CS688 Machine Learning Syllabus

Time and Location

07:20-10:00 pm
Wednesday @ ENGR 1101

Instructor

Fang-Yi Yu

1:00-2:00 pm Wednesday
@ Research Hall 350

GTA

TBD

Course Overview

Machine learning uses computational methods and information to improve performance or accuracy. In this course, we will explore various machine learning settings that can access different information, supervised, unsupervised, online, and reinforcement learning, and we will study the computational methods to process and utilize information efficiently. Finally we will study the possibilities and limitations of machine learning.

Recommended Reading

Although there is no required textbook, we highly recommend the following books

- Pattern Recognition and Machine Learning (PRML)
- Machine Learning: A Probabilistic Perspective (Murphy)

Prerequisite

CS 580 or 584.

In the first homework, we will review linear algebra and probability.

Tentative Schedule

Week	Subject	Deliverables
Week 1	Introduction	HW0 out
Week 2	Single-layer network: regression	
Week 3	Gradient Descent	HW1 out, HW0 due
Week 4	Single-layer network: classification	
Week 5	Constrained optimization and duality	HW2 out, HW1 due
Week 6	Deep Neural Networks	
Week 7	Regularization	HW2 due
Week 8	**Midterm**	
Week 9	Convolutional networks	HW3 out
Week 10	Transformers	checkpoint due
Week 11	Online learning	HW3 due, HW4 out
Week 12	Sequential learning	
Week 13	Reinforcement learning	HW4 due
Week 14	Thanksgiving Recess (Nov 27-Dec 1)	
Week 15	Final project presentation	Final project report due

Grading Policy

We'll calculate your final grade based on the following components. There will be no make-up or extra-credit assignments at the end of the semester; your grade should be a measure of your semester-long progress.

- Homework: 40% (best four out of five)
- Midterm 25%
- Final project 30%
- Participation 5%

Assessment

- A+ (rank >= 5%)
- A (score >= 95.0% or rank >= 10%)
- A– (score >= 90.0% or rank >= 20%)
- B+ (score >= 85.0% or rank >= 30%)
- B (score >= 80.0% or rank >= 40%)
- B– (>= 75.0%)
- C and F

Homework Policy

Activities and assignments in this course will regularly use the Blackboard. You may submit multiple files to Blackboard prior to the deadline, but only the last version will be graded. You can and should download your submission to verify if the file is in a working copy.

There will be five homework assignments and the score of the lowest one will be dropped. Each homework assignment has a posted deadline, and late submission is not accepted. Assignments are considered individual efforts, and no sharing and discussion of problem solutions are allowed with anyone except the TAs or the instructor.

If you feel points have been incorrectly deducted, contact the grader: TA for homework and instructor for the midterm. Contesting of grades on any/all submissions must be requested within one week of receiving the grades. No grade changes will be considered after that deadline.

Midterm Exam

Midterm covers the first six weeks of the material. You are allowed one 8.5x11in sheet of notes, front and back. There will be no make up for the exam unless previously arranged (well in advance)

Final project

The final project will be graded in groups of size 3-4 people. The project will consist of the following:

1. Checkpoint, a written report that contains a research topic, a brief introduction, and a literature review of the topic,
2. Presentation in the class,
3. Final report that includes the research topic, introduction, literature, results, and discussion.

Honor Code

This class enforces the GMU Honor and the more specific honor code policy special to the Department of Computer Science. You will be expected to adhere to this code and policy.

Use of Generative-AI tools should follow the fundamental principles of the Honor Code. All of the work you submit HAS TO BE YOUR OWN. Note that these systems are prone to mistakes and hallucinations. If you do use generative AI software, you will be responsible for any incorrect, biased, or unethical information that you submit. For example, if you use ChatGPT for a report and it hallucinates a citation,

or it produces a verbatim repetition from a pa per without a proper citation, THIS IS A VIOLATION OF ACADEMIC INTEGRITY and you will be referred to the appropriate office, as per the Honor Code requirement.

Disabilities

If you have a documented learning disability or other condition which may affect academic performance, make sure this documentation is on file with the Office of Disability Services and talk to the instructor about accommodations.