

WAYNE STATE  
UNIVERSITY

COLLEGE OF ENGINEERING

Computer Science Department

---

**CSC 8860 Seminar Topics in Computer Vision and Pattern  
Recognition**

Fall 2017

0027 STAT

M W 2:30 P.M. – 3:45 P.M.

**Faculty contact information:**

Name: Dongxiao Zhu

Office address: Maccabee Building 14101.3

Office hours: M/W 1:00 – 2:00 P.M.

Phone: 313-577-3104

Email: [dzhu@wayne.edu](mailto:dzhu@wayne.edu)

**Course Description:**

This is a seminar course discussing the latest research topics in computer vision and pattern cognition, with strong emphasis on deep learning and artificial intelligence. The main application domains focus on, but not limited to, imaging and text processing. Students are schedule to present research papers and lead discussion.

**Credit Hours:**

Lectures (3.0)

**Prerequisite:**

CSC 7860 or written consent of instructor

**Co-requisites:**

None

**Required and optional textbook(s):**

N/A

**Computer Programs:**

N/A

**Course contents:**

This course covers some of the most important topics in computer vision, text mining and machine learning. Topics include deep learning methods such as convolutional neuronal network (CNN), recurrent neuronal network (RNN), stacked

auto-encoder (SAE) and deep Bayesian networks (DBN). Application domains range from image classification, segmentation, machine translation and medical record mining.

**Laboratory (lab location)**

*N/A*

**Course Learning Objectives:**

*The course learning objectives are skills and abilities students should have acquired by the end of the course.*

Upon successful completion of this class, the student will be able to:

#	CSC 8860 Course learning Objectives
1	To understand the essential deep learning models, such as CNN, RNN, SAE and DBN
2	To design effective deep learning architectures and tune parameters
3	To learn the stochastic gradient descent type training algorithms
4	To be aware of the cutting edge applications to imaging classification, segmentation, machine translation and medical record mining

**Assessment:**

*Homeworks 60 %*

*Presentations 20%*

*Participation 20%*

**Grading Scale:**

90-100%	A	65-69%	C+
85-89%	A-	60-64%	C
80-84%	B+	55-59%	C-
75-79%	B	54 or Below	F
70-74%	B-		

**Grading Policies:**

You will receive the grade that you earn through your performance on the homeworks, presentations and participation. If you are not satisfied with grades you received for either homeworks or presentations, you may formally request re-grading (in writing) the **entire** project or homework (but **NOT** the individual problem(s)). I'll be glad to honor your request but there is no guarantee of a better outcome.

**Religious Holidays:**

Because of the extraordinary variety of religious affiliations of the University student body and staff, the Academic Calendar makes no provisions for religious holidays. However, it is

University policy to respect the faith and religious obligations of the individual. Students with classes or examinations that conflict with their religious observances are expected to notify their instructors well in advance so that mutually agreeable alternatives may be worked out.

### **Student Disabilities Services:**

- If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located in the Adamany Undergraduate Library. The SDS telephone number is 313-577-1851 or 313-202-4216 (Videophone use only). Once your accommodation is in place, someone can meet with you privately to discuss your special needs. Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.
- Students who are registered with Student Disability Services and who are eligible for alternate testing accommodations such as extended test time and/or a distraction-reduced environment should present the required test permit to the professor at least one week in advance of the exam. Federal law requires that a student registered with SDS is entitled to the reasonable accommodations specified in the student's accommodation letter, which might include allowing the student to take the final exam on a day different than the rest of the class.

### **Academic Dishonesty - Plagiarism and Cheating:**

Academic misbehavior means any activity that tends to compromise the academic integrity of the institution or subvert the education process. All forms of academic misbehavior are prohibited at Wayne State University, as outlined in the Student Code of Conduct (<http://www.doso.wayne.edu/student-conduct-services.html>). Students who commit or assist in committing dishonest acts are subject to downgrading (to a failing grade for the test, paper, or other course-related activity in question, or for the entire course) and/or additional sanctions as described in the Student Code of Conduct.

- **Cheating:** Intentionally using or attempting to use, or intentionally providing or attempting to provide, unauthorized materials, information or assistance in any academic exercise. Examples include: (a) copying from another student's test paper; (b) allowing another student to copy from a test paper; (c) using unauthorized material such as a "cheat sheet" during an exam.
- **Fabrication:** Intentional and unauthorized falsification of any information or citation. Examples include: (a) citation of information not taken from the source indicated; (b) listing sources in a bibliography not used in a research paper.
- **Plagiarism:** To take and use another's words or ideas as one's own. Examples include: (a) failure to use appropriate referencing when using the words or ideas of other persons; (b) altering the language, paraphrasing, omitting, rearranging, or forming new combinations of words in an attempt to make the thoughts of another appear as your own.
- **Other** forms of academic misbehavior include, but are not limited to: (a) unauthorized use of resources, or any attempt to limit another student's access to educational resources,

or any attempt to alter equipment so as to lead to an incorrect answer for subsequent users; (b) enlisting the assistance of a substitute in the taking of examinations; (c) violating course rules as defined in the course syllabus or other written information provided to the student; (d) selling, buying or stealing all or part of an un-administered test or answers to the test; (e) changing or altering a grade on a test or other academic grade records.

