CS 682

Project Guidelines

For the project you need to choose a topic which explores in greater detail some topics covered in class, involes additional reading and implementation of the chosen methods and demostrate it in action.

You can form teams, ideally two or three people. Individual projects require the instructor's approval. Feel free to use the "Search for Teammates" topic on Piazza to form teams. The template for the one page project desription can be found here project template There is also a "project" tag for discussing project ideas. Here are some ideas for getting started on projects:

- Select a paper from the computer vision literature, implement and test the approach described in that paper.
- Take some publicly available code, apply it to an interesting dataset and explore various extensions and modifications. You may also want to compare two or more systems. Merely running existing code on the data provided by the authors is not sufficient.
- Design and implement a solution to a problem that interests you. It is fine to pick a problem related to your RA or dissertation research, but be sure to formulate a clear short-term goal and desired outcome for the class project. Ideally, you should use the class project as an opportunity to try new techniques that you might not consider or have a chance to use otherwise.
- Kaggle competition: Find a competition on Kaggle and implement system to enter in it. Here are some options: Deep learning competitions

Project Resources, Optional Starter Project

Additional resources and starter project are below.

Resources:

Here are some open source libraries, pointers to large models and previous projects that you can use and get inspired for your class project. The focus of this course is on Computer Vision fundamentals, introductions of different image analysis problems and basic algorithms for 3D reconstruction.
Recent machine learning techniques that rely on large amounts of data have had a profound impact on the field of computer vision, leading to significant improvements in various aspects of image and video analysis. This gave rise to several deep neural network architectures architectures for different basic tasks of object detection, recogition, image segmentation for image analysis such as convolutional neural networks, transformers or GAN's (generative advesarial neural networks for image generation). The third part of the course will cover the

basics of learning based techniques and some of the existing models and approaches. You are encouraged to explore the use of these pre-trained models in your projects. Good place to look for datasets and ideas is [Kaggle Competitions](#) site.

- Open 3D open source library http://www.open3d.org
- Open Face [github](#)
- Open Pose [github](#)
- CLIP Connecting Text and Images [paper, code and colab](#) . There are also several other colabs available to test the model and interact with him.
- Detic Detecting Twenty-thousand Classes using Image-level Supervision [paper](#)
- Segment Anything [Repository](#)

Optional Projects

- Object detection Project [starting point.](#)
- 3D reconstruction from multiple views [project.](#)

Datasets & Papers

- Autonomous Driving Datasets [Berkeley Drive](#)
- Image Based Localization - where was this images was taken from [paper](#)
- Emotion recognition [paper](#)
- Traffic lights datasets [dataset](#)
- Object detection [dataset](#)

Previous CS 682 Projects

- Wide-Baseline Matching and in the presence of repetitive structures
- Traning an object detector for a novel object
- American Sign Language Finger Spelling Classifier
- Detecting Hate Symbols in Images
- Detecting and Classifyimg Cones for Maritime Challenge competition
- Plant Image Synthesis with GAN's
- Face Mask Detection in Images
- Bird Species Recognition
- Detecting Content in Bottles For Smart Refrigerator
- Emotion Classification from Face Images
- Dermatological Cancer Detection
- Deep Learning for Traffic Sign Detection and Classification
- Deep Learning Image Based Captioning

- 3D Reconstruction GMU
- Deep Fake Detection (paper)
- Face Detection and/or Tracking
- Object Instance Recognition
- Image Based Mosaicing, Look in the past
- Object Detection in cluttered environments
- Emotion recognition
- Fine Grained Categorization