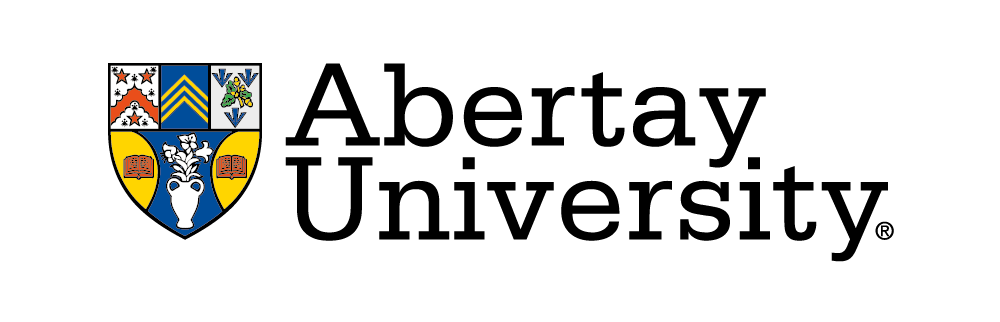
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**School of Design & Informatics**

# Session 2023/2024

# CMP304: Artificial Intelligence

## Module Deliverer: Shailendra Rathore, Stuart Anderson

**Part 2 of the module assessment – 50%**

**Learning outcomes assessed by this assignment:**

**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:** 26/02/2024

**Submission date:** 07/05/ 2024

**Grade Release and Feedback date:** Week commencing 27/05/2024

## Assessment overview

For this assessment, you are going to design and develop a machine learning (ML) application to demonstrate your understanding of data-driven AI concepts and the relevant techniques.

## The Coursework

You should develop a machine learning application and use it to solve a problem of your choice. You should consider which domain would be most appropriate for a solution. For example, you may want to develop a supervised model able to distinguish between two or more entities (like binary or multi-class classifiers) or predict continuous values (like regression systems). Or you may choose an unsupervised approach where no training is required (like clustering and data mining). Based on your selected application and technique, you may need to find or create relevant datasets suitable for training/testing your system. You have to have enough data to enable you to create a reasonably sophisticated AI system.

**Suggested Approach**

1. Find a suitable dataset for the problem you are trying to solve – you can use dataset search tools or generate your own data based on certain rules. You need to be systematic and deliberate about your choices and justify your data sources in the report.
2. Design any pre-processing steps that may be needed to prepare the data.
3. Investigate ML models that can be used in the task. Select one and give rationale for your choice.
4. Define features to describe the inputs. Not all ML problems/models require a separate feature extraction step. You will have to decide and justify your decision.
5. Write an application that will implement the ML pipeline you decided.
6. Conduct a performance analysis of the system with appropriate measures.
7. Write a report detailing how you developed the application and how it was tested and assessed. Discuss how successfully the application works overall.

## Data

Keep in mind that data is a significant component in ML. Before starting on the application, make sure you are able to find appropriate datasets for the specific problem.

Some places to find data might include, but are not limited to:

<https://www.kaggle.com/>

<https://datasetsearch.research.google.com/>

<https://www.re3data.org/>

<https://github.com/leomaurodesenv/game-datasets>

Game APIs

* <https://docs.opendota.com/>
* <https://developer.pubg.com/>
* **Remember that you MUST check the copyright notices for any dataset you intend to use and reference every source in your report.**

**Some Ideas**

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

* Assist a virtual agent gain awareness of its surroundings by identifying what object it “sees”.
* Create a system to predict players next actions, such as an opponent AI may use during gameplay
* Use unsupervised learning to classify groups of players within a dataset
* Use supervised learning to train an AI to play a game based on examples from a dataset

If you come up with your own idea, you should discuss it with staff before going ahead with the implementation to ensure that you are doing something appropriate.

**Grading the Assessment**

**The Application (20%)**

The application should be coded efficiently and properly documented. Remember to follow good programming practices. The ML system should be able to solve your chosen problem and demonstrate learning. You can adapt any external material you find useful, as long as you provide proper referencing.

**The Report (80%)**

The report should fully describe the design process for the application, giving specific details of the steps you followed. You should give full rationale for the choice of features (if any) and techniques. i.e. why you chose them and why they are particularly suited for your application. Your report should include details of testing, an explanation of the performance, and a quantitative performance measure (e.g. system accuracy). The report should be well written and structured in a style suitable for a technical report (introduction, method, data and testing specification, results and conclusions with appropriate headings etc.). 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 the adopted approach. Any references or images used MUST be properly cited. Refer to Abertay’s referencing guide on how to cite different material.

**Submission**

You must submit your written report and program separately. Please submit your solution via MyLearningSpace as follows (separate files):

* **Report as .pdf**
* **Source file or .zip of source files.**

*Please DO NOT UPLOAD ANY LARGE DATASETS with your submission.*

All submissions must be uploaded via appropriate location within MyLearningSpace system. No email submissions will be accepted. The deadline for submissions is 12 noon on the 7th May 2024.

The system is likely to be busy at that time. For this reason, 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 12 noon then the work will be treated as a late submission.

Guidance on submitting via MyLearningSpace is available at digital skills guide for students. Please contact the Support Enquiry Zone [sez@abertay.ac.uk](mailto:sez@abertay.ac.uk) if you have any problems with the submission process.

**Use of Generative AI**

Use of Generative AI Tools (such as ChatGPT, Bard, etc.) is **explicitly prohibited** in this assessment in CMP304. The output gleaned or generated from the tools mentioned, and others that are similar, relates to sources already published/available. Consequently, using these tools without correct referencing is deemed plagiarism. Also, be aware that the information obtained can be inaccurate or incomplete. Thus, all submitted work should be your own. If the assessment is found to have been plagiarised or to have used unauthorised AI tools, you will be referred to the Student Disciplinary Officer within the School and this may result in an Academic Misconduct charge.

