Weiwei "William" Kong
Curriculum Vitae

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Research Interests

Differential Privacy, Computational Complexity, Nonconvex Optimization, Convex Optimization, Accelerated Methods, Proximal Point Methods, Constrained Optimization, Optimization Algorithms, Optimization Software

Education

2016–2021   **Ph.D.** in Operations Research
Georgia Institute of Technology, Atlanta GA, USA

» *Dissertation Title*: Accelerated Inexact First-Order Methods For Solving Nonconvex Composite Optimization Problems

» *Committee*: Arkadi Nemirovski, Guanghui Lan, Renato D.C. Monteiro (Chair), Santanu S. Dey, Edmond Chow

» *Advisor*: Renato D.C. Monteiro

2018–2019   **M.Sc.** in Computational Science and Engineering
Georgia Institute of Technology, Atlanta GA, USA

2010–2014   **B.Math.** in Mathematical Finance
University of Waterloo, Waterloo ON, Canada

Publications

A1. **Kong, W.**, & Monteiro, R.D.C. (2021). An Accelerated Inexact Dampened Augmented Lagrangian Method for Linearly-Constrained Nonconvex Composite Optimization Problems. *arXiv preprint arXiv:2110.11151*. (Accepted in *Computational Optimization and Applications*)

A2. **Kong, W.**, Melo, J.G., & Monteiro, R.D.C., (2023). Iteration Complexity of an Inner Accelerated Inexact Proximal Augmented Lagrangian Method Based on the Classical Lagrangian Function. *SIAM Journal on Optimization*, 33(1), 181-210.

A3. **Kong, W.**, Melo, J.G., & Monteiro, R.D.C. (2022). Iteration complexity of a proximal augmented Lagrangian method for solving nonconvex composite optimization problems with nonlinear convex constraints. *Mathematics of Operations Research*.

A4. **Kong, W.**, & Monteiro, R. D. (2022). Accelerated inexact composite gradient methods for nonconvex spectral optimization problems. *Computational Optimization and Applications*, 1-43.

A5. **Kong, W.**, & Monteiro, R. D.C. (2021). An accelerated inexact proximal point method for solving nonconvex-concave min-max problems. *SIAM Journal on Optimization*, *31(4)*, 2558–2585.

A6. **Kong, W.**, Krichene, W., Mayoraz, N., Rendle, S., & Zhang, L. (2020). Rankmax: An Adaptive Projection Alternative to the Softmax Function. *Proceedings of Advances in Neural Information Processing Systems 33 (NeurIPS 2020)*.

A7. **Kong, W.**, Melo, J. G., & Monteiro, R. D.C. (2020). An efficient adaptive accelerated inexact proximal point method for solving linearly constrained nonconvex composite problems. *Computational Optimization and Applications*, *76(2)*, 305–346.

A8. **Kong, W.**, Melo, J. G., & Monteiro, R. D.C. (2019). Complexity of a quadratic penalty accelerated inexact proximal point method for solving linearly constrained nonconvex composite programs. *SIAM Journal on Optimization*, *29(4)*, 2566–2593.

A9. **Kong, W.**, Liaw, C., Mehta, A., & Sivakumar, D. (2018). A new dog learns old tricks: RL finds classic optimization algorithms. *Proceedings of the International Conference on Learning Representations (ICLR 2019)*.

WORKING PAPERS & PREPRINTS

B1. **Kong, W.** (2022). Complexity-Optimal and Curvature-Free First-Order Methods for Finding Stationary Points of Composite Optimization Problems. *arXiv preprint arXiv:2205.13055*. (Submitted to *SIAM Journal on Optimization*)

B2. **Kong, W.**, & Monteiro, R.D.C. (2021). Global Complexity Bound of a Proximal ADMM for Linearly-Constrained Nonseperable Nonconvex Composite Programming. *arXiv preprint arXiv:2110.12502* (Submitted to *SIAM Journal on Optimization*)

B3. **Kong, W.**, Melo, J.G., & Monteiro, R.D.C. (2021). FISTA and Extensions – Review and New Insights. *arXiv preprint arXiv:2107.01267*.

