

Sangwoon Yun
CURRICULUM VITAE

Department of Mathematics Education
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RESEARCH INTERESTS

Convex and nonsmooth optimization, image processing, variational analysis.

EDUCATION

- University of Washington, Seattle, Washington,
Ph.D. in Mathematics, August 2007.
- Yonsei University, Seoul, Korea,
Master of Science in Mathematics, August 1999.
- Yonsei University, Seoul, Korea,
Bachelor of Science in Mathematics, February 1995.

EMPLOYMENT HISTORY

- Professor, Department of Mathematics Education, Sungkyunkwan University, March 2022 - Present.
- Associate Professor, Department of Mathematics Education, Sungkyunkwan University, March 2016 - February 2022.
- Assistant Professor, Department of Mathematics Education, Sungkyunkwan University, March 2012 - February 2016.
- Research Fellow, School of Computational Sciences, Korea Institute for Advanced Study, October 2009 - February 2012.
- Research Fellow, Computational Engineering Program, Singapore-MIT Alliance (National University of Singapore), August 2008 - September 2009.
- Research Fellow, Department of Mathematics, National University of Singapore, August 2007 - July 2008.

HONORS, AWARDS, FELLOWSHIPS

- TJ Park Science Fellowship of POSCO TJ Park Foundation, October 2013.
- Teaching Assistantship, University of Washington, October 2001 - August 2007.

- Research Assistantship (NSF grant), Autumn 2005, Spring 2006, Spring 2007, Summer 2007.
- Brain-Korea 21 Graduate Scholarship, Yonsei University, March 2000 - February 2001.
- Teaching Assistantship, Yonsei University, September 1997-June 1999, 2000.
- Excellent Student Award, Department of Mathematics, Yonsei University, September 1994.
- Yangyoung Foundation Fellowship, March 1992 - February 1995.
- Yonsei Fellowship, Autumn 1991.

PUBLICATIONS

42. Kum, S., Duong, M. H., Lim, Y., and Yun, S., Regularization of Wasserstein barycenters for π -exponential distributions, submitted to Journal of Computational and Applied Mathematics.
41. Jeong, J., Jung, Y. M., Kim, S. H., and Yun, S., Trend Filtering by Adaptive Piecewise Polynomials, submitted to Communications in Nonlinear Science and Numerical Simulation.
40. Jeong, J., Jung, Y. M., and Yun, S., Elastic Trend Filtering, submitted to International Journal of Nonlinear Sciences and Numerical Simulation.
39. Kum, S., Lim, Y., and Yun, S., Divergences on symmetric cones and medians, to appear in Taiwanese Journal of Mathematics.
38. Jung, Y. M., Shin, B., and Yun, S., Global attractor and limit points for nonsmooth ADMM, to appear in Applied Mathematics Letters.
37. Ahn, C. Y. and Yun, S., Nonconvex constrained minimisation for 3D left ventricular shape recovery using 2D echocardiography data, E. Asian J. Appl. Math. 12 (2022), 111 – 124.
36. Yun, S., Sun, X., and Choi, J.-I., Stochastic gradient methods for L2-Wasserstein least squares problem of Gaussian measures, J. Korean Soc. Ind. Appl. Math. 25 (2021), 162 – 172.
35. Jung, Y. M., Whang, J. J., and Yun, S., Sparse probabilistic K-means, Appl. Math. Comput. 382 (2020), 125328.
34. Krishnan, M., Yun, S., and Jung, Y. M., Dynamic clustering approach with ACO-based mobile sink for data collection in WSNs, Wireless Networks 25 (2019), 4859 – 4871.
33. Lee, J. H., Jung, Y. M., and Yun, S., A subspace SQP method for equality constrained optimization, Comput. Optim. Appl. 74 (2019), 177 – 194.
32. Krishnan, M., Yun, S., and Jung, Y. M., Enhanced clustering and ACO-based multiple mobile sinks for efficiency improvement of Wireless Sensor Networks, Computer Networks 160 (2019), 33 – 40.
31. Kum, S. and Yun, S., Gradient projection methods for the n-coupling problem, J. Korean Math. Soc. 56 (2019), 1001 – 1016.
30. Ahn, C. Y. and Yun, S., A mathematical model for the 3D location estimation of 2D echocardiography data, Appl. Math. Lett. 88 (2019), 186 – 192.

