CPS 803 / CP 8318 **Machine Learning**

Course Project

Fall 2019

Due Dates:

Final Project due December 1st, AOE

Requirements:

Projects may be done individually, in pairs (CPS 803 / CP 8318) or groups of up to 4 (CPS 803). If a project is done in a team of 2, the expectations will be higher in line with 2 people working on the project. For larger groups, expectations will be even higher.

Task:

- Choose a research problem that involves machine learning and provide an implementation that attempts to address the problem.
- Deliverables for the project include source code and a written report. More details are provided below.
- The template for your report should be a standard template for an IEEE or ACM conference (CPS 803) - 8 pages or an IEEE Transactions paper (CP 8318) - 14 pages, and this should be written in a form consistent with a research paper. You should identify related work on the problem, and implement a solution to the problem that differs from existing work, extends existing prior work in a new direction, or provides an independent in depth investigation of a problem. You may include an additional file with supplementary text, analysis and results and there are no limits on this supplementary material.
- This may be a challenging task, and it is not expected that all attempts to solving the problem will be successful. Above all, your investigation should demonstrate an understanding of the problem domain, and a substantial effort at addressing the problem.

Examples: The following provides a variety of examples as food for thought. There are problems in almost any domain that can be tied to machine learning. If you are having trouble with ideas for a project, feel free to discuss with the instructor.

- Forecasting (weather, stocks, housing prices, electricity usage)
- Classification (spam vs. ham, fake vs. real (news?), dog vs. cat, Shazam)
- Sentiment prediction
- Photo style transfer
- Object recognition
- Social network related
- Generative models (art, music, etc.)
- Machine translation (klingon to blingon)
- Recommender systems
- ???

Scope:

If you are unsure whether the project you intend to pursue fits within the guidelines mentioned above, you are encouraged to consult with the course director.

To Submit:

For the final submission, you should hand in:

- A pdf format report and source files (use of a LaTeX template is recommended, but not required).
- Any code and files required to reproduce the results. If your project may be difficult to run without a specific setup/libraries, you are still expected to submit the code, but can also provide a short demo to facilitate evaluation. You should also make a note of the source of any external code/data/libraries that are used so that I can best assess your contribution independent of external resources. This should appear in code itself, and in a readme file.
- **Be very careful to make clear which contributions are your own, and what part of your submission is based on external content / code or ideas**

Criteria for project grading:

Breadth/Depth [20 %]: - To what extent does the project involve a significant breadth of investigation, or what is the level of depth for a narrower more targeted effort. This includes how the problem is framed, the range/nature of techniques considered, and approaches used to understand the overall problem.

Effort [20 %]: - Irrespective of other factors (even if investigation ends up being rather narrow/shallow), to what extent is the project indicative of a substantial effort consistent with expectations. In your discussion, you might consider discussing things that you tried that might not seem worth reporting, or what the outcome was, or what you learned from doing these things. In general, if you can make a case for having tried hard to solve the problem, but ultimately ended up with an end result that's disappointing in your view, this helps me to see how much effort was spent.

Difficulty/Success [20 %]: - What is the difficulty of the project chosen, and what level of success has been achieved this is considered jointly. Specifically, a simple problem with exceptional results isn't guaranteed to produce a better mark than a very tough problem with mediocre results. Ultimately, you should try to choose something that you find fun/interesting, but that isn't so simple that it can be solved in a trivial fashion.

Originality/Insight [20 %]: - Does the project contain original thought? If it is an implementation, or involves experimentation with existing algorithms, is the discussion insightful? Does it give any sense of what challenges the problem itself presents, and why certain strategies (algorithms, data treatment etc.) may or may not be appropriate choices?

Presentation of Results [20 %]: - Is the report well written and complete? Contain adequate references to work relevant to the project? (note that this does not imply any measure of the quality of English writing, but reflects the extent to which the reporting of results motivates the problem/scope of the project, discusses related work/references, and demonstrates the important elements tied to any successes, failures, or challenges that the problem presents.