VINUNIVERSITY

Lab Assignment 04

COMP3040 Computer Vision **December 09, 2024**

Due: December 09, 2024, 5:05pm

Objective: The goal of this assignment is provide students with hands-on experience in working with Optical Flow and Visual Tracking

Evaluation Criteria:

- Correctness of the code.
- Proper comments and documentation.

Submission Instructions:

- Download **Lab04_code.zip** to your computer
- Write your Python code in **lab04_p1.py** and **lab04_p2.py**
- Zip the whole folder and submit on Canvas

Note: Please install the following Python packages:

- numpy
- opencv-python (cv2)

1 Problem 1: Object Selection in Sparse Optical Flow (50 pts)

Information: When using Sparse Optical Flow via Lucas-Kanade algorithm, we demonstrated the case where the auto-selection of the starting points (via Corner Detection) can work just fine. However, it might become messy in environments of overlapping objects or crowded spaces. Sometimes, we would prefer to have a function in which we can define the starting points, e.g., the object of interests.

Your Task: Follow the instruction in **lab04_p1.py**, and write code to satisfy the following:

- The program should allow user manually select one starting point in the first frame, then visualize the optical flow tracking of that object throughout the remaining frames.
- Test the program with **shibuya.mp4** and plot the trajectory on the figure.

2 Problem 2: Multiple Trackers (50 pts)

Information: The OpenCV library provides 8 different object tracking methods using on-line learning classifiers, including: BOOSTING, MIL, KCF, CSRT, MedianFlow, TLD, MOSSE, GOTURN. In this problem, our aim is to compare different trackers when applied to specific cases.

Your Task: Follow the instruction in **lab04_p2.py**, and write code to satisfy the following:

- The program should allow users manually select a bounding box in the first frame, then perform the visual tracking of that bounding box throughout the remaining frames.
- Pick 4 of the provided trackers of your choices, test the program with **shibuya.mp4** and **california-road.mp4**. Calculate the video's frame rate when testing with each tracker.
- In each video, which tracker should we prefer for efficiency? Briefly explain your answer.