ECE 4554 / 5554 — COURSE PROJECT GUIDELINES — Fall 2022

Every student is expected to complete a course project as part of a 2-person or 3-person team. Each team should select a topic, which can be anything related to computer vision. Instructions for finding partners and for signing up at Canvas will be given separately. A team can be formed from any mixture of students from any section of 4554 or 5554.

The course project provides an opportunity for you to explore an area in greater detail than is covered in the regular course material. You are not limited to things that we have already discussed in class! You could, for example, pick a technique and apply it to a real-world problem. You could select two different approaches to solve a problem, and compare them. You could take an existing technique and extend it.

You are welcome to implement something from scratch. You are also allowed to use existing code for your project, but in that case it is very important to give proper citations and references (such as links to GitHub repositories and citations to published papers). If you make use of code that was written by others, then you are expected to do additional work to build on top of the existing implementation, and you must clearly explain what you have added.

Each team needs to submit a project proposal, a final project report, and a short video. The proposal and report will be in the form of a professional-looking, self-contained web page. A template will be provided. The web page should contain visual elements; it must be more than text and equations. You are allowed to edit the template directly and submit your work as a ZIP file to Canvas. As an alternative, you are allowed to post your project web page at sites such as https://sites.google.com, or at another convenient location. In those cases, the file that you submit to Canvas should be a text file containing a URL link to your online project web page. For each team, only one team member should submit materials to Canvas.

Project proposal. (20% of project grade – **due Oct. 15.**) At a minimum, please provide the following:
- Problem statement. Clearly state the goal of your project.
- Approach. Describe the technical approach you plan to employ.
- Experiments and results. Describe the experimental setup you will follow, which datasets you will use, which existing code you will borrow (if any), what you will implement yourself, and what you would define as a success for the project. If you plan to collect your own data, provide a description of the procedure that you will follow. Provide a list of experiments that you will perform. Describe what you expect the experiments to reveal, or what is uncertain about the potential outcomes.

Final project report. (50% of project grade – **due Nov. 28.**) Update your project proposal to include the following:
- Abstract. One or two sentences on the motivation behind the problem you are solving. One or two sentences describing the approach you took. One or two sentences on the main result you obtained.
- "Teaser" figure. A figure that conveys the main idea behind the project or the main application being addressed.
- Introduction. Motivation behind the problem you are solving, what applications it has, and a brief background on the particular domain you are working in. If you are using a new way to solve an existing problem, briefly mention and describe the existing approaches and tell us how your approach is new.
- Approach. Provide a clear description of your approach to solve the problem. If you utilized code that you did not write for part of your project, clearly describe where you obtained that code. Describe what obstacles you faced and how you addressed them. Justify any design choices or judgment calls you made in your approach.
- Experiments and results. Provide details about your experimental arrangement. (For example, describe the datasets that you experimented with, number of images or videos, train/test split if you used machine-learning algorithms, etc.) Describe the metrics that you used to evaluate how well your approach is working. Include clear figures and tables, as well as illustrative qualitative examples if appropriate. Be sure to include obvious baselines to see if your approach is doing better than a naive approach. (As an example, if you implemented a classifier, you might compare its accuracy with the accuracy of a classifier that made random decisions.) Also discuss any parameters of your

algorithms, and tell us how you set the values of those parameters. If reasonable, show how the performance varies as you change those parameter values. Be sure to discuss any trends you see in your results, and explain why these trends make sense. Are the results as expected? Why?

- Qualitative results. Show several visual examples of inputs/outputs of your system (success cases and failures) that help us understand your approach.
- Conclusion. Briefly summarize the report. "This report has described …." Discuss any ideas that you have to make your approach better.
- References. Provide a list of references that you have used for your project.

Along with your project report, please submit any source code that you developed, along with sample input and output files that you used to train and/or test your system. Ideally, your team will provide the source code in a ZIP file.

You may take a look at these web sites for inspiration.

- Here is an example of how you might lay out various parts of your report. (You may need to provide more details than are given here, because this particular page is promoting a conference paper by the authors.)
- Here is an example of a professional-looking page.

Project video. (30% of project grade – **due Dec. 3.**) Each team must prepare a 1-minute to 2-minute video summarizing the project. Consider the video to be a teaser to convey the main points, and to gain the viewer's interest in wanting to know more about your project. The video should be understandable by anyone who is familiar with Computer Vision concepts. You may upload a video file to Canvas, or you may post the video online (e.g., YouTube) and submit a text file to Canvas containing a URL link to your online video. Here are some example videos for your reference, borrowing from Dr. Devi Parikh, who was recently a faculty member at Virginia Tech. (Apologies if you have to sit through an advertisement on YouTube.)

Important: For this project, you are allowed to borrow ideas and code from other sources, but for anything that you borrow you must state what you borrowed and where you obtained it. You must explain clearly what work you have done beyond the previous work. For your written report, do not cut-and-paste from other sources without providing appropriate citations. (As a general rule for written reports, you should never copy directly from another source without enclosing that part in quotation marks, even if you provide a citation.) It will be considered to be a violation of the Honor Code to borrow materials from other sources without giving proper credit to those sources.