For the final project, you can either work alone or in a group of up to three people. Each person in your group (possibly just yourself) will choose a machine learning algorithm that was not on one of our homework assignments, experiment with applying that algorithm to a particular dataset or problem, and analyzing the results. Multi-person groups should work on the same dataset or problem and compare the results of their respective methods.

Here are some examples of algorithms you can choose: Gaussian mixture models trained with expectation maximization; decision trees; random decision forests; convolutional networks; recurrent neural networks; reinforcement learning. Other algorithms not on this list are also okay, but your algorithm should differ from those you worked with (or will work with) on the homework assignments.

For your final project, your group will turn in a paper that explains your algorithm and dataset / problem, describes your hypotheses and the experiments you did to test these hypotheses, gives the results of your experiments, discusses the results with respect to your hypotheses, gives a
brief description of what you learned in doing the project, and gives some ideas for potential future work. The paper should be about 10 to 20 pages (double-spaced).

**Important Note 1: Plots:** Make sure to label the axes on any plots you give in the paper. Unlabeled axes will decrease your grade!

**Important Note 2: Code:** Explain the extent to which you wrote code for this project (and say what language you used). If you used external machine-learning libraries or other code, please cite what you used.

**Important Note 3: Using text or figures from other sources:** If you use any text from other sources, the text must be surrounded by quotation marks, and the source must be cited. If you use any figures from other sources, you must cite the sources. Please read Portland State’s statement on Academic Misconduct: Section V-9 of https://www.pdx.edu/dos/codeofconduct#ProscribedPSU.

**Project proposal, due February 14, 5pm:** Before starting on the final project, you and your group will write a one-page project proposal, describing your chosen algorithm(s), dataset(s)/problem, hypotheses, and plans for experiments. This proposal is due in pdf format (send to mm@pdx.edu) by February 14, 5pm. I will give you feedback on your proposal by Tuesday February 19.

**Final paper, due March 22, 5pm.**
Sample Project Titles from Fall, 2018

- A Comparative Analysis: Random Forest And Decision Tree Models
- Tic-Tac-Toe & Reinforcement Learning
- Clustering network traffic with DBSCAN and K-means
- Classifying Banknotes with a Decision Tree
- Using Convolutional Neural Networks to Classify Microscopic Images of Protein
- Snake Gameplay Through Epsilon-Greedy Q-Learning
- Poker Hand Classification with Decision Trees and Random Forests
- Robustness of Faster-RCNN to Image Corruptions
Introduction

This document demonstrates the desired format of the final paper for CS 445/545. The paper should have a header, like the one above, that contains the title, your name(s), the class name, and the term. The section titles should be boldface, and larger than the text (e.g., 14 point font). The text should be 11 or 12 point font, and should be double-spaced. The pages should be numbered. The paper should begin with an introductory section that describes the topic of your project and the hypotheses or questions that you explored. The total paper should be about 10-20 pages (or longer, if you need more space), including figures and any references.

START EARLY!!!!

Methods

In this section, describe the problem you addressed (e.g., a classification problem), give the details of the algorithms you applied to the problem, and explain your hypotheses. Describe the experiments you did and how they address your questions / hypotheses.

Results of Your Experiments

In this section, give all the results from your experiments. Include any plots, tables, or diagrams.
Discussion
In this section you should summarize and discuss your results, and whether or not they support your hypotheses.

Conclusions and Future Work
This section should contain any more general conclusions you drew from the results of your project. Also give a brief discussion of what you learned in this project, along with ideas for future work you (or someone else) could do to follow up on or extend the work described in this paper.

References
Give a list of any references you used. Any standard citation style is acceptable.

What to Turn in: Email your completed paper (in pdf format) to mm@pdx.edu by 5pm, Friday, March 22, 2019. You don’t need to turn in any code.