

ME 780 Project Description

Spring 2017

Final Project

The Course Project is an opportunity for you to apply what you have learned in class to a problem within the domain of autonomous driving. There are multiple topics for you to pick from:

- Lane Detection
- Dynamic Object Detection
- Optical Flow
- Traffic Light Detection, Traffic Light State Estimation
- Traffic Sign Detection
- Object Detection
- Free Space Estimation
- Semantic Scene Segmentation
- Instance Level Segmentation
- Depth Estimation
- Data Labeling
- Object Tracking and Velocity Estimation

The students can work on projects individually or in pairs. The project can be an interesting twist on one of the topics above that the student comes up with himself/herself or with the help of the instructor. The grade will depend on the ideas, how well you present them in the report, how well you position your work in the related literature, how thorough are your experiments and how thoughtful are your conclusions.

For project ideas, check the main conferences in machine learning and pattern recognition:

- NIPS (Neural Information Processing Systems)
- ICML (International Conference on Machine Learning)
- ICLR (International Conference on Learning Representations)
- AISTATS (International Conference on Artificial Intelligence and Statistics)
- CVPR (IEEE Conference on Computer Vision and Pattern Recognition)
- ICCV (International Conference on Computer Vision)
- ECCV (European Conference on Computer Vision)
- ACL (Association for Computational Linguistics)
- EMNLP (Conference on Empirical Methods in Natural Language Processing)

Schedule

- Week 2: Assign Project Teams and General Topics.
- Week 4: Project Proposal Due.
- Week 7: Project Milestone.
- Week 12: Final Project Presentation, with Report.

Project Proposal

The project proposal should be one paragraph (200-400 words). Your proposal should contain:

- What is the problem that you will be investigating? Why is it interesting?
- What data will you use?
- What method or algorithm are you proposing? If there are existing implementations, will you use them and how? How do you plan to improve or modify such implementations?
- What reading will you examine to provide context and background?
- How will you evaluate your results? Qualitatively, what kind of results do you expect (e.g. plots or figures)? Quantitatively, what kind of analysis will you use to evaluate and/or compare your results (e.g. what performance metrics or statistical tests)?

Project Milestone

Your project milestone report should be between 2 - 3 pages using the provided Latex template. The following is a suggested structure for your report:

- **Title, Author(s).**
- **Introduction:** this section introduces your problem, and the overall plan for approaching your problem.
- **Problem statement:** Describe your problem precisely specifying the dataset to be used, expected results and evaluation.
- **Technical Approach:** Describe the methods you intend to apply to solve the given problem.
- **Intermediate/Preliminary Results:** State and evaluate your results upto the milestone.

Final Report

Your final write-up should be between 6 - 8 pages using the provided latex template.

- **Title, Author(s).**
- **Abstract:** It should not be more than 300 words.
- **Background/Related Work:** This section discusses relevant literature for your project.
- **Technical Approach:** This section details the framework of your project. Be specific, which means you might want to include equations, figures, plots, etc.
- **Experiments:** This section begins with what kind of experiments you're doing, what kind of dataset(s) you're using, and what is the way you measure or evaluate your results. It then shows in details the results of your experiments. By details, we mean both quantitative evaluations (show numbers, figures, tables, etc) as well as qualitative results (show images, example results, etc).
- **Conclusion:** What have you learned? Suggest future ideas.
- **References:** This is absolutely necessary.

Grading Policy: 70% of final grade.

- Milestone: 5%
- Write-up: 30%
 - Clarity, structure, language, references: 10%
 - Background literature survey, good understanding of the problem: 10%
 - Good insights and discussions of methodology, analysis, results, etc.: 10%
- Technical: 20%
 - Correctness: 8%
 - Depth: 8%
 - Innovation 4%

- Evaluation And Results: 15%
 - Sound evaluation metrics: 5%
 - Thorough analysis and experimentation: 5%