B4. **Kong, W.** (2021). Accelerated Inexact First-Order Methods for Solving Nonconvex Composite Optimization Problems. *arXiv preprint arXiv:2104.09685*.

INVITED & CONTRIBUTED TALKS

C1. **Kong, W.**, & Monteiro, R.D.C. (2022, October 16-19) *Complexity Of A Dampened Proximal ADMM For Linearly-constrained Nonseparable Nonconvex Composite Optimization* [Invited Talk]. INFORMS Annual Meeting.

C2. **Kong, W.**, & Monteiro, R.D.C. (2022, July 25-28) *Complexity Of A Dampened Proximal ADMM For Linearly-constrained Nonseparable Nonconvex Composite Optimization* [Invited Talk]. ICCOPT.

C3. **Kong, W.**, & Monteiro, R.D.C. (2021, October 21–24) *Complexity Of A Dampened Proximal ADMM For Linearly-constrained Nonseparable Nonconvex Composite Optimization* [Invited Talk]. INFORMS Annual Meeting, Virtual.

C4. **Kong, W.**, Melo, J.G., & Monteiro, R.D.C. (2021, September 18–19) *Iteration complexity of a proximal augmented Lagrangian method for constrained nonconvex composite programming* [Invited Talk], SIAM-SEAS, Virtual.

C5. **Kong, W.**, & Monteiro, R.D.C. (2021, August 2–4) *A Smoothing Scheme for Nonconvex-Concave Min-Max Problems* [Contributed Talk], MOPTA, Virtual.

C6. **Kong, W.**, Melo, J.G., & Monteiro, R.D.C. (2021, July 20–23) *Iteration Complexity of a Proximal Augmented Lagrangian Method for Solving Nonconvex Composite Optimization Problems with Nonlinear Convex Constraints* [Contributed Talk], SIAM Conference on Optimization, Virtual.

C7. **Kong, W.**, & Monteiro, R. D.C. (2021, July 20–23) *An Accelerated Inexact Proximal Point Method for Solving Nonconvex-Concave Min-Max Problems* [Invited Talk], SIAM Conference on Optimization, Virtual.

C8. **Kong, W.** (2020, November 9) *An Accelerated Proximal Point Method for Large-Scale Nonconvex Optimization* [Invited Talk], Oak Ridge National Lab's Research Seminar, Virtual.

C9. **Kong, W.**, & Monteiro, R.D.C. (2020, November 7–13) *Accelerated Inexact Composite Gradient Methods For Solving Nonconvex Spectral Optimization Problems* [Invited Talk], INFORMS Annual Meeting, Virtual.

C10. **Kong, W.**, Krichene, W., Mayoraz, N., Rendle, S., & Zhang, L. (2020, December 6–12) *Rankmax: An Adaptive Projection Alternative to the Softmax Function* [Poster Presentation], Conference on Neural Information Processing Systems, Virtual.

C11. **Kong, W.**, Melo, J.G., & Monteiro, R.D.C. (2019, October 20–23) *Solving Nonconvex-Concave Min-Max Problems* [Invited Talk], INFORMS Annual Meeting, Virtual, Seattle WA, USA.

C12. **Kong, W.**, Liaw, C., Mehta, A., & Sivakumar, D. (2019, May 6–9) *A New Dog Learns Old Tricks: RL Finds Classic Optimization Algorithms* [Poster Presentation], International Conference on Learning Representations, New Orleans LA, USA.

C13. **Kong, W.**, & Monteiro, R.D.C. (2018, November 16) Nonconvex Optimization: Accelerating First-Order Methods [Invited Talk], ISyE DOS Seminar, Atlanta GA, USA.

C14. **Kong, W.**, & Monteiro, R.D.C. (2018, November 2) Nonconvex Optimization: Accelerating First-Order Methods [Invited Talk], ISyE Student Seminar, Atlanta GA, USA.

