



# Abertay University

**School of Design and Informatics**

**Session 2021/22**

**CMP304: Artificial Intelligence**

**Module Tutor: Christopher Acornley**

**Unit 1 of Module Assessment – 50%**

**Learning Outcomes Assessed by this Assessment:**

**LO1. Critically examine various artificial intelligence techniques.**

**LO2. Develop a critical understanding of AI techniques and technologies.**

**LO3. Evaluate the use of AI technologies and techniques for specific purposes.**

**Date of Issue: 8<sup>th</sup> February 2022**

**Submission Date: 29<sup>th</sup> March 2022 (last submission 11:59pm)**

**Grade Release and Feedback date: 22<sup>nd</sup> April 2022**

## Assessment overview

During this module you will be investigating various intelligent systems, techniques and algorithms that can be used to support various processes in Computing. For this assessment you can either choose **two different non-learning** Artificial Intelligence (AI) techniques and compare them (Rule Based Systems, Finite State Machines, Fuzzy Logic, Tree Searches, etc.), or look in depth at a **single stochastic** technique (Genetic Algorithms, Reinforcement Learning, Machine Learning). You will develop an application in a domain of your choosing to demonstrate the chosen techniques.

The assessment is divided into two main artefacts, an application allowing you to develop and demonstrate your chosen technique(s), and a report describing the design process and implementation of said technique(s).

## The Application

You should develop an application and use it to compare and contrast two different AI systems or look at a single AI technique in depth. You should consider which domain would be most appropriate to test the AI algorithms that you have chosen. Remember, whatever application you choose you will have to have enough data to enable you to create a reasonably sophisticated AI system. You may develop this application in any language and on any platform, you wish but you must submit a standalone executable that can run on a Windows 10 system.

## Some Ideas

You have a completely free choice as to what your AI system will do, but here are some possible ideas to get you started.

### Applied Computing Applications:

- You could create a Decision Support System (DSS), e.g. for medical diagnosis etc.
- You could try using AI techniques to detect patterns in Big Data in order to extract meaningful information.
- You could try some form of intelligent planner for complex tasks.
- You could try to train an AI to recognise different letters and/or numerals.
- You could try creating a chatbot that is able to respond to the users' emotions using Affective Computing techniques.
- You might like to see if AI can be creative, by automatically producing music or art etc.
- You might want to think about an intelligent recommender system, e.g. for online shopping on Amazon etc.

- You can create an expert system for controlling an external system
- You can apply an AI to handling or identifying software that may cause security concerns
- Create an AI system to act in a quality assurance capacity

#### **Video Game Applications:**

- You could use an AI that makes a racing car follow the racing line.
- You could have a decision-making system to create believable interactions with game characters.
- You could try a planning system to create strategies in a Real Time Strategy (RTS) game.
- You could try using AI techniques to automatically generate game content.
- You could use evolutionary (or other) algorithms to 'evolve' opponents in games in order to balance the challenge of the game to the skills of the player (Dynamic Difficulty Adjustment (DDA)).
- You could use Affective Computing techniques to detect emotions in the player, which will change the game play.
- You could use emotional modelling to create 'realistic' behaviours in the NPCs.

You are free to apply any AI technique to any problem you wish. It is recommended that you check your idea with a member of teaching staff before proceeding with the coursework. Time will be allocated for this during the semester.

### **The Report**

Your report should describe fully the design process for the application, giving specific details of the AI techniques implemented. You should give some general background to AI and its uses in the domain which you have chosen, and you should give full rationale for your choice of AI techniques. I.e. why you chose them and why they are suited for your particular application.

If comparing two techniques, the report should include the properly tabulated results of testing the two approaches using graphs or other illustrations to make them clear, and explain what differences there were between them.

If focusing on a single AI technique, testing should focus on performance of the algorithm, using graphs and other illustrations to explain how effective the approach is. You should also compare the techniques in terms of computational efficiency and ease of coding.

## **Grading the assessment**

### **The report (50% weighting)**

Should be well written and structured in a style suitable for a technical report (Introduction, method, test data, results and conclusions with appropriate headings etc.). Any references used should be appropriately cited. There should be a full set of test data and results as well as suitable conclusions drawn and discussion on the advantages and disadvantages of each AI technique.

### **The application (50% weighting)**

The application should be coded efficiently and properly documented. You will need to create a video, no more than 10 minutes long, demonstrating the application with an appropriate commentary detailing how you created the methods and how the application compares them.

## **Submission**

***You must submit your written report and video separately, along with all application files in a zip file, using the link provided on the CMP304 module page in MyLearning Space.***

All submissions must be uploaded to the appropriate location within the MyLearningSpace system. The deadline for submissions is on the 29<sup>th</sup> March 2022 at 11:59pm.

