Syllabus for STAT 5171/6071-001 Spring 2021

Meeting Time: MWF 2:30-3:25 PM

Class Room: W Char 120

<mark>Updated: 9/24/2023 6:16 PM</mark>

Instructor: Dr. Won Chang, Assistant Professor

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Office Hours: (virtual) 12:00-1:00PM Tuesdays, 10:00-11:00AM Thursdays
                               Zoom link: https://ucincinnati.zoom.us/j/7462671870

Course title: Machine Learning and Statistics

Textbook:

Deep learning. 2016. by Goodfellow, I., Bengio, Y., and Courville, A.

The Elements of Statistical Learning, 2017. by Jerome H. Friedman, Robert Tibshirani, and Trevor Hastie

Prerequisite:

Minimum Grade of C- in STAT5131/6031 and STAT 5121/6021 or permission by instructor.

Course objectives:

The main objective of this course is to expose undergraduate/graduate students in the STEM fields to various methods developed in areas such as Data Mining, Statistical Learning and Big Data Analytics. This course will cover various modern statistical methods for supervised and unsupervised learning that are widely used in both scientific fields and industry.

Course Outline:

Week 1-2. Machine Learning Basics
Week 3-4. Neural Network and Deep Learning
Week 5-6. Convolutional Neural Network
Week 7-8. Long-Short Term Memory Network
Week 9-10. Uncertainty Quantification for Deep Neural Networks
Week 11-12. Additional Topics in Deep Learning (e.g. Generative Adversarial Network and One-Shot Learning)
Week 13-14. Gaussian Process Regression & Random Forest

Course Webpage: All course-related information will be posted on UC CANVAS, including course syllabus, lecture notes, homework assignments and announcements. Visit UC CANVAS frequently.

Semester Grade Calculation: Your final course grade will be assigned based on the total points that you have accumulated from

Homework 30pts

Midterm Exam: 30pts   Final Project: 30pts

out of the maximum possible **100 points**, according to the following grading scales:

A: 93-100pts, A-: 90-92pts, B+: 87-89pts, B: 83-86pts, B-: 80-82pts, C+: 77-79pts,

C: 73-76pts, C-: 70-72pts, D+: 67-69pts, D: 63-66pts, D-: 60-62pts, F: 59 or less pts

Homework: Homework will be assigned on CANVAS throughout the semester.

- One assignments with the lowest scores will be dropped from the final grade calculation.
- All students must submit their own written work in their own words. Academic misconduct including plagiarism will not be tolerated.
- No late assignments will be accepted unless there are extreme and documentable circumstances that are approved by the instructor.
- Both the code and R output should be submitted along with your report through CANVAS. Half credit will be given if the code or R output is not attached.
- Please note that your solutions need to be presented in a clear, readable format with sufficient details. NO CREDIT will be given to solutions lacking details or that are hard to read. Note that this applies to the R code and output as well.
- The due date of the homework will be announced in the class and/or on CANVAS.
- It is strongly recommended to utilize the computational resources provided by the Ohio Supercomputer Center (OSC) when working on the assignments. Detailed instructions on how to use the supercomputer clusters will be provided during the class.

Midterm Exam:

  Date: Friday, March 11th, 2:30 - 3:25 pm

The test is open-book and administered through Canvas.

- You will need to prepare a calculator for each test.
- Students should NOT communicate with other people during the exam.
- Academic misconduct including act of cheating will not be tolerated.

Final Project (subject to change):

Students will be given a common dataset and individually work on a project. The grading criteria:

- Model performance (40 points): The model should achieve accuracy of 90% on the test data set. The score will be calculated as 100×(test accuracy-0.5).
- Overall quality of report (30 points): Data preparation and model fitting process should be clearly described in detail, along with proper reasoning.
- Overall quality of programing code (30 points): Students need to submit their R code (or any language) that is organized in a clear manner with proper comments

Policies

Academic Integrity Policy: The University Rules, including the Student Code of Conduct, and other documented policies of the department, college, and university related to academic integrity will be enforced. Any violation of these regulations, including acts of plagiarism or cheating, will be dealt with on an individual basis according to the severity of the misconduct. (http://www.uc.edu/conduct/Academic_Integrity.html)

Regarding Policy: If a student believes that a grading error has occurred, he/she should request for regarding within the next 5 days after the work is returned to the class. This will apply even if the student is absence in the class on the day the work is returned unless prior permission was obtained from the instructor.

Policy about make-up exam: Only students with legitimate excuses will be allowed to make up missed exam. The student must request make-up tests within a reasonable amount of time after one of the following excusable events occurs:

1. **Illness**. Need official certification from you doctor, typed on medical stationary (with their license # to practice medicine on it).
2. **Attending the funeral of an immediate relative**. Need proof of attending the funeral with the date of the ceremony.
3. **Mandatory courtroom appearance**. Need a copy of your official court summons with the date.
4. **Athletic event participation**. Need a signed letter from your coach no later than **one week prior to** the day of the exam.

Special Needs Policy: If you have any special needs related to your participation in this course, including identified visual impairment, hearing impairment, physical impairment, communication disorder, and/or specific learning disability that may influence your performance in this course, you should meet with the instructor to arrange for reasonable provisions to ensure an equitable opportunity to meet all the requirements of this course. At the discretion of the instructor, some accommodations may require prior approval by Disability Services. In order to take advantage of those available accommodations, students may contact the Disability Services Office at 210 University Pavilion (513-556-6823). (http://www.uc.edu/aess/disability.html)

Personal Communication Devices Policy: Cell phones and PDAs must be either turned off or put on vibrate mode during class. Additionally, please make all efforts not to use cell phones during the class time. **Cell phone usage is strictly prohibited during exams**.

Email Communication Policy: All communications will be done via UCmail. The instructor will try his best to reply within 24 hours from receipt of emails.