Honors & Awards

2020-2021	IDEaS-TRIAD Research Scholarship, *Georgia Institute of Technology / National Science Foundation (NSF)*
2018–2020	Alexander Graham Bell Postgraduate Scholarship, *Natural Sciences and Engineering Research Council of Canada (NSERC)*
2016–2017	Thomas Johnson Fellowship, *Georgia Institute of Technology*
2010	Waterloo President's Scholarship, *University of Waterloo*
2010–2014	Queen Elizabeth II Aiming for the Top Scholarship, *Government of Canada*

Research Experience

2022–Present   **Research Software Engineer**
Google LLC, New York NY, USA
  - » Research and analyze algorithms related to differential privacy
  - » Publish research papers in top machine learning conferences, such as ICML
  - » Develop production-level differential privacy libraries in `C++` and `Python`
  - » Investigate statistical models for improving existing web crawling and search algorithms

2021–2022   **Postdoctoral Research Associate**
Oak Ridge National Labs (ORNL), Oak Ridge TN, USA
  - » Investigated new sparse grid methods for use in high-dimensional multiscale problems.
  - » Developed production-level code in `C++` and `Python` for various computing projects in ORNL's other scientific directorates.
  - » Collaborated with other ORNL researchers on contributing white papers and conferences.

2019   **Research Intern @ Google AI**
Google LLC, Mountain View CA, USA
  - » Published a paper on sparse alternatives to the softmax function.
  - » Developed new optimization frameworks for use in large-scale recommender systems.
  - » Implemented these frameworks in `TensorFlow` to validate their effectiveness.

2016–2020   **Graduate Research Assistant**
Georgia Institute of Technology, Atlanta GA, USA
  - » Designed and analyzed methods for large-scale nonconvex optimization problems.
  - » Developed efficient `MATLAB` code for checking the practical performance of these methods.
  - » Drafted and submitted grant proposals for funding existing and future research projects.

Teaching Experience

2016–2020   **Head Graduate Teaching Assistant**
Georgia Institute of Technology, Atlanta GA, USA
  - » Deeply involved with courses on graduate topics in optimization theory ($\times 3$), applied operations research ($\times 3$), and probability theory ($\times 1$).
  - » Designed and graded programming/written assignments, grading rubrics, and course projects.
  - » Held lectures, exam reviews, weekly office hours, and one-on-one tutorial sessions.

2014   **Undergraduate Teaching Assistant**
University of Waterloo, Waterloo ON, Canada
  - » Graded assignments in an applied real analysis course of 85+ students.

PROFESSIONAL EXPERIENCE

2018   **Software Engineering Intern @ Google AI**
Google LLC, Mountain View CA, USA
- » Published a paper on applying reinforcement learning to online optimization problems.
- » Developed production code in `C++` and `Python` for use in Google's internal database.

2013–2017   **Senior Risk Modeling Analyst**
TD Bank Financial Group, Toronto ON, Canada
- » Pioneered a new logistic regression variable selection method based on mutual information and variable effect maximization.
- » Developed production code in `SAS` for national and international regulatory tests.

SERVICES TO THE PROFESSION

Referee for the following journals and conferences: Computational Optimization and Applications (COAP), Optimization Methods and Software (OMS), SIAM Journal on Scientific Computing (SISC), Annual Conference on Neural Information Processing Systems (NeurIPS), International Conference on Learning Representations (ICLR), SIAM Journal on Optimization (SIOPT), Mathematics of Computation - AMS (Math. Comp.), International Conference on Machine Learning (ICML), Journal of Machine Learning Research (JMLR), Numerical Algorithms (Num. Algs.)

Session organizer for the following conferences: SIAM Southeastern Atlantic Section Conference

Developer for the following software packages: `NC-OPT`, `TASMANIAN`, `TensorFlow Privacy`

OTHER SKILLS

Programming Languages: Working knowledge of `C++`, `MATLAB`, and `Python`. Some knowledge of `Julia`, `Haskell`, and `SQL`.

Software Packages: Experienced with `Gurobi`, `TensorFlow`, `SAS`, and `Condor`.

Administrative Experience: Held executive positions (President, Vice-President of Finance) at the University of Waterloo's Mathematical Finance Student Association (MFSA).