**Due to the frequency of uploads at this time, you are advised to leave plenty of time (at least an hour) to successfully complete the upload process. If the MyLearning Space system records a submission time after 11:59pm then the work will be treated as a late submission.**

## CMP304 – Coursework Grading Criteria

	<b>Introduction (5%)</b>	<b>Methodology (15%)</b>	<b>Results (10%)</b>	<b>Conclusions (10%)</b>	<b>References (5%)</b>	<b>Structure and Style (5%)</b>	<b>Application (50%)</b>
<b>A</b>	Excellent introduction which gives an appropriate overview of the project	Excellent description of the methods used including a complete explanation and rationale for the technique(s) chosen.	Excellent results, clearly tabulated and relevant.	Excellent conclusions with a full analysis and summary of the project.	A good number of excellent references properly cited in Abertay Harvard style.	Excellent structure in a good, readable style with excellent spelling and grammar.	Excellent application which clearly shows how the programme is operating, efficiently coded with excellent documentation.
<b>B</b>	Very good introduction which gives an almost perfect overview of the project.	Very good description of the methods used including a mostly complete explanation and rationale for the two techniques chosen.	Very good results, very well tabulated and mostly relevant.	Very good conclusions with a very good analysis and summary of the project.	A number of very good references mostly properly cited in Abertay Harvard style.	Very good structure in a readable style with very good spelling and grammar.	Very good application which clearly shows how the programme is operating, mostly efficiently coded with very good documentation.
<b>C</b>	A good introduction which gives a more than adequate overview of the project.	A good description of the methods used including an explanation and rationale for the two techniques chosen with some omissions.	Good results, reasonably well tabulated and relevant.	Good conclusions with a good analysis and summary of the project.	A reasonable number of good references mostly cited in Abertay Harvard style.	Good structure in a fairly readable style with good spelling and grammar.	Good application which mostly shows how the programme is operating, well coded with good documentation.

<b>D</b>	A brief introduction which gives an adequate overview of the project.	An adequate description of some of the methods used including an incomplete explanation and rationale for the technique(s) chosen.	Adequate results, with some tabulation and relevance.	Adequate conclusions with an adequate analysis and summary of the project.	A few adequate references properly cited in Abertay Harvard style.	Adequate structure in a just readable style with passable spelling and grammar.	Adequate application which just shows how the programme is operating, adequately coded with some documentation.
<b>M F</b>	A very brief introduction which just fails to give an adequate overview of the project.	A not quite adequate description of the methods used with an incomplete explanation and rationale the technique(s) chosen with many omissions.	A few results, with little tabulation and relevance.	Inadequate conclusions with inadequate analysis and summary of the project.	Some references inadequately cited.	Some structure, readable in places with inadequate standards of spelling and grammar.	Inadequate application which does not show how the programme is operating clearly enough, inadequately coded with insufficient documentation.
<b>F</b>	Too brief and completely fails to give a sufficient overview of the project.	Totally inadequate description of the methods used with very little explanation and rationale for the two techniques chosen..	Inadequate results, not properly tabulated and barely relevant.	Scant conclusions with barely any analysis or summary of the project.	Barely any references cited, or poorly cited.	Poorly structured, not easy read with poor spelling and grammar.	Very poor application which barely shows how the programme is operating, poorly coded with little documentation.

Please note that the percentage weightings for each criterion are approximate.

### Marking scheme

<b>Literal Grade</b>	<b>Grade Point</b>	<b>Evaluative Descriptor</b>
A+	4.5	<p>Excellent overall.</p> <p>Demonstrates an excellent grasp of the subject matter.</p> <p>Excellent capacity for original and creative enquiry.</p> <p>Excellent ability to critically evaluate, analyse, synthesise and integrate complex information.</p> <p>Excellent communication skills.</p> <p>In addition, exceptional in at least one of the above.</p>
A	4	<p>Excellent overall.</p> <p>Demonstrates an excellent grasp of the subject matter.</p> <p>Excellent capacity for original and creative enquiry.</p> <p>Excellent ability to critically evaluate, analyse, synthesise and integrate complex information.</p> <p>Excellent communication skills.</p>
B+	3.5	<p>Very good overall.</p> <p>Demonstrates a very good grasp of the subject matter.</p> <p>Very good capacity for original and creative enquiry.</p> <p>Very good ability to critically evaluate, analyse, synthesise and integrate complex information.</p> <p>Very good communication skills.</p> <p>In addition, excellent in at least one of the above but overall performance deemed to be very good.</p>
B	3	<p>Very good overall.</p> <p>Demonstrates a very good grasp of the subject matter.</p> <p>Very good capacity for original and creative enquiry.</p> <p>Very good ability to critically evaluate, analyse, synthesise and integrate complex information.</p> <p>Very good communication skills.</p>
C+	2.5	<p>Good overall.</p> <p>Demonstrates a good grasp of the subject matter.</p>

		<p>Good capacity for original and creative enquiry.</p> <p>Good ability to critically evaluate, analyse, synthesise and integrate complex information.</p> <p>Good communication skills</p> <p>In addition, very good in at least one of the above but overall performance deemed to be good.</p>
C	2	<p>Good overall.</p> <p>Demonstrates a good grasp of the subject matter.</p> <p>Good capacity for original and creative enquiry.</p> <p>Good ability to critically evaluate, analyse, synthesise and integrate complex information.</p> <p>Good communication skills</p>
D+	1.5	<p>Satisfactory overall.</p> <p>Demonstrates a satisfactory grasp of the subject matter but limited grasp in some areas</p> <p>Satisfactory capacity for original and creative enquiry.</p> <p>Satisfactory ability to critically evaluate, analyse, synthesise and integrate information.</p> <p>Satisfactory communication skills.</p>
D	1	<p>Adequate.</p> <p>Achievement of all threshold standards but grasp of some subject areas and graduate attribute development may be more limited.</p>
MF	0.5	<p>Marginal fail.</p> <p>Performance just below the threshold standard. A reasonable expectation that a pass is achievable by reassessment without the need to repeat the module.</p>
F	0.0	<p>Fail. Performance well below the threshold level. Some limited evidence of achievement of the outcomes.</p>
NS		<p>NS No assessments submitted.</p>