BRSU

Neural Networks - Assignment 1

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1 From Haykin's book, Chapter 1 problems - "Models of a neuron", solve any 2 out of 11 (1.1 to 1.11).

1.1 Exercise 1.6

Consider the pseudolinear activation function $\phi(v)$ shown in figure P1.6.
(a) Formulate $\phi(v)$ as a function of v.
(b) What happens to $\phi(v)$ if α is allowed to approach zero?

(a)

$$\phi(v) = \begin{cases} 0 & \text{if } v < -0.5\alpha \\ b & \text{if } v > 0.5\alpha \\ \frac{b}{\alpha} v + 0.5b & \text{else} \end{cases}$$

(b)
The function will not be defined for $\alpha = 0$. The function becomes more and more similar to a step function with value 0 for $v < 0$ and value b for $v > 0$.

1.2 Exercise 1.7

Repeat Problem 1.6 for the pseudolinear activation function $\phi(v)$ shown in Fig. P1.7.

(a)

$$\phi(v) = \begin{cases} -b & \text{if } v < -\alpha \\ b & \text{if } v > \alpha \\ \frac{b}{\alpha} v & \text{else} \end{cases}$$

(b)
The function will not be defined for $\alpha = 0$. The function becomes more and more similar to a step function with value -b for $v < 0$ and value b for $v > 0$.

2 From Haykin's book, Chapter 1 problems - "Network architectures", solve any 2 out of 7 (1.12 to 1.19) including 1.13.

2.1 Exercise 1.12

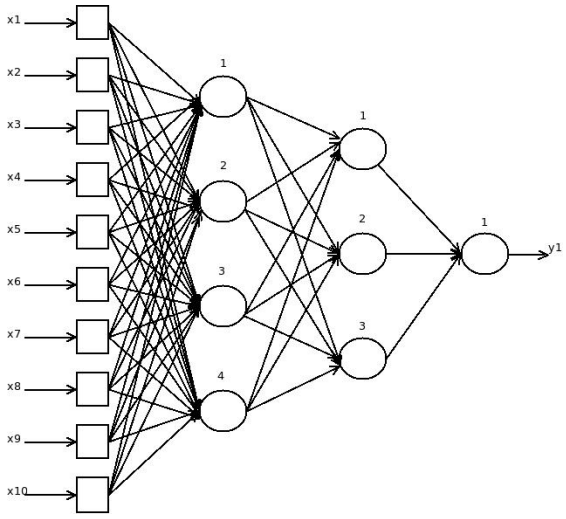

Figure 2.1: Fully recurrent network with five neurons, no self-feedback

2.2 Exercise 1.16

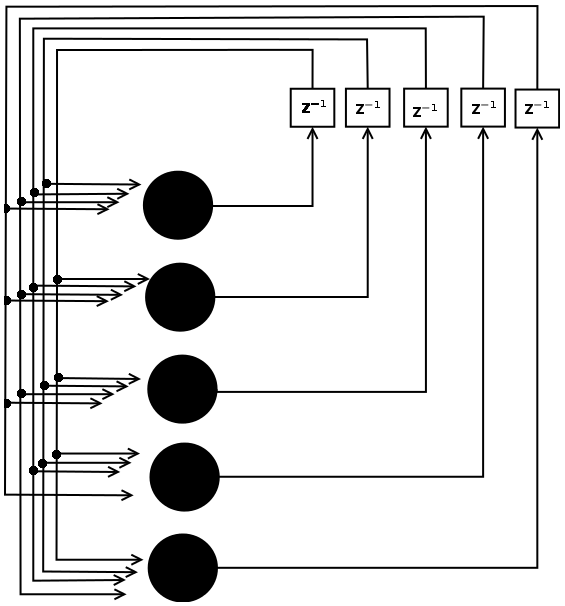

Figure 2.2: Fully connected 10-4-3-1 feedforward network