SYDE522: Foundations of Artificial Intelligence

Department of Systems Design Engineering, University of Waterloo
Final Project Information

The goal of the final project is to apply multiple techniques that you have learned during the course to a particular problem. We want to see that you can choose an appropriate technique, make use of it, configure its parameters, and evaluate the results.

Project Format: The project will be written as a 6-8 page paper in the same format as used for one of the standard conferences in AI: NeurIPS (Neural Information Processing Systems). The stylesheet is available at https://neurips.cc/Conferences/2020/PaperInformation/StyleFiles. Note: we will not be overly picky about exactly conforming to the style, so if you want to use Word or Google Docs instead of LaTeX, that's fine, but keep the same spacing and formatting and font sizes and overall style.

Project Groups: You can have up to two (2) people in the group working on a project together.

Tasks and/or Datasets: All the AI algorithms that we talked about in the course work on some sort of dataset. Choose a dataset and a task that you will work on. We mostly focussed on supervised learning tasks in the course, but unsupervised and reinforcement learning tasks are also fine. There is a large collection of datasets at https://www.kaggle.com/datasets or you can create your own dataset (although then you'd also have to describe how you did that). You can also use datasets from the classic papers that we described in the course, such as anything in Minsky & Pappert's Perceptrons book, the backpropagation papers ("Learning representations by back-propagating errors" and "Learning Internal Representations by Error Propagation"), the recurrent network paper "Finding Structure in Time", or the blog post exploring text generation http://karpathy.github.io/2015/05/21/rnn-effectiveness/)

Applying Techniques: In the final paper, just must apply at least two relevant AI algorithms to the dataset. For each technique, there will be parameters to vary (such as amount of regularization, or learning rate, or number of features, etc.) and you must do so. You will then evaluate the performance of the algorithm as those parameters are varied. The final report will indicate what you varied, why you varied those parameters in that way, and what the results were.

Marking Scheme:

- [5 marks] Description of Task and Data
- [5 marks] Choice of Algorithm
- Comparison
  - [5 marks] Measuring Performance of Algorithm (accuracy, or whatever is appropriate)
  - [5 marks] Multiple Algorithms
  - [5 marks] Varying Parameters
  - [5 marks] Correctly using Training / Validation / Test data
- [5 marks] Clarity of Figures
- [5 marks] Clarity of Writing