CSCI 8945
Advanced Representation Learning
Fall 2019

Instructor
Dr. Sheng Li
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University of Georgia
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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
Wednesday: 1:00pm - 2:00 pm or by an email appointment.
Location: Boyd GSRC 549

Course Description
This course presents a rigorous overview of advanced representation learning algorithms in machine learning, from the traditional subspace learning models to the recent deep representation learning models. Applications in the fields of computer vision, data mining, and natural language processing will be covered.

This course will be research oriented, encouraging students to explore the recent advances in machine learning field. The instructor will review the basic concepts of representation 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. Overview of machine learning
2. Subspace learning
3. Manifold learning
4. Low-rank learning
5. Deep auto-encoders
6. Recurrent Networks
7. Adversarial Networks
8. Graph neural networks
9. AutoML

Grade Distributions
Class Participation 15%
Paper Review 20%
Paper Presentations 20%
Final Project 45%

Reading Assignments and Paper Reviews
Students will be required to review one paper every week and submit the review to eLC by midnight of every Monday. The reviewed paper should be chosen from the papers that will be presented in the same week. For example, the submissions on August 26th (Monday) should be the review reports for papers that will be presented from August 27th (Tuesday) to August 29th (Thursday). The reviewed papers should not contain the papers 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 possible future research directions.
**Class Participation and Paper Presentations**

Each student will be required to sign up and present two research papers over the semester. Each presenter should prepare slides for a 20 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; (5) conclusions; and (6) discussions. The presenter will need to lead another 10 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.