

## 18.1 Data Features-Reading

**Notebook:** How Computers Work [CM1030]

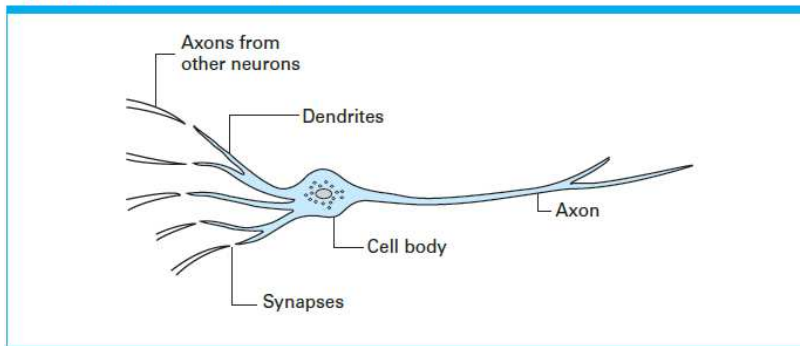
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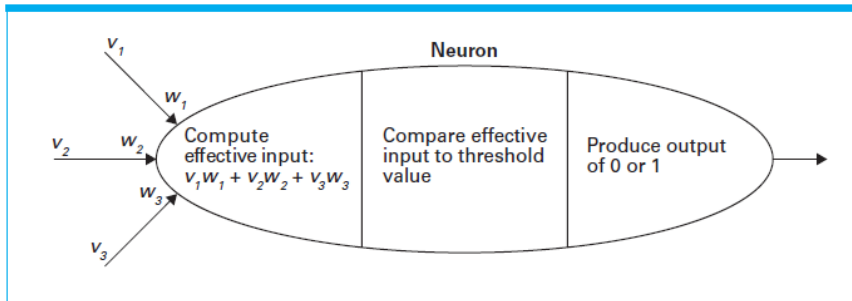
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<b>Cornell Notes</b>	<b>Topic:</b>	Course: BSc Computer Science
	18.1 Data Features-Reading	Class: How Computer Work [CM1030]-Lecture
		Date: February 05, 2020
<b>Essential Question:</b>		
How does data representation affect machine learning?		
<b>Questions/Cues:</b>		
<ul style="list-style-type: none"><li>• What is a Artificial Neural Network?</li><li>• What is an biological neuron?</li><li>• What is associative memory?</li><li>• What are Hopfield Networks?</li></ul>		
<b>Notes</b>		
<ul style="list-style-type: none"><li>• Artificial Neural Network = a comp processing model that mimics networks of neurons in living biological systems</li><li>• Biological Neuron = single cell with input tentacles called dendrites and an output tentacle called the axon. Signals transmitted via cell's axon reflect whether cell is in inhibited or excited state. State is determined by combination of signals received by cell's dendrites, dendrites pick up signals from axons of other cells across small gaps known as synapses<ul style="list-style-type: none"><li>◦ A neuron in artificial neural network is software unit that mimics biological neuron<ul style="list-style-type: none"><li>■ Artificial Neuron produces output of 1 or 0 depending on whether its effective input exceeds a given value called neuron's threshold. Effective input is weighted sum of actual input</li><li>■ Neuron receiving inputs from other axons of other neuron multiplies each by associated weight for the connection and adds products to form effective input. If this sum exceeds neuron's threshold, neuron produces an output of 1(excited state) or output of 0 (inhibited state)</li><li>■ Neurons are arranged in topology of several layers, where inputs (first-layer) and outputs are last-layers and there are hidden layers in between'</li></ul></li></ul></li></ul>		

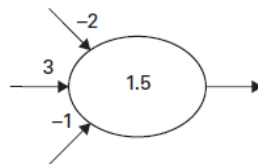
**Figure 11.15** A neuron in a living biological system



**Figure 11.16** The activities within a neuron

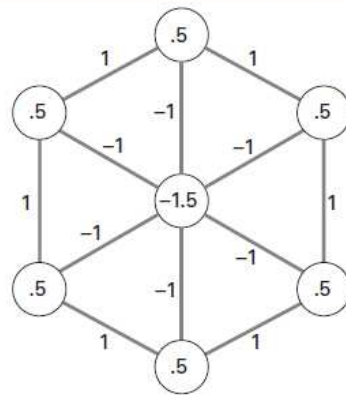


**Figure 11.17** Representation of a neuron

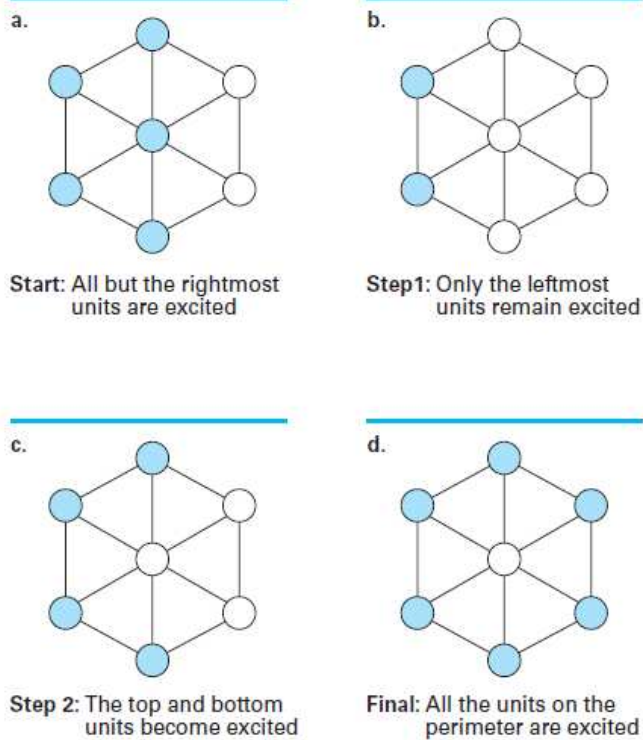


- Associative Memory = retrieval of info that is associated with or related to info at hand
- Hopfield Network = output of each neuron is connected as inputs to each of the other neurons; in other cases, the output of a neuron may be connected only to its immediate neighbours

**Figure 11.20** An artificial neural network implementing an associative memory



**Figure 11.21** The steps leading to a stable configuration



## Summary

In this week, we learned about what features are, what weights are and what a neuron is.