Each student will perform an individual project on a topic of their choice (which is relevant for the course). Three separate submissions are required for the final project. These are detailed below.

1 Project Proposal: Due Thursday 3/7, by 9:30 as a paper copy and as a PDF file on canvas

Please write *three paragraphs* per project proposal.

The first paragraph describes your data or application and the machine learning problem associated with it.

The second paragraph describes what probabilistic model will be used in this context (e.g., sparse GP, variational autoencoder, some topic model, your own graphical model, etc) and the algorithms used for learning and evaluation. Please refer to the paper/source for the model or algorithms if available.

The third paragraph explains the work that needs to be done: do you need to collect data or is it already available? do you still need to understand the model/algorithm or are these clear? if not using a paper, do you need to develop the model or equations or is everything already specified? are you planning to use any libraries, or are you writing code form scratch? etc. Many students will implement specific approximate inference algorithms from some papers - please be specific about what algorithm, which portion of the paper, what results you hope to reproduce or improve, etc.

I would like to see that the project is not "too hard", that is, one can complete it within 4-5 weeks (you will have some learning theory assignments before the end of the semester which will require some of your time). I would also like to see that the project is not "too easy" meaning it requires a good amount of work and some investigation.

If you have any questions at any point in the semester I am happy to discuss - please come to office hours or send me an email and we can set up a time to meet.

2 Interim Project Report: Due Thursday 3/28, by 9:30 as a paper copy and as a PDF file on canvas

The report, which should be about 1 page long, should discuss (1) what you have achieved so far, (2) any observations, difficulties or new opportunities relative to the original proposal, (3) an explicit roadmap for completion by the final project deadline.

3 Final Project Submission: Due Friday 4/26, by 9:30 as a paper copy and as a zip file on canvas

Please investigate the application, machine learning methods, algorithms, and so on as agreed in the proposal and run an experimental evaluation to the best of your ability/knowledge. Then write a report on the project. The best way to think about the report is as a (preliminary version of

a) paper (that might be) submitted to a machine learning conference (ICML, NIPS, ...) or the relevant conference in the application domain.

The report should include a description of what you set out to do including the application and algorithms that were investigated. Please include details for anything which is not straight from the textbook/lectures/paper. Please include a discussion of any insights, or difficulties, you found in this project, the conclusions from your investigation, and how you might continue the work or redo the work if you were to start from scratch.

Submitting your project

Please put the report (a PDF file) and code in a zip file and submit the zip file on canvas . Make sure to include a README file so I can run your code if needed. Please print the code and report and submit as a paper copy. You are welcome to submit the paper copy in the last class on Thursday or put it in my physical mailbox in the CS mailroom on the second floor of Luddy.