

Syllabus for Learning Theory– CS395t

Adam Klivans

Fall 2018

1 Course Overview

This course will cover the fundamentals of computational and statistical learning theory. There will be a focus on *provably* efficient algorithms, and the class will be mathematically intensive. We will also discuss recent topics/papers of note.

2 Instructors

Instructor: Adam Klivans (office hours: Wednesday 1pm–2pm in GDC 4.826). TA: Yihao Feng (office hours: Friday 12:30pm–1:30pm at the TA Stations).

3 Classroom

GDC 4.304 (TTH 2:00–3:30)

4 Prerequisites

You should have taken a class in machine learning (or equivalent), CS311 and CS331 (or equivalents), and be well-versed in linear algebra and probability.

5 Textbooks

- “Understanding Machine Learning from Theory to Algorithms,” by Shalev-Shwartz and Ben-David.

6 Syllabus

- Formal Learning models; Mathematical preliminaries (1-2 weeks).
- Generalization bounds (1-2 weeks and interspersed)
- Algorithms for classification and regression (3 weeks)
- Distribution-specific learning: Fourier methods (2 weeks)

- Boosting and online learning. (1 week)
- Learning with noise. (1 week)
- Project Presentations.

The syllabus is subject to change depending on students' background and interests.

7 Assignment, Assessment, Evaluation

- There will be four–six homeworks (50%) and a class project/presentation (50%). Extra credit will be awarded for class participation.
- Homework is due by the beginning of class. Students are encouraged to use Latex to typeset their solutions and email them to the instructor. You may have two free “late days” that you can use all on one homework or on two homeworks. Homework that is one day late is worth 50%. Homework is worth 0% if turned in more than one day late.
- Some homeworks may have programming assignments. We will be programming in Python and use the scikit-learn package. You may work in groups of two for any programming assignment, clearly indicating who you collaborated with. Each non-programming assignment must be written up individually. You may discuss a non-programming assignment with at most two other students in the class (or use Piazza). **YOU MUST WRITE UP YOUR OWN SOLUTIONS BY YOURSELF.**
- You may not under any circumstances search for a solution to homework on the internet, in a book or from any other resource. Each student in this course is expected to abide by the University of Texas Honor Code.

8 Other University Notices and Policies

8.1 Documented Disability Statement

Any student with a documented disability who requires academic accommodations should contact Services for Students with Disabilities (SSD) at (512) 471-6259 (voice) or 1-866-329-3986 (video phone). Faculty are not required to provide accommodations without an official accommodation letter from SSD. Please notify me as quickly as possible if the material being presented in class is not accessible (e.g., instructional videos need captioning, course packets are not readable for proper alternative text conversion, etc.). Contact Services for Students with Disabilities at 471-6259 (voice) or 1-866-329-3986 (video phone) or reference SSDs website for more disability-related information: http://www.utexas.edu/diversity/ddce/ssd/for_cstudents.php

8.2 Behavior Concerns Advice Line

If you are worried about someone who is acting differently, you may use the Behavior Concerns Advice Line to discuss by phone your concerns about another individuals behavior. This service is provided through a partnership among the Office of the Dean of Students, the Counseling and Mental Health Center (CMHC), the Employee Assistance Program (EAP), and The University of

Texas Police Department (UTPD). Call 512-232-5050 or visit <http://www.utexas.edu/safety/bcal>.