CPSC 536C: Algorithms for Convex Optimization
Open Problems

Department of Computer Science
University of British Columbia

Winter 2026

Open Projects and Student Lectures

- Minimax Theorems and Game Theory
- Efficient Convex Oracles and Reductions https://arxiv.org/abs/1706.07357
- Shallow-Cut Barrier Method [Grotschel, Lovasz, Schrijver 3.3, 4.3]
- Geometric Descent https://arxiv.org/abs/1506.08187
- Vaidya https://ieeexplore.ieee.org/document/63500 + Lee-Sidford-Wong Cutting Plane Method https://arxiv.org/abs/1508.04874
- Accelerated Gradient Descent (original https://www.mathnet.ru/php/archive.phtml?wshow=paper&jrnid=dan&paperid=46009&option_lang=eng, Nesterov Notes 2.2, Linear coupling https://arxiv.org/abs/1407.1537, Approx Duality gap https://epubs.siam.org/doi/10.1137/18M1172314)
- Laplacian Solvers https://dl.acm.org/doi/abs/10.1145/1007352.1007372 ...
- Max Flow https://www.cs.cmu.edu/~15859n/RelatedWork/LeeRaoStrivastava.pdf
- Krylov/ Preconditioning for Linear Systems
- Smoothing for Lower bounds https://www.sciencedirect.com/science/article/pii/S0885064X1400083
- Smoothing for Acceleration https://link.springer.com/article/10.1007/s10107-004-0552-5
- Learning Rate for Online Optimization https://proceedings.mlr.press/v119/fang20a.html
- Relative strong convexity/ moothness https://epubs.siam.org/doi/10.1137/16M1099546
- Vaidya https://ieeexplore.ieee.org/document/63500 + Lee-Sidford Barrier https://arxiv.org/abs/1910.08033
- Universal Barrier (Nesterov, Nemirovski 2.5)
- Entropic Barrier https://arxiv.org/abs/1412.1587
- Predictor/Corrector Method for LP https://www.jstor.org/stable/3690133
- Straight-Line Complexity https://arxiv.org/abs/2206.08810