**Course Drops and Withdrawals:** In the first two weeks of the (full) term, students can drop this class and receive 100% tuition and course fee cancellation. After the end of the second week there is no tuition or fee cancellation. Students who wish to withdraw from the class can initiate a withdrawal request on Pipeline. You will receive a transcript notation of WP (passing), WF (failing), or WN (no graded work) at the time of withdrawal. No withdrawals can be initiated after the end of the tenth week. Students enrolled in the 10th week and beyond will receive a grade. Because withdrawing from courses may have negative academic and financial consequences, students considering course withdrawal should make sure they fully understand all the consequences before taking this step. More information on this can be found at: <http://reg.wayne.edu/pdf-policies/students.pdf>

**Student services:**

- The Academic Success Center (1600 Undergraduate Library) assists students with content in select courses and in strengthening study skills. Visit [www.success.wayne.edu](http://www.success.wayne.edu) for schedules and information on study skills workshops, tutoring and supplemental instruction (primarily in 1000 and 2000 level courses).
- The Writing Center is located on the 2nd floor of the Undergraduate Library and provides individual tutoring consultations free of charge. Visit <http://clasweb.clas.wayne.edu/> writing to obtain information on tutors, appointments, and the type of help they can provide.

**Class recordings:**

Students need prior written permission from the instructor before recording any portion of this class. If permission is granted, the audio and/or video recording is to be used only for the student's personal instructional use. Such recordings are not intended for a wider public audience, such as postings to the internet or sharing with others. Students registered with Student Disabilities Services (SDS) who wish to record class materials must present their specific accommodation to the instructor, who will subsequently comply with the request unless there is some specific reason why s/he cannot, such as discussion of confidential or protected information.

## **Presentation schedule:**

### **Xiangrui Li (Sept 6)**

Choi, Edward, et al. "Multi-layer representation learning for medical concepts." *Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*. ACM, 2016.

Link: <https://arxiv.org/pdf/1602.05568.pdf>

### **Lu Wang (Sept 13)**

Miotto, Riccardo, et al. "Deep patient: An unsupervised representation to predict the future of patients from the electronic health records." *Scientific reports* 6 (2016): 26094.

Link: <https://www.nature.com/articles/srep26094.pdf>

Cheng, Yu, et al. "Risk prediction with electronic health records: A deep learning approach." *Proceedings of the 2016 SIAM International Conference on Data Mining*. Society for Industrial and Applied Mathematics, 2016.

Link: <https://astro.temple.edu/~tua87106/sdm16.pdf>

### **Deng Pan (Sept 20)**

Wu, Jiajun, et al. "Deep multiple instance learning for image classification and auto-annotation." *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*. 2015.

Link: [http://www.cv-foundation.org/openaccess/content\\_cvpr\\_2015/papers/Wu\\_Deep\\_Multiple\\_Instance\\_2015\\_CVP\\_R\\_paper.pdf](http://www.cv-foundation.org/openaccess/content_cvpr_2015/papers/Wu_Deep_Multiple_Instance_2015_CVP_R_paper.pdf)

### **Yifan Wang (Oct 4)**

Kamnitsas, Konstantinos, et al. "Efficient multi-scale 3D CNN with fully connected CRF for accurate brain lesion segmentation." *Medical image analysis* 36 (2017): 61-78.

Link: <http://www.sciencedirect.com/science/article/pii/S1361841516301839>

### **Xin Li (Oct 11)**

Vaswani, Ashish, et al. "Attention Is All You Need." *arXiv preprint arXiv:1706.03762* (2017).

Link: <https://arxiv.org/pdf/1706.03762.pdf>

### **Sikai Zhong (Oct 18)**

Zhang, Wenlu, et al. "Deep model based transfer and multi-task learning for biological image analysis." *IEEE Transactions on Big Data* (2016).

Link: <http://ieeexplore.ieee.org/document/7480825/>

### **Xiangrui Li (Oct 25)**

Choi, Edward, et al. "Doctor ai: Predicting clinical events via recurrent neural networks." *Machine Learning for Healthcare Conference*. 2016.

Link: <http://proceedings.mlr.press/v56/Choi16.pdf>

### **Lu Wang (Nov 1)**

Harutyunyan, Hrayr, et al. "Multitask Learning and Benchmarking with Clinical Time Series Data." *arXiv preprint arXiv:1703.07771* (2017)

Link: <https://arxiv.org/pdf/1703.07771.pdf>

### **Deng Pan (Nov 8)**

Mnih, Volodymyr, and Geoffrey E. Hinton. "Learning to label aerial images from noisy data." *Proceedings of the 29th International Conference on Machine Learning (ICML-12)*. 2012.

Link: [http://machinelearning.wustl.edu/mlpapers/paper\\_files/ICML2012Mnih\\_318.pdf](http://machinelearning.wustl.edu/mlpapers/paper_files/ICML2012Mnih_318.pdf)

Guan, Melody Y., et al. "Who Said What: Modeling individual labelers improves classification." *arXiv preprint arXiv:1703.08774* (2017).

Link: <https://arxiv.org/pdf/1703.08774.pdf>

### **Yifan Wang (Nov 15)**

Szegedy, Christian, et al. "Rethinking the inception architecture for computer vision." *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*. 2016.

Link:

[http://www.cv-foundation.org/openaccess/content\\_cvpr\\_2016/papers/Szegedy\\_Rethinking\\_the\\_Inception\\_CVR\\_2016\\_paper.pdf](http://www.cv-foundation.org/openaccess/content_cvpr_2016/papers/Szegedy_Rethinking_the_Inception_CVR_2016_paper.pdf)

**Xin Li (Nov 29)**

Radford, Alec, Rafal Jozefowicz, and Ilya Sutskever. "Learning to generate reviews and discovering sentiment." *arXiv preprint arXiv:1704.01444* (2017).

Link: <https://arxiv.org/pdf/1704.01444.pdf>

**Sikai Zhong (Dec 6)**

Shin, Hoo-Chang, et al. "Deep convolutional neural networks for computer-aided detection: CNN architectures, dataset characteristics and transfer learning." *IEEE transactions on medical imaging* 35.5 (2016): 1285-1298.

Link: <https://arxiv.org/pdf/1602.03409.pdf>