Macao Polytechnic University

School of Applied Sciences (M.Sc. in BD and IoT)

Group Project Guidelines for COMP6116 –
Selected Topics I
Convolutional neural networks for video analysis
1st Semester 2024/2025
(40% of the Final Mark)
Submission of Proposal and Work Allocation: ***October 24, 2024 (Week #9)***
Date of Presentations: ***November 21&28, 2024 (Week #13&14)***
Report, Slides, Work Contribution Due Date: ***11:59pm (UTC/GMT+08:00), November 20, 2024***

Overview

The project aims to propose innovative solutions to challenges in fields such as healthcare, automotive, security, agriculture and augmented reality. By leveraging computer vision, the teams will explore advancements in object detection, object tracking, pose estimation, image classification, image and video generation, etc.

To carry out the projects, teams of 2 to 4 students must be formed. Team members should collaborate to explore potential project ideas in computer vision. Clearly defining each member's role is recommended to ensure fair distribution of work.

To complete a solution project, a fully developed algorithm in Python must be created, uploaded to GitHub, and applied to a real-world problem. As a simple example, the YOLOv10 algorithm can detect objects such as people, masks, or cars.

Many conferences regularly publish papers in the field of computer vision, proposing novel algorithms and solving existing problems. These include:

1) Computer Vision and Pattern Recognition (CVPR)

2) International Conference on Computer Vision (ICCV)

3) European Conference on Computer Vision (ECCV)

4) **International Conference on Learning Representations (ICLR),** etc.

Additionally, open-source codes can be found on GitHub.

For the final project, in addition to proposing a novel algorithm and applying it to real-world problems, each team should demonstrate which published research inspired their idea and code. Furthermore, teams are encouraged to incorporate new designs or concepts.

Submission Instructions

For the approval of a proposed project, a team must submit a ***proposal*** and a ***work allocation*** document to the instructor by ***October 24, 2024 (Thursday)*** the latest for evaluation. The proposal should be no more than two pages in length on A4-sized paper. Teams can proceed with their proposals upon receiving approvals from the instructor.

Before the lecture for project presentations, teams must submit their final project ***reports***, the PowerPoint ***presentation slides***, ***a 3-4 minute video demonstrating the project functionalities***, and ***work contribution*** documents. Each team may run the demonstration in class after presenting the project motivation, objectives, designs, and evaluation results.

Work Allocation/Contribution Documents

Regarding individual mark within the group project, each team member must fill in his or her foreseeable work allocation in the "Work Allocation" document. This document must be submitted together with the proposal for approval.

A final report must be submitted at the end of the semester. There is a "Work Contribution" document which should be attached to the final report as an appendix. In the "Work Contribution" document, each member in a team must detail what he or she actually did and completed for the project in detail.

Marking Scheme

There are three components in the final markings for an individual member in this course project:

- Individual assessment (40 out of 100)
- Group assessment: final report (40 out of 100)
- Group assessment: project presentation and demonstration (20 out of 100).

The breakdown and reasoning of each marking component will be elaborated in the marking rubric below.

Group Assessment [Total 60%]

Final Report [40% out of 60%]

A report (at most 10 pages; A4 paper size, single-line spacing) should contain the following sections:

1. **Introduction**
    - State the motivation and design objectives of the project
    - Provide a brief background for the topic under investigation and what problem you discovered
2. **Main body/Methodology – Algorithm Design**
    - Introduce the solution and algorithm functions
    - Describe the whole algorithm design in detail and demonstrate the unique function of each component
3. **Experiments/Measurements/Analysis**
    - For experiments and testing: detail the results and indicate whether they were successful or not.
    - For comparison: evaluate the usefulness of each component in comparison
    - For review: critique the design and evaluate the performance expectation
4. **Conclusion**
    - Provide an overview and insights on the project results
    - Assess if the project meets the original design goals
5. **References**
    - Include proper citations related to the report
6. **Appendix: Individual Work Contribution**
    - Clearly detail each team member's contributions, such as concept and architecture design, coding components, and paper collection

turnitin submission: both plagiarism and self-plagiarism are unethical. For this project, each group is required to submit the final report to *turnitin* website. A member in group can open an account at *turnitin*. The details on using the *turnitin* can be found at link: https://www.mpu.edu.mo/student_corner_p/en/gls_avoid_plagiarism.php.
No "*turnitin*" report attaching to the final project report upon submission may possibly render the project mark to zero.

The detailed marking rubrics can be found in Appendix A.

Oral Presentation and Video Demonstration [20% out of 60%]
Each team is required to present (20 minutes presentation + 3 minutes of Q&A) during the last lecture session.

The marking scheme for this part can also be found in Appendix A.

Individual Assessment [40%]

Each member in a team is assessed individually according to his or her contribution to the project. There are two documents regarding this individual contribution component: 1) ***work allocation*** document, and 2) ***work contribution*** document. The work allocation should be submitted together with the proposal document. And the second document, work contribution should be added and attached as an appendix to the final report for submission.

