COMP4423 – Computer Vision

Project Requirement

Canteen Queue Monitoring System

[Deadline: 23:59:00 Wen 8th May 2024]

Important Notes

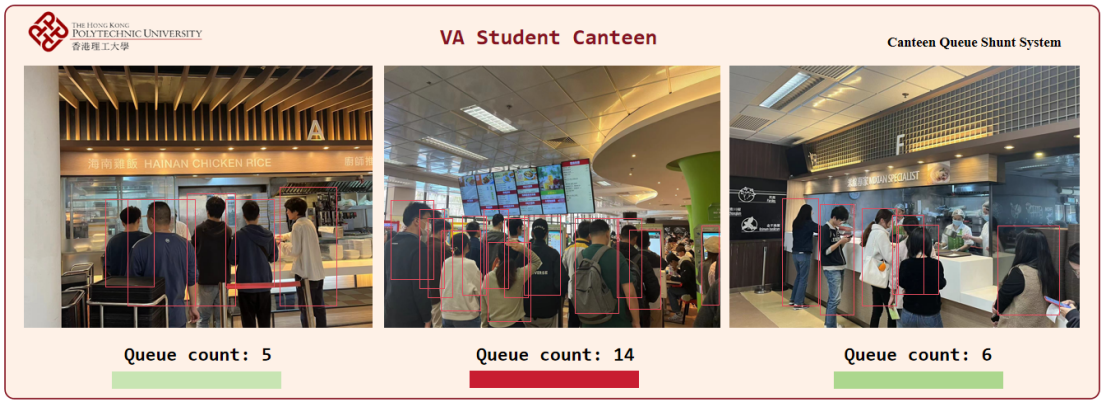
1. Form your groups, each consisting of no more than three students, on or before **19 April 2024**. Afterward, students with no group will be randomly grouped, and requests for group change are only approved if written agreements from all members of the involved groups are provided before or on **24 April 2024**.
2. Compress the source code, the tests, the dataset, and the final report in PDF into a single ZIP archive and submit it on Blackboard before or on **8 May 2024**.
3. Each member of the group needs to submit an individual report. The report should be prepared from your own perspective and reflect your understanding of the project. It is mandatory for the individual report to demonstrate a distinct difference of at least 30% from the reports of other group members.

1. Task Description

Addressing long queues in campus canteens during peak hours continues to pose a management challenge for universities worldwide. Implementing a monitoring system to track queue lengths and provide real-time information would be an effective solution.

To this end, an ideal queue monitoring system should focus on the following aspects:

- Monitor the number of students waiting in line in front of any service window.
- Calculate the estimated average waiting time per window per canteen.



For this project, your task is to collaborate with a team and develop algorithms and models that will serve as the foundation for constructing the monitoring system. It is essential to note that this is an open-ended project, prioritizing practical experience over achieving a flawless outcome. You are encouraged to experiment with various models and pre/postprocessing techniques, even if they do not yield the desired results.

Furthermore, you are required to submit a comprehensive report outlining your step-by-step process for completing the assigned tasks. This report should encompass your ideas, algorithm design, any challenges encountered, corresponding solutions implemented, experimental results, and significant findings made throughout the project.

Please take note that this project consists of a series of consecutive steps that must be adhered to. These steps encompass dataset collection, framework definition (e.g., retrieval, classification, detection, and tracking), algorithm design, and performance validation. Moreover, it is essential to deploy and test the algorithm or model in an authentic setting.

For data collection, you have the flexibility to gather information from any service window or obtain videos that are publicly available. It is not obligatory for the windows to be located on the campus. However, please be mindful that certain service windows may have their own regulations that prohibit filming. It is imperative to respect and comply with these regulations to avoid any violations.

In terms of development, the objective is not to construct a fully-fledged system. Rather, the emphasis is on developing the backend algorithm or model specifically for queue flow monitoring. The minimum requirement for this task is to create an algorithm that takes a video of a service window as input and generates outputs for the number of customers in line and the estimated waiting time at 5-second intervals.

