Recurrent Nets and their functions (Pen & Paper)

Fig. 1 shows two different recurrent neural networks. Which characteristic mathematical functions does these networks represent. Draw the activation of neuron$_2$ (in A) and neuron$_1$ (in B) as a function of the iteration (after 5-7 iterations you may be able to recognize the mathematical function). The initial output of all neurons (at iteration 0) is 0. The activation function is the identity $f_{act}(net)=net$. (All neurons of the net are updating their outputs within one iteration cycle).

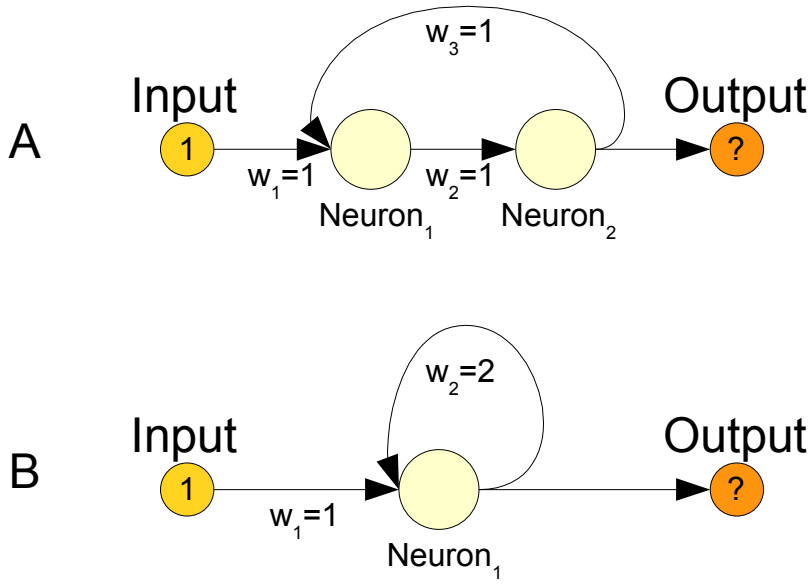

Fig. 1

Neural Networks in life-forms (computation)

The simple network shown in Fig.3 produces a complex function. The activation of both neurons is initialized with 0 (at iteration=0). The activation function of $Neuron_1$ is the identity function $f_{act}(net)=net$ and the activation function of $Neuron_2$ is the identity function that is cut to zero at a net-Input of >90 (see Fig.3 right).

Implement the given neural net in Matlab / Java or any other language and draw the net's output (the activation of $Neuron_2$) for at least 1000 iterations. Describe the output. Which role may such an output function have in life-forms.

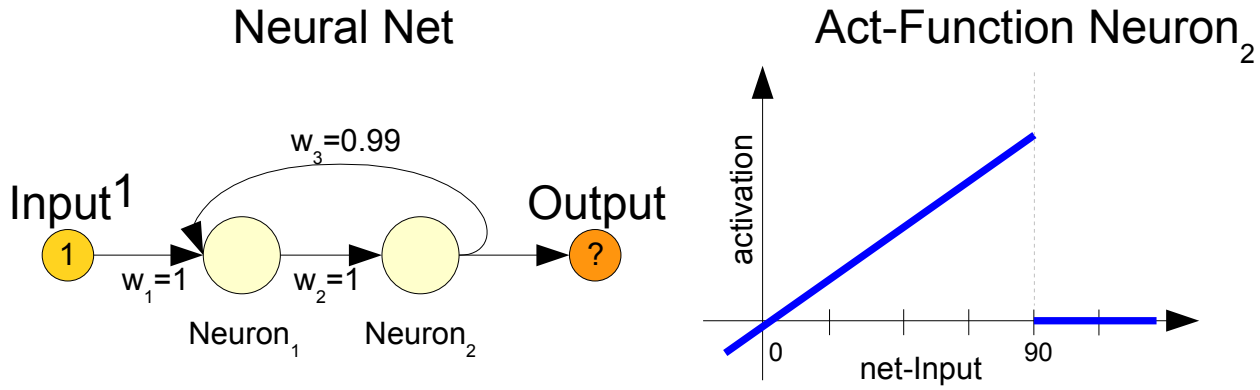

Fig. 3

Data Input Space linear separation (pen & paper)

Use the hessian normal form to find a neuron that successfully separates the given data input space into the groups of white and black classified samples.