Individual work allocation / contribution MUST include the following items:

1. The specific work items will be / were carried out individually by each member, for example, the algorithm designs, latest publication investigations, code contribution, etc. Each assigned / contributed item must be meticulously written in documents.
2. At the end of the project, it is understandable that not all parts would function or operate as initially expected, owing to time constraint or other resource limitations. In case of any fall back in designs, each member should elaborate the problems or difficulties encountered during the process, and their possible solutions in future.
3. Individual reflection about the lessons learned and challenges encountered in the project in the work contribution document.

The individual assessment will be based on both the work allocation and contribution documents. The amount of work a person has done for the project as depicted in the work contribution document, and whether it would be quite different from the initial estimate as indicated in the work allocation document. The work contribution of a member will be assessed based on the criteria for the report assessment method. If there are no work contributions to the project by an individual, then this person will get zero mark in this component. In our expectation, the individual work contributions among all team members MUST not be identical; otherwise, all members may get zero marks on in-depth project review.

(Self-) Plagiarism

According to the Merriam-Webster Online Dictionary, "to plagiarize" means

to steal and pass off (the ideas or words of another) as one's own
to use (another's production) without crediting the source
to commit literary theft
to present as new and original an idea or product derived from an existing source.

In other words, plagiarism is an act of fraud. It involves both stealing someone else's work and lying about it afterward. For more details about plagiarism and how to prevent

it, please refer to www.plagiarism.org.

Please note that any alleged cases of academic dishonesty[1], including plagiarism, will be reported to the School Director who shall conduct a thorough investigation. Established cases should be reported to the Pedagogical Committee (PC) for further consideration. Any proven acts of academic dishonesty may result in dismissal from the Institute.

A zero mark will be given if you copy someone else's work or you let someone copy your work. Zero mark will also be given if a team reuses its past assignment project due to self-plagiarism.

[1] see *https://www.mpu.edu.mo/student_corner/en/reg_for_handling_violations_acad_integrity.php*

Appendix A

The following marking criteria will be used for the final report. The quality of the written English would have impact on the marks given in each of the components.

Final Report (100% Mapped into 40% Final Marks)

Complexity of the Project (25%)	18-25	• Highly innovative design concept, involving multiple complex Artificial Intelligence (AI) components or algorithms; challenging project.
	9-17	• Medium difficulty, includes some innovative elements or multiple basic AI components
	0-8	• Low complexity, involves only basic AI model application or simple algorithm implementation
1) Design Details or 2) An In-depth Study (30%)	21-30	• Thorough explanations of AI system architecture and component designs; clear algorithm implementation details; logically structured documentation
	11-20	• Sufficient explanation of AI system design and algorithm implementation; well-organized documentation
	0-10	• Insufficient design or implementation explanation, including misunderstanding or misuse of AI technologies; poorly structured documentation
Experiment / Analysis (25%)	15-25	• Excellent AI model implementation: fully functional, runs well; in-depth performance analysis and evaluation
	9-14	• Satisfactory AI model operation, partially functional; reasonably sound analysis and evaluation
	0-8	• Failed implementation or poor quality analysis and evaluation
Original Goals and Results (10%)	0-10	• 10 for meeting all initial design plans • 0 for failed to meet any initial design plans
References (10%)	0-10	• Thorough referencing or not

Presentation (20%)

Quality of prepared slides (8%)	7-8	• Slides are well-structured, clearly outlining the project's motivation, objectives, and the innovative application of computer vision techniques (e.g., object detection, tracking, or image generation). • Visuals effectively highlight key components of the algorithm, making complex technical details easy to understand. • The content flows logically from the introduction to the conclusion, providing a comprehensive overview of the project.
	4-6	• Slides present the necessary technical details, but lack depth in explaining the novel aspects of the algorithm or application. • The organization of the content is satisfactory, though some sections may be unclear or less focused on key objectives.

	0-3	• Slides are poorly organized, with minimal explanation of the project's technical details or its real-world application. • Key concepts and algorithm designs are missing or unclear, making it difficult for the audience to follow the presentation.
Quality of presentation (8%)	7-8	• The presenter clearly communicates the project's innovations, explaining both the problem being solved and the algorithm's unique contribution. • The presentation is well-paced and engaging, effectively showcasing the algorithm's application in real-world challenges (e.g., healthcare, security, augmented reality). • The presenter confidently answers questions, demonstrating a deep understanding of the project and relevant computer vision concepts.
	4-6	• The presenter is able to explain basic aspects of the project, but struggles with detailing the innovative components or answering technical questions. • The presentation is somewhat engaging but may lack clarity or fail to emphasize the real-world application effectively.
	0-3	• The presenter fails to communicate the core concepts of the project, leading to confusion about the algorithm or its application. • Little or no engagement with the audience, and difficulty addressing questions or explaining the relevance of the project to real-world challenges.
Video Demonstration (4%)	3-4	• The demonstration clearly showcases the project's functionality, illustrating how the algorithm solves a real-world problem (e.g., object tracking in security systems, pose estimation in healthcare). • The video is well-edited and includes clear annotations or narration to explain the algorithm's processes and outputs. • The visual quality and explanations are aligned with the project's objectives, enhancing understanding.
	0-2	• The demonstration fails to properly show the project's functionality, with significant issues in performance or visual clarity. • The video is poorly structured or lacks meaningful guidance, making it difficult to understand how the algorithm operates or solves the target problem.