2. Tasks & Assessment

Please submit your code and ensure executability with a ***one-line command.***

- **Task 1** ***Build the necessary datasets***. (**15 marks**)

Important: When gathering the data, please ensure that you do not infringe upon any portrait rights.

- **Task 2** ***Formulate the requirements as appropriate computer vision tasks and provide explanations for the motivations and reasoning behind them. (5 marks)***
- **Task 3** ***Devise, implement, validate, and enhance the algorithm capable of accurately counting the customers in the queue. (20 marks)***

- **Task 4** ***Develop, implement, validate, and enhance the algorithm capable of calculating the estimated waiting time. (20 marks)***
- **Task 5 Prepare a comprehensive report that elaborates on the methodology and your contributions to the aforementioned four tasks. (40 marks)**

Extra credit will be awarded for exceptional and well-executed implementations that demonstrate high quality and reasonable additions beyond the tasks outlined above. This includes insightful approaches, additional functionalities, or any other noteworthy contributions that go beyond the initial project requirements.

The final grade of this project will be calculated as $\min(100, normal\_grade + bonus)$.

3. Group Formation

This project requires group collaboration, with each group limited to a maximum of 3 members. Please organize yourselves into groups by 19 April 2024. In case any students are without a group, they will be randomly assigned to a group. Requests for group changes will only be considered if all members of the involved groups provide written agreements before or on 24 April 2024. After this date, no further group changes will be permitted. To find the groups you have formed or wish to join, please access the "Group" section on the BlackBoard platform. Kindly refrain from joining a group without obtaining consent from all other members involved.

4. Individual Report

It is crucial for each member to submit an individual report. The report should be prepared from your own perspective and reflect your understanding of the project. It is mandatory for the individual report to demonstrate a distinct difference of at least 30% from the reports of other group members.

Additionally, your report should include a dedicated subsection titled "*My Contribution and Role Distinction.*" In this subsection, you should provide a detailed account of your individual contributions to the project and highlight the unique aspects of your role in comparison to other group members. The content of all other sections should align with the claims made in this subsection.

4. Submission

Follow the steps below:

1. Create a main directory with your project's name, e.g., G001.

2. Within the main directory, create subdirectories for each component of the submission, such as Source Code, Dataset, and Report.

3. Place the relevant files in their respective directories. For example:

- The source code files should be placed inside the Source Code directory.
- The collected data should be placed inside the Dataset directory.
- The report document should be placed inside the Report directory. The report should be named as <your_ID>_<your_name>.pdf, e,g., 12345678d_DawenChan.pdf.

4. Ensure that all files are appropriately named and in the required file formats.

5. Double-check that the files and directories are organized correctly and follow the specified structure.

7. Compress the main directory and its components into a ZIP file.

8. Submit the ZIP file on the blackboard. Each group only needs to submit once.

Example Directory Structure:

```
G001
├─ Source Code
│  ├─ Main.py
│  └─ ...
├─ Dataset
│  ├─ labels.json
│  ├─ image1.jpg
│  └─ ...
└─ Report
   ├─ 12345678d_Jack.pdf
   ├─ 22345678d_Mike.pdf
   └─ 32345678d_Louis.pdf
```

Warning:
If you are unable to complete the whole program, try to accomplish part of the tasks and make sure it can run successfully.

This assignment will give any wrong file naming and submission a ZERO mark.

The deadline for this assignment is **23:59:00 8th May 2024**.

Late submission penalty

10% is deducted for each day that the work is late. The penalty will be applied up to a maximum of three days after, including the submission deadline day. After three days, the work will be marked as zero.

This assignment is individual work. All work must be done on your own. Plagiarism is a serious offense. Copying code from web resources is prohibited as well. Any plagiarism case (for both the copier and the copiee) will be given a ZERO mark in this assignment.