SCHOOL OF ARCHITECTURE, COMPUTING, & ENGINEERING

Module code	CN7023
Module title	Artificial Intelligence & Machine Vision
Assignment title	AI & Machine Vision coursework
Assignment number	1
Weighting	Portfolio 100%
Handout date	W4
Submission date	21st August 2023
Learning outcomes assessed by this assignment (see course handbook)	Learning Outcomes: 1-8
Turnitin submission requirement	Yes
Additional information	ASSESSMENT FEEDBACK - Feedback on your assessment will be available in four working weeks from the submission date. Please refer to the module pages on UEL+ for assessment specific details.

CN7023 Assessment: Complete all tasks (100 marks in total)

Task 1: Data Science Skills (20 marks)

Complete four MATLAB Online Courses to learn Data Science skills. Earn a certificate for each course, acquire the following four certificates to complete this part of the assessment.

- **Course 1: MATLAB Onramp -** Get started quickly with the basics of MATLAB. **(5 marks)**
- **Course 2: Machine Learning Onramp -** Learn the basics of practical machine learning methods for classification problems. **(5 marks)**
- **Course 3: Deep Learning Onramp** - Get started quickly using deep learning methods to perform image recognition. **(5 marks)**
- **Course 4: Image Processing Onramp** - Learn the basics of practical image processing techniques in MATLAB. **(5 marks)**

Task 2: Design, implement and report on neural network-based techniques for classification of a dataset of images. (70 marks)

Write a 2500 words research report. The report should be written in your own words and include the following sections, the marks for each section are highlighted:

Introduction (5 Marks) • Objective of the coursework (Research questions(s) you are exploring) (3) • An overview of the report content (2)
Simulations (30 Marks) • Provide a description of the dataset, including sample images (10) • How did you encode the dataset so that you could use the images as input to the neural network? (10) • Explain the network architecture that you used, how you trained, validated and tested the network, explain the learning algorithm used. (10)
Results Obtained (15 marks) Describe your results in the three different ways: 1. As a percentage (%) accuracy for the test set, i.e. the test set achieved 95% accuracy. (5) 2. Include an accuracy curve figure for the training, testing and validation results. The x-axis will represent the number of epochs and the y-axis will represent the percentage accuracy. (5) 3. Include a confusion matrix figure as a visual representation of the accuracy you achieve from the test set. (5)
Critical Analysis of results (10 Marks) ○ Provide information on how you have achieved the results, by making changes to the simulations. (5)

○ Provide detailed analysis and discussion of the results you achieved. (5)
Conclusions (10 Marks) • Restate the research problem addressed in the paper and summarize your overall arguments or findings. (5) • Suggest the key takeaways from your paper. (5)
Appendix: Task 1 MATLAB Certificates (20 Marks) Include the four certificates as screenshots in your report. • Course 1: MATLAB Onramp (5 marks) • Course 2: Machine Learning Onramp (5 marks) • Course 3: Deep Learning Onramp (5 marks) • Course 4: Image Processing Onramp (5 marks)

NOTE: You can choose to complete the coursework using any one of the following approaches:

1. Mixture of image processing with artificial neural networks (with Matlab or Python)
2. Deep learning only (with Matlab or Python)

Dataset

You must choose one of the following image datasets for your coursework. The dataset you use should have at a minimum of 3 classes and 5,000 images.

1. honeybees – simplified, https://www.kaggle.com/unsunnedsnow/honeybees-simplified
2. Simpsons Main Characters, https://www.kaggle.com/mlwhiz/simpsons-main-characters
3. Animals-10 - Animal pictures of 10 different categories taken from google images, https://www.kaggle.com/alessiocorrado99/animals10
4. Natural Images - A compiled dataset of 6899 images from 8 distinct classes, https://www.kaggle.com/prasunroy/natural-images#motorbike_0000.jpg
5. Fruit Classification - 22495 Images of Fruit!, https://www.kaggle.com/datasets/sshikamaru/fruit-recognition
6. Fruits 360 - A dataset with 90380 images of 131 fruits and vegetables, https://www.kaggle.com/datasets/moltean/fruits
7. Medical MNIST - 58954 medical images of 6 classes, https://www.kaggle.com/datasets/andrewmvd/medical-mnist

Task 1 & Task 2 Submission

Upload completed report to Turnitin before deadline. The Turnitin link can be found on the module's Moodle site.

Task 3 (10 marks)

In groups of 3, prepare a PowerPoint presentation on one of the following problems in AI (5 marks):

1. People might lose their jobs to automation

2. People might have too much (or too little) leisure time
3. People might lose their sense of being unique
4. AI systems might be used toward undesirable ends
5. The use of AI systems might result in a loss of accountability
6. The success of AI might mean the end of the human race

During the timetabled practical session of Week 10, you will deliver these presentations.

- Each presentation should have 6-10 sides.
- Each group member must present 1 or more slides.
- The group will answer questions from the practical group tutor.