

Class Project – 534: Spring 2022

The goal of this semester-long project is to get a deeper understanding of one computer vision topic of interest to you as well as getting hands-on research experience. You are going to identify a topic, find interesting recent papers on it, read and understand them, replicate their results, suggest modifications that can potentially improve the results, evaluate your proposed suggestions. The project will build up through the semester in 4 steps to help you make measurable progress. Please, read the entire document to get an understanding of the whole journey before you start.

Groups of 2 students (preferred), or individuals.

Grade: 20% of course grade + 5% extra credits.

Phase 1: Due February 13th

Proposal: Think about possible topics. Do some preliminary searches for the literature on this topic to identify some papers that you might be using in Phase 1. Read Phase 1 description first. You are not going to be confined to this preliminary selection. You can change it later as relevant.

Deliverable: 1-page proposal including the topic, a list of potential papers with urls. If you are thinking about more than one topic, you can include them for a feedback.

Phase 2: Due: March 1st

Identify a topic: choose one of the class topics or other related topics/applications and make a short survey of some of the newest, state of the art and/or important papers (3~5 papers from the last 3 years) in this topic. Example would be new ways of using deep learning to address some of the traditional problems in computer vision problems. Examples include traditional topics like: edge detection, segmentation, 3D reconstruction, ..., or applications of computer vision. Also, in this phase, you need to research the computational resources that you need for your project (GPUs, machines, etc.)

Deliverable: 5 mins video presentation + slides

Phase 3 - Due: April 1st

Choose at least 2 of the methods where you can find an implementation, and at least 2 datasets and try to re-generate the results reported on the papers on these datasets.

Suggest possible changes to improve the results. You will implement some of these suggestions in phase 3.

Deliverable:

1-2 page document describing your experiments, the challenges you faced, the results you got, and suggestion for improvement.

Phase 4 – Due – May 1st

Propose an improvement (or more) to one of the methods you read that you think can make better results. It is not acceptable to suggest an improvement that has been already suggested in another published paper. So, you have to make sure that what you are suggesting is not done before.

Implement and evaluate the proposed improvement. Report your findings, whether successful or not, and the challenges you faced.

Deliverable:

A 10 min presentation, in a video recording format, describing your work.

A short paper: 4 pages describing the whole project:

- Abstract
- Introduction: problem definition, summary of contribution
- Related work: survey of related work from Phase 1, possibly extended as you will come across other works
- Approach and improvements
- Results
- Discussion and conclusions

Example Topics

Facial Expression Recognition

Facial Expression Synthesis

Facial Expression Transfer

Image Segmentation using CNNs

Semantic Segmentation

Instance Segmentation

Object Detection

Object Pose Estimation

Texture Synthesis

Tracking

Image steganography

Activity Recognition

Image Captioning

