Homework 3

1. Run the multilayer perceptron program in Marsland, Ch. 3 with the iris, PNOz and sinewave data provided in the same package. Show your results and make comments on the accuracy of the results.

2.

Problem 3.2 Suppose that the local power company wants to predict electricity demand for the next 5 days. They have the data about daily demand for the last 5 years. Typically, the demand will be a number between 80 and 400.

1. Describe how you could use an MLP to make the prediction. What parameters would you have to choose, and what do you think would be sensible values for them?
2. If the weather forecast for the next day, being the estimate temperatures for daytime and nighttime, was available. How would you add that into your system?
3. Do you think that this system would work well for predicting power consumption? Are there demands that it would not be able to predict?

3.

Problem 3.7 A Hospital Manager wants to predict how many beds will be needed in the geriatric ward. He asks you to design a neural network method for making this prediction. He has data for the last 5 years that cover:

- The number of people in the geriatric ward each week.
- The weather (average day and night temperatures).
- The season of the year (spring, summer, autumn, winter).
- Whether or not there was an epidemic on (use a binary variable: yes or no).

Design a suitable MLP for this problem, considering how you would choose the number of hidden neurons, the inputs (and whether there are any other inputs you need) and the preprocessing, and whether or not you would expect the system to work.

4.

P10.1 Consider the ADALINE filter in Figure P10.1.

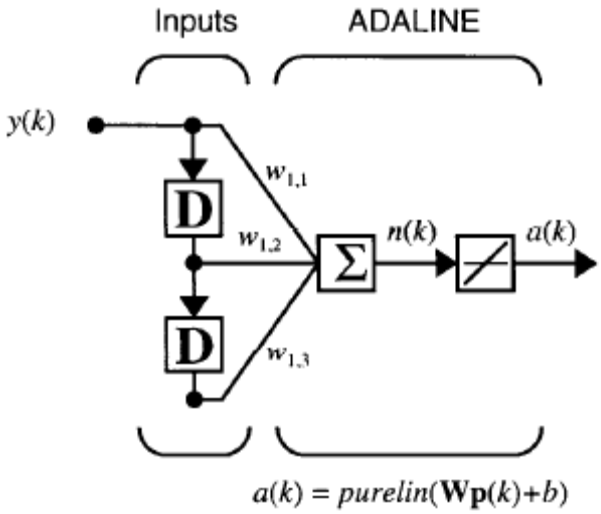

Figure P10.1 ADALINE Filter

Suppose that

$$w_{1,1} = 2, \quad w_{1,2} = -1, \quad w_{1,3} = 3,$$

and the input sequence is

$$\{y(k)\} = \{\ldots, 0, 0, 0, 5, -4, 0, 0, 0, \ldots\}$$

where $y(0) = 5$, $y(1) = -4$, **etc.**

i. **What is the filter output just prior to** $k = 0$**?**

ii. **What is the filter output from** $k = 0$ **to** $k = 5$**?**

iii. **How long does** $y(0)$ **contribute to the output?**