CS 782: Advanced Machine Learning

George Mason University

Department of Computer Science

Course Description

The course covers recent advances in the field of machine learning. Possible topics include: Different learning paradigms (supervised learning, semi-supervised learning, unsupervised learning, self-supervised learning, transfer learning, and active learning); Learning with structured data (e.g. graphs); Learning with text; Learning with sequential and time series data; Recommendation Systems; and issues concerning modern machine learning such as fairness and bias, explainability, and privacy.

Class Time and Location

Tuesday 4:30-7:10pm

Music/Theater Building 1006

Instructor

Dr. Jessica Lin
Email: firstname [AT] gmu [DOT] edu
Office: ENGR Building 4419
Office Hours: Tuesday 2-3pm or by appointment

Teaching Assistant

Wenjie Xi

Prerequisites

B- or better in CS 681, 687, or 688.

Course Format

The course, taught in seminar style, aims to provide an in-depth exploration of modern research topics in machine learning. Through a combination of literature review, critical analysis, presentation, and active participation in discussion, students will gain exposure to both foundational and emerging ML

topics. In addition, students will collaborate in teams on a course research project in machine learning.

Grading

Grading will be based on presentation (x2), paper reviews (x3), in-class short report (x5), participation, and a final project.

Paper review (3): 15% (5% each)
Presentation (2): 20% (10% each)
Project: 40%
In-class report (5): 15% (3% each)
Class participation/discussion: 10%

Presentation: We will have about 10 presentation weeks (excluding the first week, Spring Break, and three weeks reserved for project pitch and presentations). In most weeks, a general reading assignment will be given, plus 3 research papers. The general reading assignment could be a survey paper on the topic of the week, or background materials relevant to the research papers. Students are required to read the general topical content prior to coming to class.

Each student will pick 2 papers from different weeks. For those 2 papers, the student will be in charge of presenting the materials and coming up with 3 questions or issues for class discussion. Depending on the final enrollment count, this means for some papers, there might be more than 1 student assigned to it, in which case the students should work together to prepare for and give the presentation.

Paper review: Each student is required to write a report on 3 papers, chosen from different weeks, and other than the ones that the student is presenting. The report (2-3 pages, single-sided) should include a summary of the paper, a review of any related work, either identified in the paper or from personal literature review, and a critical review of the issues and/or significance of the work reported. A template for the report will be provided. Students should not just copy text from the paper; the review should reflect the student's understanding of the proposed method and ability to identify key issues (if any), contributions and impact to the field. **Generative-AI-based tools such as ChatGPT are prohibited.**

In total, each student is expected to read 5 papers in depth (2 to present and 3 to review).

In-class Report: At the end of each class, students are also expected to write a short in-class summary about the presentations, along with feedback for the presenters and answers to the questions/issues provided by the presenters. The instructor might add additional questions. Each student is required to submit in-class reports for at least 5 of the weeks that the student is not presenting.

Research project: There will be one research project in the semester. Students can work alone or in a group of up to 3 team members. Expectations will be higher in larger groups. The project grade consists of project proposal (including project pitch, 8% total of overall course grade), two progress reports (7% total), presentation (5%), and project deliverables (20%). More information on the project will be posted later.

Grading Schema

Letter Grade	Score Range
A+	>=98
A	[93, 98)
A-	[90, 93)
B+	[88, 90)
B	[83, 88)
B-	[80, 83)
C+	[76, 80)
C	[72, 76)
C-	[60, 72)
F	<60

Textbooks

No required textbook. Reading materials and research papers will be given.

Paper List and Schedule

TBA

GMU Academic Standards Code

The GMU Academic Standards Code is in effect at all times. In addition, the CS Department has further honor code policies, which are detailed here. Some examples can be found here. Any deviation from the GMU Academic Standards or the CS department Honor Code is considered a violation.

ChatGPT or other Generative-AI tools are prohibited in this course.

Learning Disability Accommodation

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 then discuss with the professor about accommodations.