EE375/STAT375: Project rules and ideas

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Rules

1. Students will form groups of two students each. (If the number of students enrolled is odd, one group of one or three students will be allowed).

2. They will choose a topic and a set of (at least 2) papers to read. The group composition and chosen topic need to be communicated to Andrea by April 23.

3. They will write a report on the topic, max 6 pages in NeurIPS format.

4. They will prepare a 15 minutes videos to present their report. Videos and reports will be posted on Canvas, and made available to other students.

5. We will devote the last 4 lectures of the class (May 25, 27, June 1, 3) to discuss these projects.

An important remark. If you list a paper among the ones you read, it will be assumed that you read all of it (including proofs and appendices).

Topics

This is a list of topics and references. Most topics are broad enough to be split across multiple groups.

Three remarks: (i) The reference lists given here are far from exhaustive. You should use them as pointers to explore the literature. (ii) Some of these topics have been (partially) discussed in the lectures; Whenever this is the case, you should briefly recall what was discussed in class and go further. (iii) You are welcome to suggest topics that are not in this list. In this case you are invited to find relevant references.

1. Low-dimensional behaviors [BRT19, RZ19].
2. Complexity bounds [GRS18, AGNZ18, SH20].
3. Convex neural nets [Bac17].
4. Stability [BE02, RRT+16, HRS16]
5. Overparametrized linear regression [HMRT19, BLLT20, TB20].
6. Kernel ridge regression [LR20, LRZ19, DL20, MMM21a].
7. Mean field theory of two-layers neural networks [CB18, MMN18, MMM19, CB20, JMM+20, Chi21].
8. Mean field theory of multilayer networks [AOY19, NP20].
9. Implicit/algorithmic bias [GWB+17, LMZ18, GLSS18, SESS19, BM19].
10. Convolutional networks [LWY+19, LZA20, NXB+19, MMM21b].
11. Boosting and interpolation [ZRTH04, RSSZ07, LS20].
12. Optimization in the linear/lazy regime [COB19, ZCZG18, AZLS19, AZLL19, OS20, LZB20a].
13. Generalization in the linear/lazy regime [GMMM19b, MM19, MZ20, MMM21a].
14. Gaps between linear and nonlinear regimes [YS19, GMMM19a, WLLM19, GMMM20, MKAS21].
15. Beyond the linear regime [BL19, AZL19, WGL+20, AZL20, LZB20b].
16. Learning and long tail [Fel20, FZ20].
17. Robustness [MMS+17, SST+18, RXY+19, BLN20].
References


Lenaic Chizat, Sparse optimization on measures with over-parameterized gradient descent, Mathematical Programming (2021), 1–46.


