



COM7019

**Artificial Intelligence and Neural
Networks
Level 7**

Date for Submission: Please refer to the timetable on ilearn

**(The submission portal on ilearn will close at 14:00 UK time
on the date of submission)**



Assignment Brief

As part of the formal assessment for the programme you are required to submit a **Artificial Intelligence and Neural Network (AI&NN)** assignment. Please refer to your Student Handbook for full details of the programme assessment scheme and general information on preparing and submitting assignments. The assignment brief will specifically give details and instructions for the assignment. No examination, or details of, are included within this module.

Description: The assignment is given as two tasks. Each task is to be answered individually, unless multiple components have been given. Task 1 has been designed to check your understanding of AI&NN methodologies for critical model analysis, through a real-world mini AI&NN project. All of which will be written in Python

Task 2 is designed to give you the opportunity to demonstrate your AI&NN critical evaluation reporting skills and ethical considerations, comprehensively written in an easily understandable manner, based upon your investigation.

A clear, concise analysis for all Tasks is to be given within the submission, complimented with screenshot evidence and written justification of all processes and results. You are to submit a single Word document for all tasks and your code for Task 1 is to be included within an appendix, so that it can be checked and verified it is working correctly. Your student ID number must be clearly defined upon the uploaded file.

Learning Outcomes:

	Coursework
Critically examine Artificial Intelligence Techniques. LO 1	X
Apply Artificial Intelligence techniques and tools for a given scenario and assess the outcomes. LO 2	X
Appraise the ethical impact of AI in a local and global context and propose appropriate mitigations. LO 3	X
Graduate Attribute Evaluate and apply digital tools and / or services while critically reflecting on opportunities for developing novel digital capabilities. Identify, select, plan for, use, modify and evaluate digital applications and strategies to enhance the achievement of aims and desired outcomes. LO 4	X

Guidance

Your assignment will include: a title page, containing your student number, the module name, the submission deadline and word count; the appendices if relevant; and a reference list in AU Harvard system(s). You are required to address all the elements of the assignment tasks listed below. Please note that tutors will use the assessment criteria set out below when assessing your work.

Maximum word count:3000 words

Please refer to the full word count policy which can be found in the Student Policies section here: [Arden University | Regulatory Framework](#)

The word count includes everything in the main body of the assessment (including in text citations and references). The word count excludes **numerical data in tables, figures, diagrams, footnotes, reference list and appendices. All other printed words ARE included in the word count.**

Students who exceed the wordcount up to a 10% margin will not be penalised. Students should note that no marks will be assigned to work exceeding the specified limit once the maximum assessment size limit has been reached.



Assignment Task

Task 1 – Image Classification using MNIST Digits AI&NN Mini Project in Python

Detail Task 1

You just been hired as an Artificial Intelligence Engineer at a tech startup that builds automated document processing. As your first task, your line manager has asked you to build a neural network that can successfully read and classify from the MNIST dataset 28x28 grayscale images of handwritten digits (0-9), which has been given to you by your line manager.

Your goal is to construct a neural network model comprising of an input layer, three hidden layers and an output layer. As part of the comparative accuracy study of the model, you will implement the ReLU and Tanh activation functions within the hidden layers to determine the model's accuracy and performance in using each activation functions separately. The output layer will have 10 nodes, one for each digit (0-9) and include an additional activation function of your choice to critically analysis results, ensuring the model outputs a probability distribution over the 10 digit classes. The full investigation is to be written in Python.

(70 Total marks)

(LO's: 1 & 2)

(1800 Word Equivalence for the code)

(700 words written Justification)

Task 2 – Critical evaluation report

Detail task 2

After the successfully development of your neural network model, the final step requires you to conduct a critical evaluation of the project. You will assess the outcomes of your model and address any ethical and moral issues that may arise from deploying a neural network system in practical applications. Your evaluation should be comprehensive, considering both the technical performance and the broader impact of the system, such as end-users, clients and society before general release.

(30 Total marks)

(500 words)

(LO's: 3 & 4)

End of questions



As technology and platforms may change, your module tutor will provide you with up-to-date details.

Formative Feedback

You are encouraged to submit your assignment for feedback **once** and it is 30% of your entire submission. You, the student, are to choose 30%, **not the tutor**. The last day for guaranteed feedback hand in is Monday of week 9 at 23:58.

The Feedback is designed to help you develop areas of your work, encouraging academic skills and independent learning.

If you are a Distance Learning student, then you are encouraged to send 30% of your assignment for feedback by email to your tutor, no later than two weeks before your final submission date. Dates will be given to you by your tutor on a module by module basis.

No formative feedback will be given after the specified details above, either blended or distance learning.

Referencing Guidance

You **MUST** underpin your analysis and evaluation of the key issues with appropriate and wide ranging academic research, ensuring all cited literature is referenced using the AU Harvard system(s).

The My Study Skills Area on iLearn contains useful resources relating to referencing.

Additional notes:

Students are required to indicate the exact word count on the title page of the assessment.

*The word count excludes the **title page, tables, figures, diagrams, footnotes, reference list and appendices**. Where assessment questions have been reprinted from the assessment brief these will also be excluded from the word count. **ALL other printed words ARE included in the word count** See 'Word Count Policy' on the homepage of this module for more information.*



Submission Guidance

Assignments submitted late will not be accepted and will be marked as a 0% fail.

Your assessment should be submitted as a single *Word (MS Word) or PDF* file. For more information, please see the “Guide to Submitting an Assignment” document available on the module page on iLearn.

