Reading Materials

Textbooks

<u>Optimization</u>

1. Amir Beck, First-Order Methods in Optimization, SIAM, 2017. Chapters 1-6, 8-10, 15.

Or Chapter 1-6 plus:

Pavel Dvurechensky, Shimrit Shtern, Mathias Staudigl, First-Order Methods for Convex Optimization, EURO Journal on Computational Optimization 9 (2021) 100015.

<u>Machine Learning</u>

2. Christopher M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006. Chapters 1-7. (Although Bishop has a newly updated book: Deep Learning - Foundations and Concepts, I would prefer students learn more about traditional machine learning techniques, rather than knowing deep learning only.)

Papers

<u>Implicit DNNs</u>

1. Xingyu Xie, Qiuhao Wang, Zenan Ling, Xia Li, Guangcan Liu, and <u>Zhouchen Lin</u>, *Optimization Induced Equilibrium Networks: An Explicit Optimization Perspective for Understanding Equilibrium Models*, IEEE Trans. Pattern Analysis and Machine Intelligence, 45(3): 3604-3616 (2023). [pdf]

<u>DNN Training Algorithms</u>

2. Xingyu Xie, Pan Zhou, <u>Zhouchen Lin</u>, and Shuicheng Yan, *Adan: Adaptive Nesterov Momentum Algorithm for Faster Optimizing Deep Models*, submitted to IEEE Trans. Pattern Analysis and Machine Intelligence. [pdf]

3. Jia Li, Cong Fang, and <u>Zhouchen Lin</u>, *Lifted Proximal Operator Machines*, AAAI 2019, arXiv:1811.01501. [pdf][supplementary material]

<u>Optimization Algorithms</u>

4. Yuanyuan Liu, Fanhua Shang, Hongying Liu, Lin Kong, Licheng Jiao, and <u>Zhouchen Lin</u>, *Accelerated Variance Reduction Stochastic ADMM for Large-Scale Machine Learning*, IEEE Trans. Pattern Analysis and Machine Intelligence, 43(12):4242-4255, 2021. [pdf]

5. Huan Li, Cong Fang, and <u>Zhouchen Lin</u>, *Accelerated First-Order Optimization Algorithms for Machine Learning*, Proceedings of the IEEE, 108(11): 2067-2082 (2020). [pdf]

6. Fanhua Shang*, Yuanyuan Liu*, James Cheng, Zhi-Quan Luo, and <u>Zhouchen Lin</u>, *Bilinear Factor Matrix Norm Minimization for Robust PCA: Algorithms and Applications*, IEEE Trans. Pattern Analysis and Machine Intelligence, 40(9): 2066-2080 (2018). [pdf][supplementary material]

7. Huan Li and <u>Zhouchen Lin</u>, *Restarted Nonconvex Accelerated Gradient Descent: No*

More Polylogarithmic Factor in the $O(\epsilon^{-7/4})$ *Complexity*, ICML 2022: 12901-12916. [pdf]

DNN Design

8. Huan Li, Yibo Yang, and <u>Zhouchen Lin</u>, *Optimization Algorithm Inspired Deep Neural Network Structure Design*, ACML 2018. [pdf]

9. Yikang Li, Yeqing Qiu, Yuxuan Chen, Lingshen He, and <u>Zhouchen Lin</u>, *Affine Equivariant Networks Based on Differential Invariants*, CVPR 2024. [pdf][supplementary material]