

Module Title:	AI Methods	Module Code:	COB107
Session:	2021/2022	Semester:	2
Title/Description:	ANN Implementation	Part:	1 of 1
This coursework represents	20	% of the module assessment	
Staff Member responsible:	Dr C W Dawson		
Date set:	w/b 14 February 2022		
Date to be handed in:	30 March 2022	By 4pm	

Specification:	As attached
Method(s) of Presentation:	Electronic submission of report – including program listings, references, figures. Submit as either Word or PDF – as many files as required – e.g. one file for code, one for report; one file containing both; etc.
Assessment Guidelines:	As attached

## **AI Methods - Neural Network Coursework**

### **Outline**

You are to implement, in a programming language of your choice, an artificial neural network – specifically a multi-layer perceptron (MLP) - trained, initially, using the error backpropagation algorithm. Once implemented you are to train your network on the data set provided and evaluate its performance. Note – you should NOT use numerical computing environments (such as MATLAB) or pre-written neural network libraries (although other libraries, for example mathematical functions, are acceptable). Typical languages you could use would be Python, Java, C#, C++, or C.

There are a number of stages to this process that will be evaluated:

- 1) Appropriate data pre-processing of the supplied data set;
- 2) Implementation of the algorithm in an appropriate language;
- 3) Documentation and commenting of this implementation;
- 4) Appropriate training, configuration and weight adjustment of the ANN model;
- 5) Appropriate evaluation of the chosen ANN;
- 6) Comparison with a simple data driven model such as a simple multiple linear regression model (for example, see LINEST in Excel).
- 7) A report detailing the above process and discussing the evaluation of the model.

You should also try different ‘improvements’ to the standard backpropagation algorithm and report on these – for example, momentum, annealing, etc; and alternative training algorithms such as line searching and conjugate gradients.

The data set will be provided as an Excel or Text file consisting of N columns. You should process these data appropriately. This involves cleaning the data, selecting a way to split the data into appropriate subsets, exploring and selecting predictors, and standardising the data to an appropriate range.

### **Marking scheme**

Your report (which should be structured in these sections) will be assessed as follows (these are weightings for each component):

1. Data pre-processing (including cleansing, data splitting, identifying predictors) – 15%;
2. Implementation of the MLP algorithm (including modifications / improvements) – 35%;
3. Training and network selection – 20%;
4. Evaluation of final model (including comparisons between different modifications to the algorithm) – 20%;
5. Comparison with another data driven model – 10%;

Your report should include a program listing (i.e. the code you have written) as well as the sections outlined above. Make sure you structure your report with these sections and section numbers. Include references where appropriate.

The report should be submitted electronically via Learn by the due date.

## COB107 – ANN Coursework Feedback

Student: xxxxx

**Data pre-processing (15%) – xx%**

comments

**Implementation of MLP (35%) – xx%**

comments

**Training and network Selection (20%) – xx%**

comments

**Evaluation of final model (20%) – x%**

comments

**Comparison with other models (10%) – xx%**

comments

**Overall – xx%**

comments