You must ensure that all parts of the submitted assignment is all your own work and that all sources used are correctly attributed. Penalties apply to assignments which show evidence of academic unfair practice. (See the Student Handbook which is on the homepage of your module and also in the Induction Area).

Assessment Criteria (Learning objectives covered - all)

Level 4 is the first stage on the student journey into undergraduate study. At Level 4 students will be developing their knowledge and understanding of the discipline and will be expected to demonstrate some of those skills and competences. Student are expected to express their ideas clearly and to structure and develop academic arguments in their work. Students will begin to apply the theory which underpins the subject and will start to explore how this relates to other areas of their learning and any ethical considerations as appropriate. Students will begin to develop self-awareness of their own academic and professional development.

Grade	Mark Bands	Generic Assessment Criteria
First (1)	80%+	Outstanding performance which demonstrates the ability to analyse the subject area and to confidently apply theory whilst showing awareness of any relevant ethical considerations. The work shows an excellent level of competence and confidence in managing appropriate sources and materials, initiative and excellent academic writing skills and professional skills (where appropriate). The work shows originality of thought.
	70-79%	Excellent performance which demonstrates the ability to analyse the subject and apply theory whilst showing some awareness of any relevant ethical considerations. The work shows a high level of competence in managing sources and materials, initiative and very good academic writing skills and professional skills (where appropriate). The work shows originality of thought.
Upper second (2:1)	60-69%	Very good performance which demonstrates the ability to analyse the subject and apply some theory. The work shows a good level of competence in managing sources and materials and some initiative. Academic writing skills are good and expression remains accurate overall. Good professional skills (where appropriate). The work shows some original thought.
Lower second (2:2)	50-59%	A satisfactory to good performance which begins to analyse the subject and apply some underpinning theory. The work shows a sound level of competence in managing basic sources and materials. Academic writing skills are satisfactory and expression remains accurate overall although the piece may lack structure. Satisfactory professional skills (where appropriate). The work lacks some original thought.
Third (3)	40-49%	Basic level of performance in which there are some omissions in understanding the subject, its underpinning theory and ethical considerations. The work shows a basic use of sources and materials. Academic writing skills are limited and there are some errors in expression and the work may lack structure overall. There are some difficulties in developing professional skills (where appropriate). The work lacks original thought and is largely imitative.
Marginal fail	30-39%	Limited performance in which there are omissions in understanding the subject, its underpinning theory and ethical considerations. The work shows a limited use of sources and materials. Academic writing skills are weak and there are errors in expression and the work may lack structure overall. There are difficulties in developing professional skills (where appropriate). The work lacks original thought and is largely imitative.
Clear fail	29% and below	A poor performance in which there are substantial gaps in knowledge and understanding, underpinning theory and ethical considerations. The work shows little evidence in the use of appropriate sources and materials. Academic writing skills are very weak and there are numerous errors in expression. The work lacks structure overall. Professional skills (where appropriate) are not developed. The work is imitative.

Rubric Task 1: Image Classification using MNIST Digits AI&NN Mini Project in Python (70 Marks)

Criteria	Outstanding 80% - 100%	Excellent 70% - 79%	Very Good 60% - 69%	Good 50% - 59%	Pass 40% - 49%	Limited 0 – 39%
Task 1 Image Classification using MNIST Digits AI&NN Mini Project in Python (70% Marks Overall)	An outstanding understanding of the processes involved when constructing a NN investigation. Activation functions and all layers have been completed correctly. The correct NN methodology has been Applied. All processes and modelling are correct.	An excellent understanding of the processes involved when conducting a NN investigation. Activation functions and all layers have been completed correctly. A NN methodology has been applied. Processes and modelling are correct.	A very good understanding of most of the processes involved when conducting a NN investigation. Activation functions and layers have been completed. A NN methodology has been Applied. Processes are mostly correct and justified.	A good understanding of most processes involved when conducting a NN investigation. Some Activation functions and layers have been completed. An NN methodology has been mostly applied. Some processes are correct and justified.	A basic understanding of the processes involved when conducting a NN investigation Minimal Activation functions and layers have been completed. Minimal NN methodologies have been applied. Processes and solutions have been given, yet incorrect.	A limited understanding of the processes involved when conducting an NN investigation No Activation functions and layers have been completed. No NN methodology has been applied and no processes are evident.

Rubric Task 2: Critical evaluation report (30 Marks)

Criteria	Outstanding 80% - 100%	Excellent 70% - 79%	Very Good 60% - 69%	Good 50% - 59%	Pass 40% - 49%	Limited 0 – 39%
Task 2 Critical evaluation report (30% Marks Overall)	An outstanding critical evaluation. All analysis results have been given and are correct, therefore inferring the correct NN methodologies and ethical implications. All results are fully reasoned and justified. No gaps are shown within the evaluation.	An excellent critical Evaluation has been given and correct, therefore inferring the appropriate NN methodologies and ethical implications. Results are reasoned and justified.	A very good critical evaluation. Most results have been given, therefore mostly inferring some form of NN methodology ethical implication. Most of the Results are reasoned with and justified. Minor gaps are shown within the evaluation.	A good critical evaluation. Some Analysis results have been given, therefore inferring some form of NN methodology and ethical implication. Some of the Results are reasoned with and justified. Gaps are shown within some of the evaluation.	A basic critical evaluation. Some Analysis results have been given, yet incorrect. Some of the results are reasoned with and justified, including ethical implications, but incorrect. Frequent gaps are shown within the evaluation.	A poor critical evaluation No Analysis has been given. No Results are reasoned with or justified, no ethical implications. Major Gaps throughout the evaluation.