**COMP 9517 Computer Vision**

**S2, 2018**

**Project**

**Project Synopsis**

The project consists of **two stages**. The **first stage must be completed individually** and will be assessed individually. The **second part is a group project**, for which you can form a group of three to complete.

**I Stage 1 - Individual Project**

This part is common to all students, and is to be **executed individually, and will be assessed on an individual basis.**

Feature detection and matching form the foundation of many successful applications of computer vision. The objective here is for you to become familiar with these techniques and their implementation in OpenCV.

In this task, you will implement an OpenCV solution to track objects of interest in a video. Given a video with several (up to 3) objects of interest, the goals are to detect the objects and track them through the video.

1. You will need a video that contains objects that appear in most video frames, and in particular in the first frame. This first frame may be used as a model frame.
2. You can then use feature descriptors to match objects in the model frame to those in each frame (image) of the sequence.
3. You should be able to display the estimated object locations in each frame in the video.
4. You should also display the ongoing object trajectories, based on the estimated object locations in each frame in the video.

Here are examples of the output with a single tracked object:

<http://www.youtube.com/watch?v=3dY4uvSwiwE>

<http://www.youtube.com/watch?v=8q0h1VJLIpM>

**The Stage 1 Individual project is worth 15% of the total course marks.**

***Bonus tasks:*** There will be two bonus marks for implementing additional features such as real-time tracking (at least 10+ fps), or the ability to automatically track occluded objects in some of the video frames using techniques such as the Kalman/Particle filter.

***Submission and Assessment of Stage1***

In the assignment section of the course website, you will see links to two video sequences that you may use for testing during development. This part will be assessed by the following:

1. CODE and REPORT to be **submitted by 23:59:59 hours, September 6** (Thursday week 7). You should submit a TWO page INDIVIDUAL report (no format specified) that provides a description of your methods and results achieved.
2. DEMO in front of a tutor in a consultation hour, from Sept 7-14, when you will demo your SUBMITTED program on a similar video sequence, which will be provided to you at the time.

**II Stage 2 - Group Project**

The second part of the project will be executed by a **three-person team**. Pick your project team members, and **register your group ONLINE by MONDAY week 7**; one registration per group is sufficient. Instructions for team registration will be made available in due course.

In stage 2, your team should propose ONE direction of further work that builds on Part 1, do the necessary literature survey on techniques and algorithms, implement them and write a detailed report. Your team is encouraged to do its own research and decide on a line of further development.

You should also find suitable datasets to work with. The week 9 presentation (see checkpoints below) will provide an opportunity to get feedback on your chosen direction.

You will **demo your program as a team** on your chosen datasets in week 13 and **submit a group report** that explains your approach and evaluation results.

Suggestions on datasets and a shortlist of top projects from the class in previous years will be separately posted along with the Stage 2 specifications. Specifications for Stage 2, as well as demo and report content and formats, will be released closer to the specific deadlines.

**The Stage 2 group project is worth 30% of the total course marks.**

**Checkpoints**

The checkpoints include:

|  |  |  |
| --- | --- | --- |
| ***Project Milestones*** | **Release Date** | **Submission/Evaluation** |
| *Stage 1, individual* | Friday Week 4 | Thursday midnight Week 7 submission,  demo to tutor by end of week 8 |
| *Specs of stage 2, group* | Friday Week 7 | Thursday Week 9 presentation |
| *Stage 2 Demo, group* |  | Thursday Week 13 |
| Group Project *report* |  | Friday Week 13 |

**Reports**

The Stage 1 report should be 2 pages long (no format specified) and submitted as a pdf file.

The Stage 2 report should be in two column IEEE format (http://www.ieee.org/web/publications/authors/transjnl/index.html). Page limits will be specified closer to the submission deadlines. Marks will be deducted for poor formatting.

**Code Submission**

Even though not directly assessable, it is a requirement that final code should be submitted at session end.

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