

CSE 352 Final Project Report Guidelines

Group projects: Size 3

Your project should be one of these three types:

1. **Learn some advanced techniques** -- Implement 2-3 advanced techniques, described in a recent paper (2000 onwards). Provide experimental evaluation of your implementation and analysis.
2. **Application** -- Apply learnt techniques to build an application. Evaluate your application on some data and compare it to any existing applications/systems.
3. **Research** -- Aim to improve the state-of-the-art on any problem -- Find a state of the art model as a baseline, identify a weakness, propose one improvement to address it, implement it and evaluate.

Scope?

This is always difficult to answer but think of this as worth the effort of 2 assignments.

Some problem domains

These are just starting points, you need to do the work to design your project.

1. Goal directed navigation in unknown domains
 - a. [Tree Adaptive A*](#)
2. Real time heuristic search
 - a. [Avoiding depressions](#)
3. Constraint Satisfaction
 - a. Scheduling applications (e.g., course scheduling, sudoku, crossword solver)
4. Probabilistic Reasoning
 - a. Implement different sampling algorithms and measure their performance on different problem sets (A [place](#) to find some datasets).
 - b. Use Bayesian networks to solve diagnostic problems. (e.g., [Breast cancer](#))
 - c. Combine probabilities and logic (See [this framework](#)).
5. Machine learning
 - a. There are many problems here ([ML datasets](#)).
 - b. Deep learning is a very marketable skill. (Do something with [TensorFlow](#))
6. Application Areas:
 - a. Natural Language processing
 - i. Question answering and other AI datasets from [AI2](#).
 - ii. Information extraction
 - iii. Dialog systems

- iv. Machine Translation
 - v. Skills for Alexa
 - b. Vision
7. Reinforcement learning
- a. Pong player (See [this paper](#))

Samples from AI 2018 Class

You can find a few example projects [here](#).

What should your project include?

1. A working implementation.
2. An empirical analysis of your implementation on a reasonably sized dataset.
3. A report that describes your implementation and a presentation of your project to the class.

Submission

You will submit your report and the code you wrote in Blackboard. There should be an entry soon. Details about what code to include will be posted on the blackboard entry.

Poster presentation

We are going to have a poster session during the time instead of a

A rough rubric for grading projects:

Note project grading is a subjective exercise with some judgmental value. Here is a rough breakdown for how I plan to evaluate projects.

1. Implementation (33%) -- This is an assessment of how much work was done. This depends on the scope of your work.
 - a. You should be able to demo your implementation. No formal requirements here but should convince us that you have indeed built something and have functioning software which demonstrates the main capabilities.
2. Empirical Analysis (33%) -- This is an empirical evaluation of the system or capability you built.
 - a. Pick an appropriate evaluation measure, a set of inputs on which you can evaluate your system and explain your results.
 - b. You should have at least one variant of your system that you are comparing against. Provide explanations for the differences in performance.
 - c. Show the output of your system for some cherry picked examples, where it succeeds and where it fails and explain why.

- d. This will be assessed based on the evaluation section in your report.
- 3. Learning outcomes (33%) -- Demonstration that you have learned a non-trivial amount about a problem/solution space through this project. Your report and poster should have an explicit section that outlines what you have learned through this project.

What should be in the project report?

A report in the AAAI 2017 format. See the link below for details:

<http://www.aaai.org/Publications/Templates/AuthorKit17.zip>.

The report cannot be more than 5 pages.

The following is a guideline on what to include in the report. I am going to score based on these expectations. If you write your report with its own sections, make sure you highlight the following items. It is much easier for me if you used the following items as the section headings. Use figures where possible.

- a. Introduction
 - i. Problem Definition -- Task definition at an I/O level with some examples.
 - ii. Motivation -- Why should anyone care about this problem. Give applications where a solution to the problem is useful. If you are presenting an application, say what use cases you envision for your application.
 - iii. Contributions -- You should state what it is specifically that you have done in this project.
 - 1. Research -- In this work, we have implemented Algorithm X and propose a new idea for improving X based on Z.
 - 2. Application -- In this work, we built an application that does X by using algorithm Y.
 - 3. Advanced Techniques -- In this work we implemented Algorithms X, Y and Z for this problem.
 - iv. You should state succinctly what you learned from this work.
 - 1. Research -- Our idea provides better accuracy than X. This idea appears to work in certain situations etc.
 - 2. Application -- This application can work successfully for these types of inputs.
 - 3. Advanced Techniques -- We found that X works in cases where ..., Y works when ..., etc.
- b. Description -- Describe the algorithm and your system implementation in enough detail so that someone else who wants to implement can follow your description. Use figures and caption them clearly.
- c. Evaluation -- Describe the dataset you use for evaluation, the evaluation measure and the systems you are comparing. This is an evaluation of the system or capability you built. Pick an appropriate evaluation measure, a set of inputs on

which you can evaluate your system and explain your results. You should explain the results you obtained. You should have at least one variant of your system (ala the configurations in Assignment 3) that you are comparing. Provide explanations for these observations. Show the output of your system for some cherry picked examples, where it succeeds and where it fails and explain why.

- d. Conclusions -- Brief recap of the main things you've learned through the project and identify one or two areas that can be good future work areas.