MCSE 6309: Machine Learning
Project Information

Overview

The final project for the Machine Learning course will be a mini research project which will be done either individually or in groups of two people. The overall goal of such a project is to do something that nobody else has ever done before. Ways to accomplish this goal include (but are not limited to):

- taking an existing ML algorithm or model and tweaking it to improve it in some way (make it faster, make it more accurate, etc.);
- taking an existing ML algorithm or model and applying it to a brand new application;
- inventing a new ML algorithm or model for a new application; and
- deriving a new theoretical analysis for a new or existing ML algorithm.

Because this is a class project on a tight schedule, it is important to keep your proposed ideas tractable, but at the same time the motivation of your project should be toward making a significant scientific contribution, one that we can imagine being a published paper if you had enough time to work on it. The expectation is that you will most likely only have preliminary results for the course project.

You will not need to submit code for the project, nor are you required to use any particular programming language, platform, or software.

Deliverables

The **first deliverable** is a project proposal that is due on 11 August 2017.

- Your project proposal should be 1-2 pages long.
- It should discuss what problem you plan to address, your preliminary plan for how you will address it, including what algorithms you will use, ideas for how to change the algorithms, and how you will evaluate its success.
- It should list at least three recent, relevant papers you and your team will read and understand as background for your contribution. You probably want to have read at least one of these before writing the proposal.
- It should discuss a proposed plan of who on your team will be responsible for what tasks. These contributions should just be a prediction for planning purposes, and you are not obligated to adhere to them precisely.

The **main deliverable** for the class project is a paper which is due on Saturday 30 September at 6 pm. The paper must be no longer than 8 pages, not counting the bibliography (you have unlimited space for references).

The final paper should have the usual structure of a scientific paper:

- The paper should begin with an abstract, which should be no longer than two paragraphs describing what problem you are addressing and what your discoveries were.
- The paper should have an opening introduction section that describes the motivation, the problem you are addressing, and your approach to solving the problem.
- The middle of the paper should describe your technical contribution in detail. The middle may be broken up into multiple sections, for example one describing an algorithmic approach and another describing experimental setup and results. A reader should be able to reproduce your experimental results or analysis from reading this middle of the paper.
- Your paper must include a section that discusses prior work: research that studies related problems, or the same problem you are addressing, other approaches that are related to your technical approach that may or may not have been applied to the same type of application, or foundational mathematical or scientific ideas you are building on. Establish in this section why none of these existing studies solves the problem your contribution aims to fix.
- The paper should end with a conclusion that summarizes your contributions and discusses open problems that remain.
- Lastly, your paper should end with a list of references.

As part of the final project report, you will need to describe each person's contributions to the project.