CSE 5539-0010 - Spring 2019

Computational Audition

Syllabus

Time/Place: Monday 12:40-2:30pm, 357 Dreese Lab
Instructor: Prof. DeLiang Wang; Office: 598 DL, 292-6827; dwang@cse.ohio-state.edu
Http://www.cse.ohio-state.edu/~dwang/

Office Hours: 2:30-3:00 M & 2-3:30 R

Course Description: Computational models and deep learning algorithms for auditory perception and processing. Topics include auditory scene analysis, pitch analysis, sound localization, speech and music processing (enhancement, segregation, recognition), modeling of the auditory system, and temporal pattern processing.

Prerequisites: Grad standing or permission of the instructor


Course Material: Papers from the literature

Grading Plan: Paper presentation - 25%; Midterm programming - 15%
Participation - 10%; Term project - 50%
Tentative Schedule

Week/Sequence and Topics

Week 1: Class canceled due to travel
Monday, 1/7

Week 2: Introduction, acoustics, and physiological basis of audition
Monday, 1/14

Week 3: No Class – MLK Day
Monday, 1/21

Week 4: Psychoacoustic basis of audition
Monday, 1/28

Week 5: Fundamentals of signal processing
Monday, 2/4

Week 6: Real-world audition, and fundamental auditory representations
Monday, 2/11

Student presentation starts

Week 7: Pitch detection and multipitch tracking

Week 8: Classification based speech separation

Week 9: Masking-based speaker separation

Spring Break Week: 3/11-15

Week 10: Reverberant signal processing

Week 11: Sound localization

Week 12: Binaural segregation
**Week 13:** Automatic speech recognition (ASR) and robust ASR  
Monday, 4/8  
**Reading:** Hinton et al. (2012), Wang and Wang (2016)

**Week 14:** Music signal analysis and separation  
Monday, 4/15  
**Readings:** Goto (2006), Rafii and Pardo (2013)

**Week 15:** Auditory attention and neural modeling  
Monday, 4/22  
**Readings:** Shamma et al. (2011), Wrigley and Brown (2004)
Term Project

Each student is required to do a term project (counted as 50% of your final grade). Topics for a term project may be, but not limited to, a complete piece of original research, a proposal and some initial results of a research plan, or a detailed analysis or an in-depth review on a specific topic covered in the class. The term paper summarizing the project must be 2000-4000 (5-10 pages) words in length. **Written project report is due by 5 pm, April 24 (Wednesday).**

Selecting a topic

A topic proposal needs to be submitted prior to conducting the project, and **the proposal is due in class on February 11 (Monday).** Check with the instructor before deciding on a topic and writing the proposal. Your proposal should be one page long and should include

1. Your background: technical area, relevant coursework, and pertinent research you have done if any.
2. Proposed project
   - General area that the project falls in.
   - Technical description of your proposed project. What are you going to do?
   - List of a few references that you have read or scanned on the subject.

Class Presentation

Each enrolled student (BOTH regular and audit) is required to be responsible for at least one class presentation (counted as 25% of your final grade). The content of each class consists typically of a couple of papers. Please make three choices, in the order of preference, of the topic you want to present. However, your choices may not be honored due to conflict among student choices. Students responsible for a presentation need to check with the instructor beforehand to go over presentation details. It is required that students make powerpoint slides to facilitate presentations.
Course Materials

(Class website: www.cse.ohio-state.edu/~dwang/teaching/cse5539/Wang5539-19.html)

Week 7


Week 8


Week 9


Week 10


Week 11


**Week 12**


**Week 13**


**Week 14**


**Week 15**


Form for Student Information and Choosing Presentation Topic

Due: January 28 (Monday)

Name: ___________________________________________________________

Email Address and Phone No: ________________________________________

Department: _______________________________________________________

Thesis advisor (if any): _____________________________________________

Level: _________-th year Graduate or Undergraduate

Your Areas of Interest: ______________________________________________

Selecting three topics for possible class presentation in the order of preference, according to the class schedule. Student presentations cover Week 7 through Week 15. Take a look at the titles of the papers to be discussed in each class.

1. Topic ____________________________________________________________
   Week _______________________

2. Topic ____________________________________________________________
   Week _______________________

3. Topic ____________________________________________________________
   Week _______________________