You may use writing-specific tools, such as Grammarly, for aiding grammar and structure.

1. It is recommended that you keep a record of your interaction with these tools.
2. It is recommended that you have evidence of drafts of your work.

# CMP304 – Coursework Grading Criteria

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Introduction and Background (20%)** | **Methodology (20%)** | **Data Specification (20%)** | **Results and Conclusions (20%)** | **Application (20%)** |
| **A** | Excellent introduction that gives a detailed overview of the project’s aims and objectives.  Background supported by an excellent set of properly referenced sources. | Excellent description of the methods used including a complete explanation and rationale for the chosen techniques. | Excellent description of data specs and rationale for datasets choice, including proper citation and sample pictures. | Excellent results, clearly tabulated and relevant.  Excellent conclusions with a full analysis and summary of the project. | Excellent application which clearly shows how the programme is operating, efficiently coded with excellent documentation. |
| **B** | Very good introduction that gives an appropriate overview of the project’s aims and objectives.  Background supported by a very good set of properly referenced sources. | Very good description of the methods used including a mostly complete explanation and rationale for the chosen techniques. | Very good description of data specs and mostly complete rationale for datasets choice, including proper citation and sample pictures. | Very good results, very well tabulated and mostly relevant.  Very good conclusions with a very good analysis and summary of the project. | Very good application which clearly shows how the programme is operating, mostly efficiently coded with very good documentation. |
| **C** | Good introduction that gives an appropriate overview of the project’s aims and objectives, but with some lack in clarity.  Background supported by a good set of mostly relevant sources. | A good description of the methods used including an explanation and rationale for the chosen techniques. | Good description of data specs and some rationale for datasets choice, citation and sample pictures. | Good results, reasonably well tabulated and relevant.  Good conclusions with a good analysis and summary of the project. | Good application which mostly shows how the programme is operating, well coded with good documentation. |
| **D** | Adequate introduction that gives an overview of the project’s aims and objectives, with some parts missing or unclear.  Background supported by a few relevant references. | An adequate description of some of the methods used including an incomplete explanation and rationale for the techniques and features chosen. | Adequate description of data specs and incomplete rationale for datasets choice, citation and sample pictures. | Adequate results, with some tabulation and relevance.  Adequate conclusions with an adequate analysis and summary of the project. | Adequate application which just shows how the programme is operating, adequately coded with some documentation. |
| **MF** | Simple overview of the project with underdeveloped aims and objectives.  Background uses few to no references. | A not quite adequate description of the methods used with an incomplete explanation and rationale for the chosen techniques. | A not quite adequate description of data specs with incomplete rationale for datasets choice, no citation or sample pictures. | A few results, with little tabulation and relevance.  Inadequate conclusions with inadequate analysis and summary of the project. | Inadequate application which does not show how the programme is operating clearly enough, inadequately coded with insufficient documentation. |
| **F** | Simplistic overview of the project with no clear aims and objectives.  No references at all. | Totally inadequate description of the methods used with very little explanation and rationale for the chosen techniques. | Totally inadequate description of data specs with little to no rationale for dataset choice, no citation or sample pictures. | Inadequate results, not properly tabulated and barely relevant.  Scant conclusions with barely any analysis or summary of the project. | 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

|  |  |  |
| --- | --- | --- |
| **Literal Grade** | **Grade Point** | **Evaluative Descriptor** |
| A+ | 4.5 | Excellent overall.  Demonstrates an excellent grasp of the subject matter.  Excellent capacity for original and creative enquiry.  Excellent ability to critically evaluate, analyse, synthesise and integrate complex information.  Excellent communication skills.  In addition, exceptional in at least one of the above. |
| A | 4 | Excellent overall.  Demonstrates an excellent grasp of the subject matter.  Excellent capacity for original and creative enquiry.  Excellent ability to critically evaluate, analyse, synthesise and integrate complex information.  Excellent communication skills. |
| B+ | 3.5 | Very good overall.  Demonstrates a very good grasp of the subject matter.  Very good capacity for original and creative enquiry.  Very good ability to critically evaluate, analyse, synthesise and integrate complex information.  Very good communication skills.  In addition, excellent in at least one of the above but overall performance deemed to be very good. |
| B | 3 | Very good overall.  Demonstrates a very good grasp of the subject matter.  Very good capacity for original and creative enquiry.  Very good ability to critically evaluate, analyse, synthesise and integrate complex information.  Very good communication skills. |
| C+ | 2.5 | Good overall.  Demonstrates a good grasp of the subject matter.  Good capacity for original and creative enquiry.  Good ability to critically evaluate, analyse, synthesise and integrate complex information.  Good communication skills  In addition, very good in at least one of the above but overall performance deemed to be good. |
| C | 2 | Good overall.  Demonstrates a good grasp of the subject matter.  Good capacity for original and creative enquiry.  Good ability to critically evaluate, analyse, synthesise and integrate complex information.  Good communication skills |
| D+ | 1.5 | Satisfactory overall.  Demonstrates a satisfactory grasp of the subject matter but limited grasp in some areas  Satisfactory capacity for original and creative enquiry.  Satisfactory ability to critically evaluate, analyse, synthesise and integrate information.  Satisfactory communication skills. |
| D | 1 | Adequate.  Achievement of all threshold standards but grasp of some subject areas and graduate attribute development may be more limited. |
| MF | 0.5 | Marginal fail.  Performance just below the threshold standard. A reasonable expectation that a pass is achievable by reassessment without the need to repeat the module. |
| F | 0.0 | Fail. Performance well below the threshold level. Some limited evidence of achievement of the outcomes. |
| NS |  | No assessments submitted. |