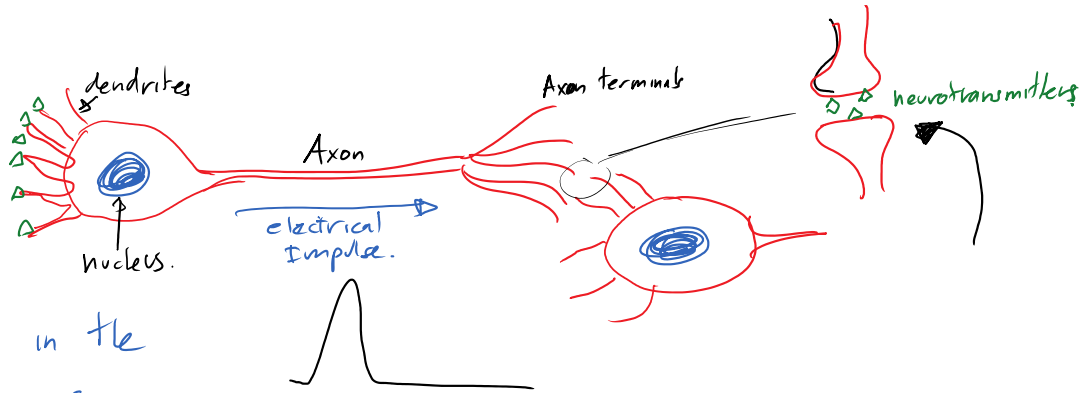


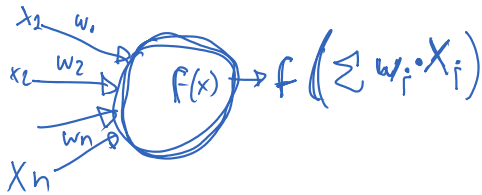
The human Brain

'40 Hobb



Learning is in the Synapses.

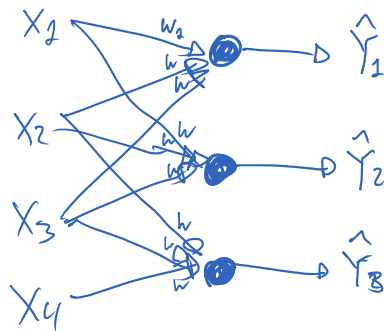
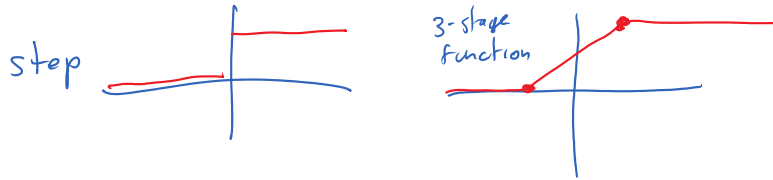
McCulloch-Pitts Model of a neuron.



'60

Frank Rosenblatt - "Perceptron"

Implemented in hardware as a circuit



'65

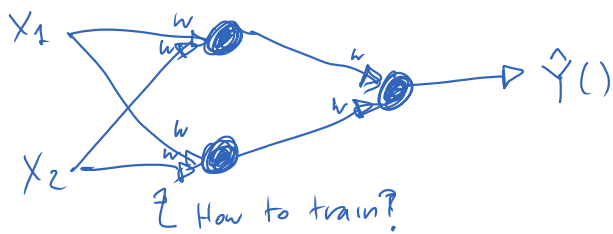
"Perceptrons" Minsk

- X-OR function
- Computationally expensive.

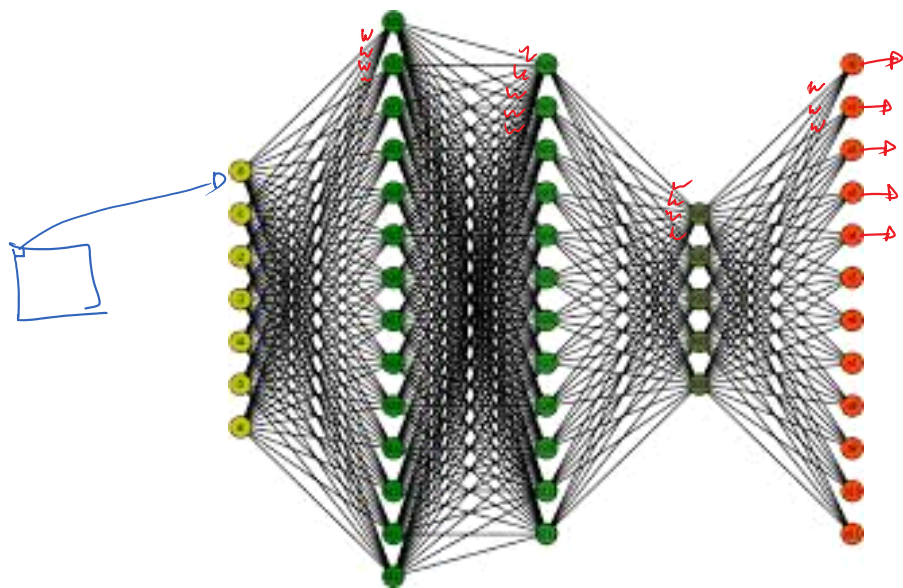
'75 "Back-Propagation" Algorithm. Werbos.



- Overcomes Linear separation.



- Overcomes Linear separation.
- remains Computationally expensive.

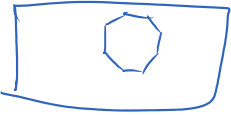


45 - 50 layers
 100's of neurons per layer.
 100,000 of weights.

'88 Support vector Machines

- Convolutional networks (for image input)

'16 - "Deep Learning" Networks with a-lot of layers.

GPU = Graphics Video Games:  compute pixels in parallel.

Google TPU =

Applications: (Learning a function)

- Signal Processing - Noise from Sound
- Speech Recognition
- Image Recognition
- Character & handwriting recognition
- Walking gait recognition.

- Medicine :- diagnose diseases
- Robot Navigation & Localization.

- Advantages

- Massively parallelisable.
- Implement them in hardware
- Any function can be implemented.