This is a growing list of pointers to reading material for the class.

Convexity and convex optimization

The book by Boyd and Vandenberghe is an excellent reference for convex analysis and optimization:

[BV] S. Boyd and L. Vandenberghe. *Convex Optimization*. Cambridge University Press. `http://stanford.edu/~boyd/cvxbook/`.

Further references on convex analysis:

[Ber09] D. Bertsekas. *Convex Optimization Theory*. Athena Scientific, 2009.

[HUL01] J.-B. Hirriart-Urruty and C. Lemaréchal. *Fundamentals of Convex Analysis*. Springer, 2001.

[Roc96] R. Tyrrell Rockafellar. *Convex Analysis*. Princeton Landmarks in Mathematics, 1996.

Good references on convex optimization that include chapters on subgradient method, gradient descent and cutting planes include

[Ber15] D. Bertsekas. *Convex Optimization Algorithms*. Athena Scientific, 2015.

[Nes04] Y. Nesterov. *Introductory lectures on convex optimization*. Kluwer Academic Publishers, 2004.

We touched / will touch upon selected chapters in the following book (cutting planes, . . .)

[SNW12] S. Sra, S. Nowozin, and S. Wright, editors. *Optimization for Machine Learning*. MIT Press, 2012.

Structured Output Prediction

The early papers show illustrative examples; the survey by Nowozin & Lampert gives an overview of methods and examples from computer vision. Further advanced topics are discussed in the book by Nowozin et al.

[NGJL14] S. Nowozin, P. Gehler, J. Jancsary, and C. Lampert. *Advanced Structured Prediction*. Neural Information Processing Series. MIT Press, 2014.

[NL11] S. Nowozin and C.H. Lampert. *Structured Learning and Prediction in Computer Vision*, volume 6. Foundations and Trends in Machine Learning, 2011.

[TGK03] B. Taskar, C. Guestrin, and D. Koller. Max-margin markov networks. In *Advances in Neural Information Processing Systems (NIPS)*, 2003.

[TJHA05] I. Tsochantaridis, T. Joachims, T. Hofmann, and Y. Altun. Large margin methods for structured and interdependent output variables. *Journal of Machine Learning Research*, 2005.

Graphical Model Inference

[Jeb14] T. Jebara. *Tractability - Practical Approaches to Hard Problems*, chapter Perfect Graphs and Graphical Modeling. Cambridge University Press, 2014.

[WJ08] M. Wainwright and M.I. Jordan. *Graphical Models, Exponential Families, and Variational Inference*. Foundations and Trends in Machine Learning, 2008.

Submodularity

Lovász' paper is a very readable introduction. In this paper, he introduces the Lovász extension. Fujishige's book is a comprehensive survey on submodular functions, submodular analysis and submodular minimization problems.

[Bac13] F. Bach. *Learning with Submodular Functions: A Convex Optimization Perspective*. Foundations and Trends in Machine Learning, 2013.

[Edm70] J. Edmonds. *Combinatorial Structures and Their Applications*, chapter Submodular Functions, Matroids and Certain Polyhedra, pages 69–87. Gordon and Breach, 1970.

[Fuj05] S. Fujishige. *Submodular functions and optimization*. Number 58 in Annals of Discrete Mathematics. Elsevier Science, 2 edition, 2005.

[Lov83] L. Lovász. *Mathematical programming – The State of the Art*, chapter Submodular Functions and Convexity, pages 235–257. Springer, 1983.

Matroids

We only touched upon the very basics of matroid theory. If you want to learn more, Oxley's book is a comprehensive reference; Gordon & McNulty is an undergraduate textbook. The two "applications" in class were Shapley's and Fujishige's papers.

[Fuj78] S. Fujishige. Polymatroidal dependence structure of a set of random variables. *Inf. Control*, 39:55–72, 1978.

[GM12] G. Gordon and J. McNulty. *Matroids – A Geometric Introduction*. Cambridge University Press, 2012.

[Oxl11] J. Oxley. *Matroid Theory*. Oxford University Press, 2011.

[Sha71] L. S. Shapley. Cores of convex games. *International Journal of Game Theory*, 1(1):11–26, 1971.