

# University of Lincoln Assessment Framework

## CMP2020M Assessment Item 1 - Briefing 2020-2021

**Module Code & Title:** CMP2020M Artificial Intelligence

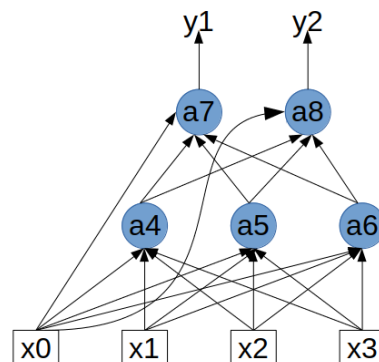
**Contribution to Final Module Mark:** 40%

### Description of Assessment Task and Purpose:

This assessment comprises a task on neural networks to demonstrate acquired knowledge in this area of Artificial Intelligence. Your submission should include a concise report of maximum 2 pages using font size of 11pt -- excluding appendices.

### TASK:

You are required to implement the *Backpropagation* algorithm discussed during the lectures and workshops, and to apply it to the network architecture and data below with inputs X and outputs Y. Your implementation can be done in your favourite programming language, but without using any publicly available library. All calculations as part of training and test should be done by your own code. Your network should be initialised with the following weight values:  $W=[w_{14}=0.74, w_{15}=0.13, w_{16}=0.68, w_{24}=0.8, w_{25}=0.4, w_{26}=0.10, w_{34}=0.35, w_{35}=0.97, w_{36}=0.96, w_{47}=0.35, w_{48}=0.8, w_{57}=0.50, w_{58}=0.13, w_{67}=0.90, w_{68}=0.8, w_{04}=0.9, w_{05}=0.45, w_{06}=0.36, w_{07}=0.98, w_{08}=0.92]$ . It should also use a learning rate of 0.1 and the Sigmoid activation function.



x1	x2	x3	Y
0.50	1.00	0.75	1
1.00	0.50	0.75	1
1.00	1.00	1.00	1
-0.01	0.50	0.25	2
0.50	-0.25	0.13	2
0.01	0.02	0.05	2

Your solution to this task should show the following:

- 1) an image with a learning curve showing the error values as part of Forward steps;
- 2) a concise table of weights of the Backward steps (up to 10 steps);
- 3) an explanation on when to stop training (how many training steps are needed?); and
- 4) the probability distribution of outputs Y as part of classifying the unseen input vector  $\{x_1=0.3, x_2=0.7, x_3=0.9\}$ .

### Learning Outcomes Assessed:

- [L02] Apply Artificial Intelligence techniques to solve practical problems
- [LO3] Locate and reference relevant information.

**Knowledge & Skills Assessed:**

Subject Specific Knowledge, Skills and Understanding: Literature searching, Referencing, Numeracy, Techniques and Skills Subject-specific knowledge.

Professional Graduate Skills: independence and personal responsibility, adaptability, written communication, creativity, critical thinking, IT skills, self-reflection and life-long learning, problem solving.

Emotional Intelligence: motivation, resilience, self-confidence.

**Assessment Submission Instructions:**

The report should be a maximum of 2 pages, excluding appendix. Keep in mind that:

- The report must contain your name, student number, module name.
- The report must be in PDF.
- The report must be formatted in single line spacing and use 11pt fonts.
- The report must include a few/several references to support the arguments in the report.
- The report must include an appendix with the code of your solution (include text, no images).
- The report does not include this briefing document, no cover page and table of content.

**Date for Return of Feedback:**

See the "Hand in Dates" spreadsheet on Blackboard.

**Format for Assessment:**

Assignment (electronically submitted report).

**Feedback Format:**

Written feedback according to the CRG (Criterion Reference Grid) document on Blackboard.

**Additional Information for Completion of Assessment:**

You must make an electronic submission of your work to Blackboard, on the Turnitin upload area for assessment item 1.

This assessment is an individual assessment. Your work must be presented according to the Lincoln School of Computer Science guidelines for the presentation of assessed written work. Please make sure you have a clear understanding of the grading principles for this component as detailed in the accompanying Criterion Reference Grid. If you are unsure about any aspect of this assessment component, please seek the advice with a member of the delivery team.

**Assessment Support Information:**

Please consult the delivery team for any questions regarding this assessment.

**Important Information on Dishonesty & Plagiarism:**

University of Lincoln Regulations define plagiarism as 'the passing off of another person's thoughts, ideas, writings or images as one's own...Examples of plagiarism include the unacknowledged use of another person's material whether in original or summary form. Plagiarism also includes the copying of another student's work'.

Plagiarism is a serious offence and is treated by the University as a form of academic dishonesty. Students are directed to the University Regulations for details of the procedures and penalties involved.

For further information, see [www.plagiarism.org](http://www.plagiarism.org)