School of Computing 2024/25

Module Code and Title	M33174 Artificial Intelligence
Module Coordinator Other lecturers	Dr. ioannis kagalidis <ioannis.kagalidis@port.ac.uk>
Assessment Item number	Item 1.
Assessment Title	Set Exercise Coursework.
Date Issued	2024-10-22

Deliverables

Deliverable	Weight	Format	Deadline / Date	Late deadline ECF deadline
code	50%	Any programming language of choice. Code files uploaded to dropbox.	2024-12-02 4pm [GMT/BST] *	2024-12-16 4pm (10 working days after deadline)

Notes and Advice

- The Extenuating Circumstances procedure is there to support you if you have had any circumstances (problems) that have been serious or significant enough to prevent you from attending, completing or submitting an assessment on time. If you complete an Extenuating Circumstances Form (ECF) for this assessment, it is important that you use the correct module code, item number and deadline (not the late deadline) given above.

- ASDAC are available to any students who disclose a disability or require additional support for their academic studies with a good set of resources on the ASDAC moodle site

- The University takes any form of academic misconduct (such as plagiarism or cheating) seriously, so please make sure your work is your own. Please ensure you adhere to our *Student Conduct Policy* and watch the video on Plagiarism.

- Any material included in your coursework should be fully cited and referenced in **APA 7** format. Detailed advice on referencing is available from the library, also see TECFAC 08 Plagiarism.

- Any material submitted that does not meet format or submission guidelines, or falls outside of

the submission deadline could be subject to a cap on your overall result or disqualification entirely.
- If you need additional assistance, you can ask your personal tutor, student engagement officer ana.baker@port.ac.uk, academic tutor eleni.noussi@port.ac.uk or your lecturers.
  - If you are concerned about your mental well-being, please contact our Well-being service.

Group Member Contribution sign sheet.

Instructions: Each group member will enter their student number and sign in the 'signature' field acknowledging their contribution to the overall work. If all team members contributed equally and fairly then the % of contribution should be 100% for each member. This sheet should be included with the submission.
Only ONE member of the team should submit.

Student Number	Signature	% of contribution to work
2060515		100%
2049701		100%
2109839		100%
2109969		100%

2158781		100%

Fair use of AI:

We require that most work submitted for assessment is your own original content, demonstrating your knowledge, skills, and critical thinking abilities.

The University's position on the use of AI is that it is permitted as a tool to assist and inform research and the generation of ideas, planning, and output. The use of AI in submitted work must be underpinned by the principles of academic integrity, proper citation, and referencing, with clear indication given as to where AI has been utilised in all submissions. Failure to do so will be considered an act of academic misconduct.

Part A. Problem Statement (10% of overall mark)

The following 32 bit long string is made up by random 1s and 0s.

E=[0 0 1 0 0 1 1 1 0 1 0 0 1 0 1 1 0 1 1 0 1 1 1 1 1 0 0 0 0 1 1 1]

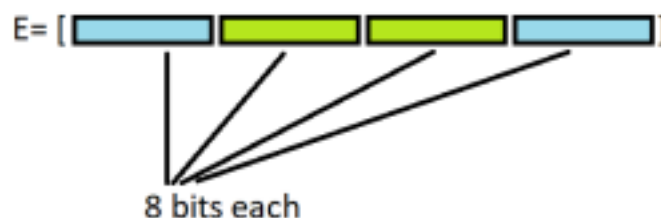You can imagine this string can be broken up as:

Figure 1. Breakup of the string.

A process is required to maximize the number of 1s in the blue blocks and minimize the number of 1s in the green blocks. Provide a solution to this problem using appropriate computational logic approaches.

Assessment Criteria

All important parts of the provided solution function properly and relate to theory. Proper demonstration of functionality features are included in the deliverable.

Deliverable

Code (any programming language of your choice, clearly indicated with the submission file).

Part B. Problem Statement (30% of overall mark)

4Core Logistics Ltd is an international transport company. The company's lorry has a load capacity of 35 tonnes. The goods that 4Core Logistics Ltd has a contract to carry are of 10 different types (or codes). Every time the company ships each good, it gets paid a certain amount. In order to maximize profit the company needs to maximize the amount it gets paid for shipping without exceeding the lorry's total load capacity. Table 1 below illustrates the items, weight and profit for the company. Provide a solution to this problem using appropriate computational logic approaches.

