Project

The course project should be done in groups of two students. You may choose to do a project individually, but the project will be graded in the same way as all other projects. Each group is required to do two submissions (in the IVLE workbin):

- A one page project proposal by Sunday 1 March (recess week) midnight.
- A final report (3 to 4 pages) by Thursday 16 April (Week 13) midnight.

Feedback will given on the proposal. You may make changes between the proposal and the final report but if the change is substantial, you should describe the reasons for them in your final report. The project is worth 30% of the course grade.

We are unlikely to have time to do project presentations in class, but you are encouraged to look at other groups' submissions to learn from what they are doing.

1 Project Guidelines

The focus of the course is on understanding machine learning. The recommended project is to review a paper. The aim of your review should be to demonstrate your understanding of the paper and help illuminate the results through your own additional work.

Your review should contain clear motivation for the work done in the paper. It should summarize the main results and clearly describe the implications of the work. It should be self-contained, i.e. understandable for someone who has done CS5339 (the lecturer may not be familiar with the particular topic and should not have to read the original paper in order to understand your review). Most importantly, it should be more than just a summary: it should contain your own understanding, interpretation and examples. Clearly separate what you did and what the authors did: use "we" or "I" for your own work and "the paper" or "they" for work done by the authors. You should not cover the entire paper: select important parts and go into depth on those parts.

The review should be structured roughly as follows:

- State the problem clearly and describe why the problem is important. If appropriate (for more theoretical papers), give proper definitions and formal statement of the problem.
- State the main contribution of the paper (theorem, algorithm, etc.). If there are many, pick the most important or interesting one. If appropriate, state the result formally (e.g. theorem), making sure that all the assumptions and definitions are clear.
- Interprete the results. This is where most of the work goes. Wherever possible, you should provide your own work that is not contained in the paper.

- What are the consequences of the results. Give examples or counterexamples. You may want to construct and run small experiments if possible/necessary. If some examples are already given in the original paper, you may want to give additional examples.
- What are the assumptions made in obtaining the results. Are they necessary? Give examples/counterexamples if possible. Again, if some examples are already given in the original paper, you may want to give additional examples.
- Describe the limitations in the results, e.g. are the assumptions too restrictive, or the algorithm too slow? Are the limitations fundamental (e.g. NP-hard)?
- You may be able to identify some possible future directions, e.g. overcoming some of the limitations, or generalizing the results. If you are able to do that, you should write about it.

Doing a review is the recommended type of project. If you have other type of projects that you wish to do instead, please talk to Prof Lee.

Where to look for papers to review?

Recent conference papers would be reasonable to review. The main conferences in machine learning are International Conference on Machine Learning (ICML), Neural Information Processing conference (NeurIPS) and Computational Learning Theory (COLT) for learning theory. You may wish to review recent papers that have had impact. One measure of impact is the number of citations. You may find highly cited recent papers from those conferences on Google Scholar (`https://scholar.google.com.sg/citations?view_op=top_venues&hl=en&vq=eng_artificialintelligence`).

2 Proposal and Report

For doing your one-page proposal, you should have selected the paper and done an initial reading of it by that time. State the problem clearly and describe why the problem is important. State the main contribution of the paper and give your plan for completing the remainder of the review. In particular, describe the additional work that you would do for the review.

The final report should be structured as described earlier. You may reuse material from your proposal in the final report.