CSC 2546 PROJECTS

Proposals Due: Feb 24 Projects Due: April 14

The project you do for this class is fairly open-ended. The best and most interesting projects tend to be ones that are close to your research interests, preferably using some methods that we've covered in the course to try to solve some problem you are looking at. Or ones that delve into an issue and explore alternative hypotheses or formulations.

Your project should involve implementing and then investigating any algorithm/model we've discussed in class or that you've come across in your reading. The project should include a range of empirical investigations, along with a bit of background reading on the algorithm/model and related methods. For example, you could focus on the studies of the H1 motion neurons in flies, discuss the assumptions underlying the information-theoretic analyses, and implement one or two of the methods. You could also pick a controversial topic and try out two different approaches to it, and analyze the relative merits of the approaches.

For the project, you will need to write code, run it on some data, make some figures, read a few background papers, collect some references, and write a few pages describing your task, the algorithm(s) you used and the results you obtained. As a rough rule of thumb, spend about one week's worth of work (spread out over a longer time to allow the computers to do some work in the interim!), and about a day writing it up after that. Projects can be done individually, or in pairs (or larger groups with permission). We encourage you to work in pairs, but of course, the expectations will be higher for pair projects.

You are free to use any third-party ideas or code that you wish as long as it is publicly available. You must properly provide references to any work that is not your own in the write-up. The project is not intended to be a stressful exercise; instead it is a chance for you to experiment, to think, to play and to hopefully have fun!

Project submission

Your submission must include at least two figures which graphically illustrate quantitative aspects of your results, such as training/testing error curves, learned parameters, algorithm outputs, input data sorted by results in some way, etc. Your submission must include at least 3 references to previous published papers or book sections. Your submission should follow the generally accepted style of paper writing: include an introduction section to motivate your problem and algorithm, a section describing your approach and how it compares to previous work, a section outlining the experiments you ran and the results you obtained, and a short conclusions section to sum up what you discovered. Your submission must be prepared in the NIPS paper format `http://nips.cc/Conferences/2015/PaperInformation/StyleFiles`, I would expect the write-ups

to be about 5-6 pages if you do the project on your own, and 2-3 pages more if you team up with someone, including the figures and tables and references. Do not hand in any code of any kind.

Also, please turn in a brief (a few sentences) proposal via email to csc2546ta, describing the issue you will focus on and a paper or two that you will use as a basis.

Marking scheme

The following criteria will be taken into account when marking:

- Clarity/Relevance of problem statement and description of approach.
- Discussion of relationship to previous work and references.
- Design and execution of experiments.
- Figures/Tables/Writing: easily readable, properly labeled, informative.

Sample topics

Here is a list of some sample topics. These are just meant to be examples – you are free to choose your own.

- neural models of decision-making
- representation and propagation of probabilities in the brain
- neural Kalman filters
- neuroscientific studies of selective attention
- computational models of particular brain sub-systems, such as the hippocampus, or VOR