CSCI 8000

Advanced Special Topics in CSCI

--Advanced Topics in Machine Learning

Fall 2018

Instructor

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Course website: http://www.cs.uga.edu/~shengli/CSCI8000F18.html

Time and Location of the Lectures:

TR: 11:00 am - 12:15 pm W: 11:15 am - 12:05 pm

Boyd GSRC 306

Office Hours and Location

Thursday: 10:00 - 11:00 am or by an email appointment.

Location: Boyd GSRC 549

Course Description

The purpose of this course is to familiarize students with several advanced topics in machine learning, including representation learning, multi-view learning, transfer learning, active learning, and counterfactual learning. Real-world applications of these machine learning approaches will also be covered in this course, such as data clustering, image classification, human action recognition, outlier detection, recommendation system, online advertising, etc.

This seminar-type course will be research oriented, encouraging students to explore the recent advances in machine learning field. The instructor will review the basic concepts of machine learning and briefly introduce some advanced topics. After that, students will in turn present research papers from the reading materials. In addition, students will need to work on a research project on machine learning theory, methodology, or applications.

Recommended Prerequisites

CSCI 6380 or CSCI 6550

Credit Hours

4

Text(s)

No textbooks. The course materials are mainly from recent research papers in the machine learning field.

Course Topics

1. Review of machine learning and deep learning
2. Dimensionality reduction, unsupervised learning, clustering
3. Multi-view learning
4. Transfer learning
5. Deep representation learning for computer vision
6. Deep representation learning for natural language processing
7. Deep representation learning for user modeling
8. Graph convolutional networks
9. Adversarial training
10. Neural architecture search
11. Machine learning meets causal inference
12. Interpretable machine learning

Grade Distributions

Class Participation	15%
Paper Review	15%
Paper Presentations	25%
Final Project	45%

Reading Assignments and Paper Reviews

Students will be required to read **10 papers from the reading list** and **<u>submit a brief review of each paper to the instructor by midnight (12:00am) before the scheduled lecture</u>**. The 10 papers should **not** contain the paper you're going to present in the class. The review should summarize the main idea and contributions of the paper, describe the major experimental results, and discuss the strengths and weaknesses of the paper. The students are also encouraged to check the follow-up works on the topic of the assigned paper (e.g., search the

latest papers that cite the assigned paper), summarize the state-of-the-art methods and results, and discuss their limitations and possible future research directions.

Class Participation and Paper Presentations

Each student will be required to present one research paper over the semester. Each presenter should prepare slides for a **30-40 minutes talk** on the paper. **Slides for the talk must be emailed to the instructor by midnight (12:00am) before the class**. The talk should clearly address the following points: (1) motivation and problem statement; (2) related work; (3) methodology; (4) experiments; (4) conclusions; and (5) discussions. The presenter will need to lead another **20 minutes discussion** during or after the talk. The presenter should prepare discussion questions that lead to a deeper analysis of the paper's content, strengths, weaknesses, and future works.

Research Project

Students are required to work on an individual or group (no more than three students) research project on machine learning over the semester. Research project will be evaluated based on the novelty, efforts, technical soundness, presentations, and the quality of final report.

Academic Integrity and Ethics

We will strictly follow UGA's Academic Honesty Policy. Dishonest behavior will not be tolerated and may result into failing the course. Please contact the instructor if you have any concerns regarding this issue.