University of Lincoln Assessment Framework
Assessment Briefing Template 2024-2025

1. Module code & title	CMP9780M Applied Signal and Image Processing
2. Assessed learning outcomes	• [LO1] Critically evaluate and apply the theories, algorithms, techniques and methodologies involved in signal and image processing. • [LO2] Design and implement solutions to a range of signal and image processing applications and problems, and evaluate their effectiveness.
3. Assessment title	Assessment 2
4. Contribution to final module mark (%)	50%
5. Description of assessment task	This is Assessment **2** and is an **individual** assignment, which assess the signal processing component of this module and consists of smaller subtasks which must all be complete. This assessment requires you to develop real-world intelligent vision applications by applying the knowledge gained from the lectures to perform image pre-processing (noise removal, extraction of salient features) and to detect facial characteristics or objects. You have the option of using Python or MATLAB Packages. • If you choose Python, you may utilise the OpenCV package (https://pypi.org/project/opencv-python/), and a machine learning framework such as Keras (https://keras.io/), TensorFlow (https://www.tensorflow.org/) or PyTorch (https://pytorch.org/) or a Library such as DeepFace (https://pypi.org/project/deepface/). • MATLAB, on the other hand, provides the Image Processing Toolbox (https://www.mathworks.com/products/image.html) as well as the Deep Learning Toolbox and Computer Vision Toolbox (https://www.mathworks.com/help/images/deep-learning.html). You will become acquainted with those powerful packages and will use their capabilities in your pipelines.

The dataset: This project requires the usage of a face and gender recognition dataset, which is available as zip file from Blackboard. You would want to improve your pipeline resilience by enriching the datasets. It would be advantageous since the tasks are graded using test images unknown to you.

Emotion Classification from Facial images

This assessment task requires you to use the facial dataset provided on Blackboard along with your own data, to create a deep learning model that classifies images into two emotions: positive (happy) or negative (sad). To complete the task, you must:

- Visualise and analyse the supplied facial images for issues that may prevent them from training a robust deep learning model for image classification and correcting any found.
- Discuss the issues mentioned above and how you addressed them in your report.
- Create a custom deep learning model that trains on the new dataset (the corrected facial dataset provided by Blackboard plus your data). Only include data that will improve model training and justify the addition.
- Evaluate your deep learning system using a confusion matrix and the new dataset. Choose some data for testing your model, but do not include them in the training since your work will be marked using datasets unseen by the model and unknown to you, consisting of 25 happy and 25 sad faces.

The Metrics

The confusion matrix should be presented in the format below:

		Predicted	
	Total population (= P + N)	**Positive (P')**	**Negative (N')**
Actual	**Positive (P)**	True positive (TP)	False negative (FN)
	Negative (N)	False positive (FP)	True negative (TN)

- **True positives** are those positive instances correctly classified.
- **False negatives** are those positive instances wrongly classified.
- **False Positives** are those negatives instances wrongly classified.
- **True negatives** are those negative instances correctly classified.

The Report

	You must produce a standard report of up to 5 pages, not including appendices which should cover but not limited to the following: • How your algorithms or pipeline functionalities work, reflecting on why you chose those approaches. • You must comment on the tools used and critically evaluate any results from each task. • The performance of your algorithms using appropriate metrics supplied. • Your discussion should not only focus on success cases, but also failure, including some discussion about possible causes. • You must provide justification for how the various datasets were enhanced, including pre-processing methods used. • You must justify and network architectural choices that were used in the development of the custom deep neural networks, and any decision leading to the choice of the pre-trained networks and framework choices. ***Some other considerations*** • Additional marks will be awarded for originality and scientific rigour. • Any figures should be numbered and have descriptive legends. • If you include graphs or tables, be sure to use appropriate axis/column/row labels. ***The Video*** You must record a 3-minute video of your solution. Because the video is short, you must ensure that just the most essential parts of the apps are captured. **It is critical to note that failing to fulfill the video criteria or submit the video will result in module failure.**
6. Assessment submission instructions	The deadline for submission of this work on Blackboard is included in the School Submission dates. Your assessment should include a concise report (up to 5 pages – not including Appendices – in PDF format and uploaded to Assessment Item 2 Upload) that describes your work on the above tasks, and a zip file with all the source code, 3-minute video and user generated datasets (uploaded to Assessment Item 2 Supporting Documentation). Other compressed formats (tar.gz, rar, etc.) will **NOT** be accepted, and it is your responsibility to ensure the zip file is not corrupt before submitting. Please note that, in the report, you also need to include the main source codes in the appendix.

	You must attend the lectures for further details, guidance, and clarifications regarding these instructions. *DO NOT include this briefing document with your submission.*
7. Date for return of mark and feedback	Please see the **Hand In Dates.xls** spreadsheet. Note: *all marks awarded are provisional until confirmed by the Board of Examiners.*
8. Feedback format	Feedback will be provided on Blackboard, along with the assessment mark.
9. Use of Artificial Intelligence (AI) in this assessment	You may **NOT** use Artificial Intelligence (**AI**) in this assignment. *This means that you may not use any AI technologies including Grammarly, CoPilot, QuillBot and others. If you are not sure whether you should be using a particular tool, then ask your module leader first.*
10. Marking criteria for assessment	A Criterion Reference Gid (**CRG**) is used to evaluate your learning against a set of pre-defined criteria.
11. Additional information (support, advice, tips etc)	• For general enquiries about the assessment strategy, please contact the module coordinator. • For other queries about the module content, please contact a member of the delivery team. • Details of the delivery team's office hours can be found on the module site on Blackboard. • You are required to use the provided report template, which is downloadable from the Blackboard site. If you choose to create your template, it must include the sections from the provided template at a minimum. • Information about the OpenCV package is available at: https://pypi.org/project/opencv-python/ • Information about the Keras machine learning framework is available at https://keras.io/ • Information about the TensorFlow Library is available at: https://www.tensorflow.org/ • Information about the PyTorch Library is available at: https://pytorch.org/ • Information about the the DeepFace Library is available at: https://pypi.org/project/deepface/ • Information about the MATLAB Image Processing Toolbox is available at https://www.mathworks.com/products/image.html • Information about the MATLAB Deep Learning Toolbox and Computer Vision Toolbox is available at: https://www.mathworks.com/help/images/deep-learning.html.
12. Important Information on Dishonesty,	University of Lincoln Regulations define plagiarism as *'the passing off of another person's thoughts, ideas, writings or images as one's own...'*. Examples of plagiarism include the unacknowledged use of another person's material whether in original or summary form. Plagiarism also

Plagiarism and AI Tools	includes the copying of another student's work'. Plagiarism is a serious offence and is treated by the University as a form of academic dishonesty. For more information on examples of Academic Offences, please see the **Academic Offence Guidance**. Please note, if you use AI tools in the production of assessment work **where it is not permitted**, then it will be classed as an academic offence and treated by the University as a form of academic dishonesty. Students are directed to the University Regulations for details of the procedures and penalties involved. For further information, see www.plagiarism.org