

Po-Wei Wang

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Education

- PhD student, Machine Learning Dept., Carnegie Mellon University** Aug. 2015 – Now
– Advised by Prof. J. Zico Kolter
- B.S., Computer Science Dept., National Taiwan University** Sep. 2008 – June 2012
– Advised by Prof. Chih-Jen Lin

Summary

I am a second-year PhD student at the Machine Learning Department of Carnegie Mellon University, advised by Prof. Zico Kolter. Before that, I was an undergrad in the CSIE Department of National Taiwan University, working with Prof. Chih-Jen Lin on convergence properties of SVMs. My interests covers both theories and applications for convex/nonconvex optimization.

Research Experience

- Global linear convergence for non-strongly convex problems** [7]
 - First global linear convergence rate for first-order methods on non-strongly convex problems.
 - Applied to cyclic coordinate descent methods for dual SVC and SVR, published in JMLR.
 - Solved the open problem of convergence rate of the Gauss-Seidel method on PSD matrices.
- Polynomial optimization methods for matrix factorization** [1]
 - Solve bi-direction line-search in matrix factorization exactly via polynomial optimization.
 - Apply Durand-Kerner method in numerical optimization to accelerate the process.
 - Achieve empirical speedup and lower objective values in benchmarks.
- The mixing method for Goemans-Williamson SDP of MAXCUT problem** [2]
 - Proposed an elemental low-rank algorithm to solve the SDP on unit polyhedron.
 - Strictly decreasing, local convergence to SDP optimal, scales to millions of vertices.
 - Orders of magnitude faster than other existing methods in experiments.
- The common-direction solver for linear classification** [3, 4]
 - Reuse gradient information to reduce communication time in distributed optimization.
 - Strictly decreasing, optimal linear convergence, and local quadratic convergence.
 - Outperform state-of-the-art first- and second-order methods in experiments.
- Disciplined convex optimization by proximal and epigraph projection** [5, 6]
 - Solve the conic program in cvxpy by fast proximal and epigraph projection operators.
 - New algorithms for the implicit dual problem and piece-wise linear functions.
 - Orders of magnitude faster than existing general-purpose optimization solvers.

Publications

- Polynomial optimization methods for matrix factorization.** Po-Wei Wang, Chun-Liang Li, and J. Zico Kolter. *AAAI*, 2017
- The Mixing method for Maxcut-SDP problem.** Po-Wei Wang and J. Zico Kolter. *NIPS LHDS Workshop*, 2016

3. **Limited-memory common-directions method for distributed optimization and its application on empirical risk minimization.** Ching-pei Lee, Po-Wei Wang, Weizhu Chen, and Chih-Jen Lin. *Technical report, 2016*
4. **The Common-directions Method for Regularized Empirical Risk Minimization.** Po-Wei Wang, Ching-pei Lee, and Chih-Jen Lin. *Technical report, 2016*
5. **Epigraph Projections for Fast General Convex Programming.** Po-Wei Wang, Matt Wytock, and J. Zico Kolter. *ICML, 2016*
6. **Epigraph Proximal Algorithms for General Convex Programming.** Matt Wytock, Po-Wei Wang, and J. Zico Kolter. *Proceedings of the NIPS 2015 Optimization Workshop*
7. **Iteration Complexity of Feasible Descent Methods for Convex Optimization.** Po-Wei Wang and Chih-Jen Lin. *The Journal of Machine Learning Research 15, 1523-1548*
8. **Support Vector Machines.** Po-Wei Wang and Chih-Jen Lin. *Data Classification: Algorithms and Applications. CRC Press. 2014*
9. **On Convergence Rate of Concave-Convex Procedure.** Ian E.H. Yen, Nanyun Peng, Po-Wei Wang, Shou-De Lin. *Proceedings of the NIPS 2012 Optimization Workshop*

Selected Awards

1. **Double Championships in KDD Cup competition on Music Rating Prediction (2011)**
2. **Third Place in Robocup Standard Platform League World Final (2011)**

Professional Services

1. Reviewer for Journal of Machine Learning Research (JMLR), Data Mining and Knowledge Discovery (DAMI), IEEE Conference on Decision and Control (CDC'14), Neural Information Processing Systems (NIPS), and Neurocomputing.
2. Organizer of NTU Machine Learning Symposium 2014

Work and Extracurricular Experience

1. Research Assistant in Machine Learning Group June 2012 – Feb. 2013, Apr. 2014 – Jul 2015
 - Worked as a research assistant for Prof. Chih-Jen Lin since I graduated.
2. Substitute Military Service at Taoyuan International Airport Apr. 2013 – Apr. 2014
 - Served as a system administrator in the police department in the airport.
3. Advisor in High School Computer Science Club 2008 – 2015
 - Teaching C-programming, algorithms, and micro-controllers in my high school's computer science club for 6 years. Also worked as an advisor in science affairs.