COMP4423 – Computer Vision

Assignment 2

Wake up in a Virtual Campus

[Deadline: 23:59 April 3rd 2024]

1. Task Description

The rapid advancement of text2image and image2image has led to the generation of highly realistic images that can often be indistinguishable from real-world photographs. It has raised concerns about the potential misuse of AI-generated images, particularly in the context of misleading information or deepfakes.

Given a bunch of fake images for PolyU campus, are you still able to distinguish the real-world campus that you know best?

In this open-ended assignment, we focus on the campus of the Hong Kong Polytechnic University (PolyU) and the architectural elements that surround us. **The goal is to develop an algorithm that could reliably differentiate between real-world pictures captured on campus and AI-generated images of corresponding architectures.** You are allowed to develop any algorithm or model you want based on Convolutional Neural Networks (CNNs) that works. Again, the focus is on practical experience rather than achieving a perfect result. It is encouraged to experiment with different models and pre/postprocessing techniques, even if they do not provide the desired outcome. You will also need to provide a detailed report outlining your step-by-step process for completing the task. This report should include your **ideas**, **algorithm design**, any **problems** encountered, and **corresponding solutions**, and **findings** you made during the project.

In general, you may need to follow multiple steps such as collecting datasets, designing proper algorithms and validating their performance. You will also need to deploy and test the algorithm or model in a real campus scenario.

Note: The AI-generated images provided in this ./references/images is only constructed in one unified style. You will receive corresponding bonuses for your efforts if you manage to identify both AI-generated/real-world and different styles.

2. Tasks & Assessment

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

- **Task 1 Expand the dataset with your real campus scenes** (both images and ground truth annotations, e.g., aiart/realpic). (**10 marks**)

Caution: please avoid portraiture right issues when collecting the data that include people.

- **Task 2** ***Define the requirement as a proper CV task*** and ***give your reasons***. **(10 marks)**
- **Task 3** ***Design corresponding algorithm*** for the task and ***validate it***. **(20 marks)**
- **Task 4** Implementing and testing the trained model in the ***real campus scenario***. **(20 marks)**
- **Task 5** A report to show the details of your method. Questions in the template should be answered. **(40 marks)**

Bonus:

1. Include different styles for the AI-generated images and corresponding algorithm to distinguish them. (5 marks)

2. Excellent code quality, output accuracy, or report quality. (5 marks)

The final grade of this assignment will be $\min(100, normal\_grade + bonus)$**.**

3. Submission

Follow the steps below:

1. Name the .py file as Assignment2_<your_ID>_<your_name>.py.
   e.g., `Assignment2_12345678d_CHAN_Dawen.py`
2. Name the report as Assignment2_<your_ID>_<your_name>.pdf.
   e.g., `Assignment2_12345678d_CHAN_Dawen.pdf`
3. Compress the two files into a .zip file and rename the .zip file.
   e.g., `Assignment2_12345678d_CHAN_Dawen.zip`
4. Upload the .zip file to the blackboard system.

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

Any wrong file naming and submission will be given a ZERO mark in this assignment.

The deadline for this assignment is **23:59:00 Wen 29th March 2023**.

Late submission penalty

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

This assignment is individual work. All work must be done on your own. Plagiarism is a serious offence. 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.