# Loughborough University

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| Module Title: | AI Methods | Module Code: | COB107 |
| Session: | 2019/2020 | 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 10 February 2020

Date to be handed in: 18 March 2020       By 2pm

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| Specification: | As attached |
| Method(s) of Presentation: | Electronic submission of report – including program listings, references, figures. |
| 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 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. Typical languages you could use would be Python, Java, C#, C++, C.

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

1) Implementation of the algorithm in an appropriate language;
2) Documentation and commenting of this implementation;
3) Appropriate data pre-processing of the supplied data set;
4) Appropriate training, configuration and weight adjustment of the ANN model;
5) Appropriate evaluation of the chosen ANN structure;
6) A report detailing the above process and discussing the evaluation of the model.

For additional marks you should contrast your ANN model with a simple data driven model such as a simple multiple linear regression model (for example, see LINEST in Excel). You should also try different 'improvements' to the standard backpropagation algorithm and report on these – for example, momentum, annealing, etc.

The data set will be provided as an Excel file consisting of N columns. The first N-1 columns are the predictors; the Nth column represents the predictand. You should process these data appropriately. This involves cleaning the data, selecting a way to split the data into appropriate subsets, selecting predictands, 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):

Implementation of the MLP algorithm (including modifications / improvements) – 40%
Data pre-processing (cleansing and data splitting) – 10%;
Training and network selection – 20%;
Evaluation of final model (including comparisons between different modifications to the algorithm) – 20%;
Comparison with another data driven model – 10%;

Your report should include a program listing (ie 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.

**Student: xxxxx**

**Implementation of MLP (40%) –** xx%
comments

**Data pre-processing (10%) –** 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