הבינתחומי הרצליה
IDC HERZLIYA

Final Project – Computer Vision Course 2020

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TA: Eyal Friedman

This is an open project in computer vision. You can submit this project in pairs (no triples).

Steps:

1. Choose your own project (some examples are given below).
2. Upload a short proposal for your project to moodle – please submit by 24.1.21
   You are welcome to submit earlier – if you want to start working on the project before. Just send us a notification by email that it was uploaded.
   The proposal should include:
   - **a.** A title and your names
   - **b.** Project goals. Be specific. Describe what the inputs to the system are, and what the outputs will be.
   - **c.** Provide a brief description of your approach. If you are implementing or extending a previous method, give the reference and web link to the paper.
   - **d.** Will you be using helper code (e.g., available online) or will you implement it all yourself?
   - **e.** Specify the main papers you intend to consider.
   - **f.** What is the proposed solution?
   - **g.** How do you intend to evaluate your method.
   - **h.** Breakdown--what will each team-member do? Ideally, everyone should do something imaging/vision related.
   - **i.** After the approval of the project by the course instructors, you can start working on it.
   - **j.** The date you intend to submit the project (no later than – 21.3.21).

3. Final submission – using moodle:
   - **a.** A link to a short video (up to 5min) that describes the project (both students should talk):
     - i. The task
     - ii. The basic idea of solution
     - iii. Evaluation
     - iv. What you would like to do next, if you had time.
   - **b.** A notebook that consists of the code, documentation, short explanation on the code, and evaluation.
   - **c.** A pdf file (2-4 pages, with a font size of 11pt) that consists of:
     - i. Title + your names + date.
     - ii. A short introduction (the task and why is it interesting).
     - iii. Related work, with references to papers, web pages.
     - iv. Technical description including algorithm.

v. Which of the methods we learned in class are used (e.g., feature matching, epipolar geometry, stereo, SFM, tracking, change detection, etc.).
vi. Data used.
vii. Summary of experimental results.
viii. Discussion of results, strengths/weaknesses, what worked, what didn't.
ix. Future work and what you would do if you had more time.

4. Setting a short meeting with Yael and / or Eyal to discuss the project.

Final Project Ideas

Here are several ideas that would make appropriate final projects. Feel free to choose variations of these or to devise your own projects that are not on this list. You can aslo use an existing solution for your task from GITHUB – and suggests how to improve it. In any case, your project should refer to methods we used in class.

1. Collect your own data (e.g., IDC campus) and apply SFM for visualization or navigation.
2. Use OF + epipolar geometry for video stabilization – use your own data.
3. Compute patch matching of short videos of a moving scene – e.g., use both appearance and optical flow.
4. Compare various state of the art methods for patch matching of wide-baseline.
5. Develop a game that is based on images or a video.
6. Augmented reality that uses geometry. E.g., computing the 3D of a scene and then placing an object in the scene in a manner consistent with the 3D scene.
7. Choose a task
   i. Find at least two papers that solve the task: one classic solution (no CNN) and the other can be either CNN-based or another classic solution.You are also allowed to suggest your own solution instead of one of the papers.
   ii. Implement the solution: You can implement the solution yourself. You can use implementations from the web – in this case, you must give a reference to the code, and you should make some modification to improve the existing code (or at least try to do so). Compare the two solutions.
   iii. List at least two subjects we learned in class that play a role in each of the solutions (e.g., feature detection, epipolar geometry, stereo, structure from motion, change detection, tracking, object detection) or suggest how they can be used to improve an existing solution.

Grading:

1. Originality
2. Coding
3. Quality of the solution
4. Presentations: video and document

Enjoy!