

CSE 891-002: DEEP LEARNING IN BIOMETRICS

Spring 2020

Instructor:	Dr. Cunjian Chen	Time:	M/W 3-4:20pm
Email:	cunjian@msu.edu	Place:	Wells Hall Rooms A301

Course Website:

- <https://cse891-002-ss20.github.io>

Office Hours:

- Office: 3200 Engineering Building
- Office Hours: Wednesday 10:00am – 11:00am or by appointment only

Main References:

This will be a seminar-style course, where students will be assigned a number of papers to read. The following textbooks are optional.

- Anil Jain, Arun Ross, and Karthik Nandakumar, *Introduction to Biometrics*, Springer, 2011.
- Ian Goodfellow, Yoshua Bengio and Aaron Courville, *Deep Learning*, MIT Press, 2016.

Prerequisites:

A good knowledge of linear algebra, calculus and statistics is expected. A basic knowledge of neural networks will be useful. A background in biometrics and pattern recognition (e.g., CSE 402) will be useful. Please contact the instructor if you have any questions.

Course Description:

This will be a seminar-style course where students will be assigned a number of papers to read. Students will then be expected to submit critiques for these papers as well as present these papers during the lecture. The papers will cover salient topics in biometrics and deep learning. These include concepts in face detection and alignment, face recognition, face anti-spoofing, iris recognition, fingerprint recognition and deep learning. The project component of this course will test the student's ability to design deep learning solutions for biometrics applications.

Course Topics:

- Introduction to Biometrics
- Convolutional Neural Networks
- Generative Adversarial Networks
- Face Detection
- Face Alignment
- Face Recognition
- Fingerprint Recognition

- Iris Recognition
- Presentation Attack Detection

Grading:

The tentative weight associated with each grading component is as follows:

- Paper critiques (30%)
- Class presentation (30%)
- Final Project (40%)

Final grades will be assigned based on the following scale:

- 90 and above: 4.0
- 85 - 89: 3.5
- 80 - 84: 3.0
- 70 - 79: 2.5
- 60 - 69: 2.0
- Below 60: 1.0

Grading Policy:

- Paper critique has to be turned in before lecture begins on the due date.
- Projects will be graded based on the project proposal, progress updates, final presentation and the final technical report.
- Paper critiques will be evaluated based on the clarity of writing, novelty of observations, and innovativeness of suggested modifications.
- Presentation will be evaluated based on the slides, the contrast/analysis of various techniques, and the presentation skill.

Course Objectives and Learning Outcomes:

- To learn to summarize and present papers in a concise and constructive manner.
- A good understanding of various deep learning techniques.
- Ability to apply deep learning approaches to address research problems in biometrics.

Academic Integrity:

Article 2.III of the Academic Freedom Report states “The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards.” In addition, the Department of Computer Science and Engineering adheres to the policies on academic honesty as specified in General Student Regulations 1.0, Protection of Scholarship and Grades; the all-University Policy on Integrity of Scholarship and Grades; and Ordinance 17.00, Examinations. (See Spartan Life: Student Handbook and Resource Guide) Therefore, unless authorized by your instructor, you are expected to complete all course

assignments, including homework, projects, quizzes, tests and exams, without assistance from any source. You are expected to develop original work for this course; therefore, you may not submit course work you completed for another course to satisfy the requirements for this course. Students who violate MSU academic integrity rules may receive a penalty grade, including a failing grade on the assignment or in the course. Contact your instructor if you are unsure about the appropriateness of your course work. (See also the Academic Integrity webpage.)