Introduction to Neural Networks : Continuous Assessment Project

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The continuous assessment component for the Introduction to Neural Networks module (which forms 30% of the total assessment for that module) will be based on your written report on the following mini-project.

The objective is for you to gain practical experience in running and optimising a neural network simulation. All you have to do is work through the following simple steps:

(1) Download from the module web-site (http://www.cs.bham.ac.uk/~jxb/inn.html) the program 'datagen' that will generate your training and validation/testing data sets. Run that program on one of Sun workstations and enter your student ID number when requested. You will find your data sets have appeared in the same directory. (Do not just copy someone else's data sets – the program pseudo-randomly generates a different set for each student!)

(2) Set up a feed-forward neural network with one hidden layer of 20 sigmoidal units and an output layer of linear units (e.g. using a neural network simulator such as SNNS).

(3) Train your neural network on your training data using back-propagation. By trying a range of values and plotting graphs, find values of the back-propagation learning rate η and momentum α that result in consistently fast training. Call these values η_{best} and α_{best}.

(4) Using the momentum α_{best} and learning rate $\eta_{best}/2$, plot the training and generalisation errors against the number of epochs.

(5) Investigate how varying the number of hidden units (while keeping the learning parameters fixed) affects the results in (4).

(6) Write a report on what you did and what you found. Include a discussion of its relevance to the optimisation of generalization performance. A reasonable length for the report would be between 2000 and 3000 words, plus as many diagrams, tables and graphs as you think appropriate.

(7) If the above seems too easy, get some extra marks by running and describing further simulations aimed at improving generalisation (e.g. involving weight decay).

There will be optional lab sessions to help you get started with SNNS and to offer some help and advice with this assignment. These will take place on:

6pm Monday 11th / Tuesday 12th November – Ground floor lab – attend *only one* of these
6pm Monday 25th / Tuesday 26th November – Ground floor lab – attend *only one* of these

The report must be handed in to the School Office by 12noon on Wednesday 15 January 2003