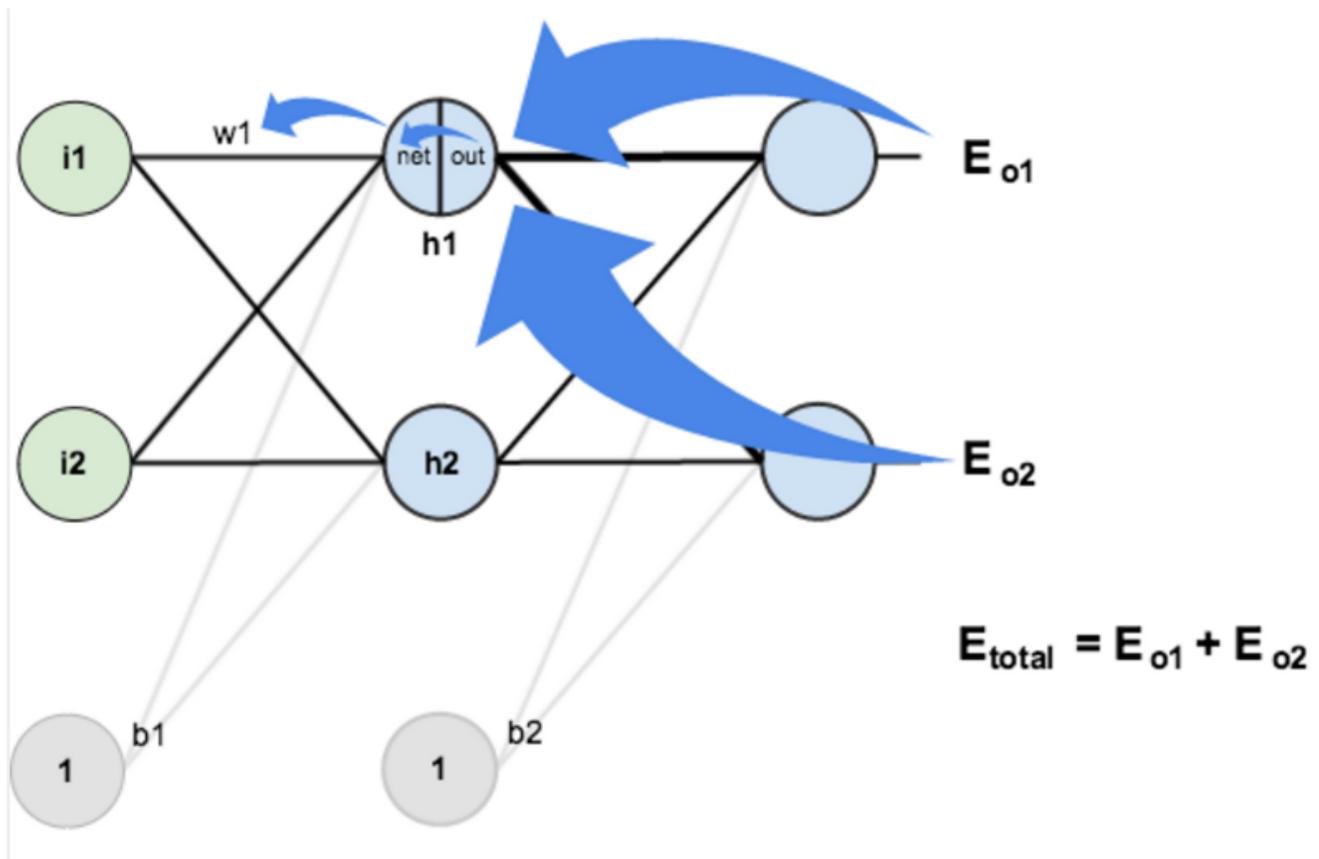
If you combine these neurons you get a straight propagating neural network. The process comes from the input to the conclusion, through neurons, connected by synapses:



Backpropagation

It is not so difficult to understand the principle of the neural network from input to output. But it's much more difficult to understand how does a neural network train on data sets. The used principle is called the backpropagation. In short: you assess the mistake of the network and change the weight of the input values (blue numbers on the first picture). The process goes from the end to the beginning, as we begin with the end of the network and move back, changing the weights until we reach the input. To

calculate all this manually you will need strong mathematical analysis skills. But it is also possible to use libraries that will consider all of the mathematical analysis for you.



Now you can try to write your own neural network, or experiment with what's already written. It's very funny to find some interesting data sets and test various assumptions using your networks.

Thanks for your attention!



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