Assessment Criteria

All important parts of the provided solution function properly and relate to theory. Proper demonstration of functionality features are included in the deliverable.

Deliverable

Code (any programming language of your choice, clearly indicated with the submission file).

Item type.	Weight (in tonnes)	Value (in thousands of £)
1	3	126
2	8	154
3	2	256
4	9	526
5	7	388
6	1	245
7	8	210
8	13	442

9	10	671
10	9	348

Table 1. Item, weight and value.

Part C. Problem Statement (20% of overall mark)

Create a suitable Neural Network that can approximate the following function:

$$y=3\,x+0.7\,x^2$$

Show how it works via plots and/ or suitable text outputs.

Assessment Criteria

All important parts of the provided solution function properly and relate to theory. Proper demonstration of functionality features are included in the deliverable.

Deliverable

Code (any programming language of your choice, clearly indicated with the submission file).

Part D. Problem Statement (40% of overall mark)

A dataset is available containing 53940 market prices and various characteristics of diamonds. These can be briefly outlined in table 2 below. The dataset can be downloaded from the Module's Moodle page. Create a suitable Neural Network that can predict the price of a diamond given a series of the above characteristics. For the purpose of this exercise you can use all of the data or choose not to use up to three (3). Show that it works via plots and/ or suitable text outputs.

Assessment Criteria

All important parts of the provided solution function properly and relate to theory. Proper demonstration of functionality features are included in the deliverable.

Deliverable

Code (any programming language of your choice, clearly indicated with the submission file).

Data	Explanation of value in dataset
Price	price in US dollars ($326--$18,823)
carat	weight of the diamond (0.2--5.01)
cut	quality of the cut (Fair, Good, Very Good, Premium, Ideal)
colour	diamond colour, from D (best) to J (worst)
clarity	a measurement of how clear the diamond is (I1 (worst), SI2, SI1, VS2, VS1, VVS2, VVS1, IF (best))
x	length in mm (0--10.74)

y	width in mm (0--58.9)
z	depth in mm (0--31.8)
depth	total depth percentage = z / mean(x, y) = 2 * z / (x + y) (43--79)
table	width of top of diamond relative to widest point (43--95)

Table 2. Diamond characteristics and explanation.

Marking Guide: The marking scheme below applies separately to every part of the coursework (parts A to D).

The Assessment Criteria referenced in the table below are given with the problem statements, the Learning Outcomes referenced in the table below are:

- 🎬 **Build neural networks from mathematical and programming building blocks.**
- 🎬 **Build genetic algorithms from mathematical and programming building blocks.**

Classifications	Categoric al Marking Scale	Description
Publishable/ Professional standard	100	Learning Outcome: Exceptional in most/all aspects, substantially exceeding expectations for this level. Assessment Criteria: Inclusion of elements beyond those required.
Near publishable/ Professional standard	95	
Exceptional 1st	88	
Outstanding 1st	85	
Excellent 1st	82	Learning Outcome: Excellent quality, exceeding expectations for this level in many aspects. Assessment Criteria: Inclusion of elements beyond those required.
Very good 1st	78	
Clear 1st	75	
Just about a 1st	72	
Very good 2:1	68	Learning Outcome: Meets all the intended learning outcomes and exceeds the threshold expectations for this level in several

Clear 2:1	65	
Just about a 2:1	62	
Very good 2:2	58	Learning Outcome: Meets all the intended learning outcomes and exceeds the threshold expectations for this level in some of them. Assessment Criteria: Addresses the question/assignment. Some omissions.
Clear 2:2	55	
Just about a 2:2	52	
Very good 3rd	48	Learning Outcome: Meets all the intended learning outcomes but rarely exceeds the

Clear 3rd	45	threshold expectations for this level
Just about a pass	42	Assessment Criteria: Addresses some aspects of question/assignment. Some omissions.
Not quite a pass/ Marginal fail	38	Learning Outcome: Fails to meet all of the intended learning outcomes and is inadequate for this level. Assessment Criteria: Fails to address much of the question/assignment. Lots of omissions.
Marginal fail	35	
Mid-range fail	32	
Mid-range fail	28	
Fail	22	
Fail	15	
Non-submission or no adequate attempt	0	No submission