Topic: Machine Learning & Deep Learning

STP 598

Instructor Info —

👤 Shiwei Lan

🕐 Office Hrs: TuTh 1:30 - 2:30PM

📍 WXLR 544; Zoom: 8055899886

ℹ️ https://math.la.asu.edu/∼slan

@ slan@asu.edu

Course Info ———

⚡ Prereq: DAT 301, Python basics

🕐 TuTh 12:00 – 1:15 PM

📍 Tempe WXLRA309

ℹ️ https://slan-teaching.github.io/STP598mldl/

Grader Info ———

👤 TBD

🕐 Office Hrs: TBD

📍 MC^2 (WXLR A303)

@ TBD

Description

This course focuses on foundations of statistical learning and modern techniques in deep learning. The topics will cover (penalized) linear regression, generalized linear regression, classification and clustering, Gaussian process, Deep neural networks, convolutional neural networks, recurrent neural networks, and auto-encoders, etc.

Objective

By the end of this course, students should have basic understanding of learning methods and be trained with hands-on software implementation.

Textbooks

Required

ESL - The Elements of Statistical Learning (2nd Edition) by Trevor Hastie, Robert Tibshirani and Jerome Friedman

DL - Deep Learning (1st Edition) by Ian Goodfellow, Yoshua Bengio and Aaron Courville

Supplementary

DLP - Deep Learning with PyTorch (1st Edition) by Eli Stevens, Luca Antiga, and Thomas Viehmann

Software

Python, TensorFlow and Pytorch.

Grading Scheme

Homework	50 %
Midterm	20 %
Final Project	30 %
Total	100 %

A+	[97%, 100%]	A	[93%, 97%)	A-	[90%, 93%)
B+	[87%, 90%)	B	[83%, 87%)	B-	[80%, 83%)
C+	[77%, 80%)	C	[70%, 77%)		
D	[60%, 70%)			E	[0%, 60%)

Homework

There will be about 5 written assignments to be submitted on canvas. There will also be about 5 computer assignments to be completed on nbgrader. Each homework assignment is worth 5 points with total 50 points. Written homework report should be submitted in either Word or PDF format, no other formats accepted. Late home will NOT be accepted by email. Coding homework will be automatically graded on Python Jupyter notebook. No partial credit within a code cell will be given.

Exam

There will be 1 take-home midterm exam worth 25 points. If you are unable to take an exam, you must contact the instructor in advance. All excuses must be verifiable. The make-up exams will be given only under exceptional circumstances.

Final Project

The final project will consist of a data analysis using the learnt techniques. The student should submit a 1-2 page plan for their project including a description of the data set by 11/12/2023. Students are encouraged to work in groups of size (2∼3) on projects. Each group would submit code, the outcome of the code, and give a presentation in the class. The final written report must be submitted to canvas by 12/08/2023 midnight.

FAQs

? Where can I find help?

! You can go to my virtual office hours and the grader's office hours. In addition, you can go to Discussion Forum to post your questions and help others.

? How do I keep track of the class?

! Constantly check canvas and the course website. I will make announcements, post homework solutions, etc..

? Do we have incentives?

! I will give bonus points through the semester for e.g. extra-credit homework problems, most helpful discussion participants, etc..

? When shall I drop if I choose to?

! Last Day to Register or Drop/Add Without College Approval is 08/28/2024. Tuition & Fees Refund Deadline is 09/04/2024 for session C. Course Withdrawal Deadline (without 'W' on your transcript) is 11/06/2024 for session C. Refer to https://students.asu.edu/academic-calendar for more deadlines.

Disability Accommodations

Qualified students with disabilities are encouraged to make their requests at the beginning of the semester to get disability accommodations. Disability information is confidential. Note: *Prior to receiving disability accommodations, verification of eligibility from the Disability Resource Center (DRC) is required.* Therefore, you should contact DRC immediately. Their office is located on the first floor of the Matthews Center Building. DRC staff can also be reached at: 480-965-1234 (V), 480-965-9000 (TTY). For additional information, visit: www.asu.edu/studentaffairs/ed/drc. Their hours are 8:00 AM to 5:00 PM, Monday through Friday.

Make-up Policy

In case of valid absence (such as serious illness, going to court, etc.) during scheduled exam, you must notify the instructor BEFORE the exam, if the circumstances allow. To be eligible for make-up exam, valid excuse has to be supported by valid documentation (such as doctor's note, letter from court, etc.). Also, please follow Academic Affairs Manual, ACD 304-04, for appropriate University policies about requesting an accommodation for religious practices, in case you have to miss an assignment due to religious practice.

Cell phones and Electronic Devices

Picture taking, talking or texting on your cell phone or any electronic device during class is prohibited. If you bring a cell phone and/or any other electronic equipment to the class, make sure they are turned off before class begins. Any sounds produced by such devices are disruptive to the class and, as such, will not be tolerated and may be reported to the Office of the Dean of Students.

Academic Honesty

ASU expects and requires all its students to act with honesty and integrity, and respect the rights of others in carrying out all academic assignments. For more information on academic integrity, including the policy and appeal procedures, please visit http://provost.asu.edu/academicintegrity.

Inclusion

The School of Mathematical and Statistical Sciences encourages faculty to address and refer to students by their preferred name and gender pronoun. If your preferred name is different than what appears on the class roster, or you would like to be addressed using a specific pronoun, please let me know.

Sexual Violence and Harassment

Both Title IX federal law and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at https://sexualviolenceprevention.asu.edu/faqs. As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, https://eoss.asu.edu/counseling, is available if you wish to discuss any concerns confidentially and privately. ASU online students may access 360 Life Services, https://goto.asuonline.asu.edu/success/online-resources.html.

Syllabus Disclaimer

This syllabus is tentative and should not be considered definitive. The instructor reserves the right to modify it (including the dates of the tests) to meet the needs of the class. Every effort will be made to avoid changing the course schedule but the possibility exists that unforeseen events will make syllabus changes necessary. It is the student responsibility to attend class regularly and make note of any change.

Class Schedule (tentative)

Week	Date	Topic	Assignments
1	08/22 - 08/23	Introduction	
2	08/26 - 08/30	Probability Review	Written 1 out
3	09/03 - 09/06	Linear Regression and Regularization	Written 1 due; Coding 1 out
4	09/09 - 09/13	Generalized Linear Regression	Coding 1 due
5	09/16 - 09/20	Classification and Clustering	Written 2 out
6	09/23 - 09/27	Trees and Random Forests	Written 2 due; Coding 2 out
7	09/30 - 10/04	Gaussian Process	Coding 2 due
8	10/07 - 10/11	Deep Neural Networks	Written 3 out; Coding 3 out
9	10/12 - 10/15	Fall break / Review	midterm-exam: due 10/18/2023
10	10/21 - 10/25	TensorFlow and PyTorch	Written 3 due; Coding 3 due
11	10/28 - 11/01	Convolutional Neural Networks	Written 4 out
12	11/04 - 11/08	Recurrent Neural Networks	Written 4 due; Coding 4 out
13	11/12 - 11/15	AutoEncoders	Coding 4 due; project proposal: due 11/10/2023
14	11/18 - 11/22	Training Neural Networks	Written 5 out
15	11/25 - 11/27	Generative Adversarial Networks	Written 5 due; Coding 5 out
16	12/02 - 12/06	Topics	Coding 5 due
Final	12/09 - 12/14	Final Exam	final project report: due 12/10/2023