29. Krishnan, M., Yun, S., and Jung, Y. M., Improved Clustering with Firefly-Optimization-Based Mobile Data Collector for Wireless Sensor Networks, *Int. J. Electron. Commun. (AEÜ)* 97 (2018), 242 – 251.
28. Jung, Y. M., Jeong, T., and Yun, S., An Lq-seminorm variational model for impulse noise reduction, *E. Asian J. Appl. Math.* 8 (2018), 586 – 597.
27. Jung, Y. M., Lee, J. H., and Yun, S., A stochastic variance reduction method for PCA by an exact penalty approach, *Bull. Korean Math. Soc.* 55 (2018), 1303 – 1315.
26. Jeong, T., Jung, Y. M., and Yun, S., Iterative reweighted algorithm for non-convex Poisson image restoration model, *J. Korean Math. Soc.* 55 (2018), 719 – 734.
25. Ahn, C. Y. and Yun, S., A study on the 3D position estimation of ventricular borders extracted from 2D echocardiography data, *Comput. Math. Appl.* 75 (2018), 1143 – 1158.
24. Jung, Y. M., Jeong, T., and Yun, S., Non-convex TV denoising corrupted by impulse noise, *Inverse Probl. Imag.* 11 (2017), 689 – 702.
23. Kum, S. and Yun, S., Incremental gradient method for Karcher mean on symmetric cones, *J. Optim. Theory Appl.* 172 (2017), 141 – 155.
22. Lee, C.-O., Lee, J. H., Woo, H., and Yun, S., Block decomposition methods for total variation by primal-dual stitching, *J. Sci. Comput.* 68 (2016), 273 – 302.
21. Yun, S., A memory efficient incremental gradient method for regularized minimization, *Bull. Korean Math. Soc.* 53 (2016), 589 – 600.
20. Jung, Y. M. and Yun, S., A coordinate descent homotopy method for linearly constrained nonsmooth convex minimization, *Optim. Methods Softw.* 31 (2016), 342 – 358.
19. Da, K., Yun, S. and Park, H., SymNMF: Nonnegative low-rank approximation of a similarity matrix for graph clustering, *J. Global Optim.* 62 (2015), 545 – 574.
18. Jung, Y. M. and Yun, S., Impedance imaging with first order TV regularization, *IEEE Trans. Med. Imaging.* 34 (2015), 193 – 202.
17. Yun, S., On the iteration complexity of cyclic coordinate gradient descent methods, *SIAM J. Optim.* 24 (2014), 1567 – 1580.
16. Tseng, P. and Yun, S., Incrementally updated gradient methods for constrained and regularized optimization, *J. Optim. Theory Appl.* 160 (2014), 832 – 853.
15. Kang, M., Yun, S., Woo, H., and Kang, M., Accelerated Bregman method for linearly constrained ℓ_1 - ℓ_2 minimization, *J. Sci. Comput.* 56 (2013), 515 – 534.
14. Jeong, T., Woo, H., and Yun, S., Frame-based Poisson image restoration using proximal linearized alternating direction method, *Inverse Problems* 29 (2013), 075007.
13. Kang, M., Yun, S., and Woo, H., Two-level convex relaxed variational model for multiplicative denoising, *SIAM J. Imaging Sci.* 6 (2013), 875 – 903.

12. Oh, S., Woo, H., Yun, S., and Kang, M., Non-convex hybrid total variation for image denoising, *J. Visual Communication and Image Representation* 24 (2013), 332 – 344.
11. Woo, H. and Yun, S., Proximal linearized alternating direction method for multiplicative denoising, *SIAM J. Sci. Comput.* 35 (2013), B336 – B358.
10. Yun, S. and Woo, H., A new multiplicative denoising variational model based on m-th root transformation, *IEEE Trans. on Image Processing* 21 (2012), 2523 – 2533.
9. Woo, H. and Yun, S., Alternating minimization algorithm for speckle reduction with shifting technique, *IEEE Trans. on Image Processing* 21 (2012), 1701 – 1714.
8. Yun, S., Tseng, P., and Toh, K.-C., A block coordinate gradient descent method for regularized convex separable optimization and covariance selection, *Math. Prog.* 129 (2011), 331 – 355.
7. Shen, Z., Toh, K.-C., and Yun, S., An accelerated proximal gradient algorithm for frame based image restorations via the balanced approach, *SIAM J. Imaging Sci.* 4 (2011), 573 – 596.
6. Yun, S. and Woo, H., Linearized proximal alternating minimization algorithm for motion deblurring by nonlocal regularization, *Pattern Recognition* 44 (2011), 1312 – 1326.
5. Yun, S. and Toh, K.-C., A coordinate gradient descent method for ℓ_1 -regularized convex minimization, *Comput. Optim. Appl.* 48 (2011), 273 – 307.
4. Tseng, P. and Yun, S., A coordinate gradient descent method for linearly constrained smooth optimization and support vector machines training, *Comput. Optim. Appl.* 47 (2010), 179 – 206.
3. Toh, K.-C. and Yun, S., An accelerated proximal gradient algorithm for nuclear norm regularized linear least squares problems, *Pacific J. Optim.* 6 (2010), 615 – 640.
2. Tseng, P. and Yun, S., Block-coordinate gradient descent method for linearly constrained nonsmooth separable optimization, *J. Optim. Theory Appl.* 140 (2009), 513 – 535.
1. Tseng, P. and Yun, S., A coordinate gradient descent method for nonsmooth separable minimization, *Math. Prog.* 117 (2009), 387 – 423.

TALKS GIVEN

- “Convex Optimization and Deep Learning”, invited talk, 2021 Symposium for AI and University-Level Mathematics, September 2021.
- “Prediction of Energy Demand in Smart Grid using Hybrid Approach”, Fourth International Conference on Computing Methodologies and Communication, March 2020.
- “Mathematical Programming”, invited talk, Yonsei University, October 2019.
- “Demand and supply management for smart grid with supervised learning-based deep neural network”, International Congress on Industrial and Applied Mathematics, July 2019.
- “Probabilistic K-means with Sparsity”, invited talk, ICTMA 2019, May 2019.

- “A coordinate descent homotopy method for linearly constrained nonsmooth convex minimization”, 2018 China-Korea International Conference on Matrix Theory with Applications, December 2018.
- “Short-Term Energy Load Forecasting Using Neural Networks in Smart Grid”, KSIAM 2018 Annual Meeting, November 2018.
- “An Improved Clustering with Particle Swarm Optimization-based Mobile Sink for Wireless Sensor Networks”, ICOEI 2018, May 2018.
- “An Efficient Clustering with Sensing Radius Adjustment in Wireless Sensor Networks”, KSIAM 2017 Annual Meeting, November 2017.
- “Coordinate gradient descent methods and incremental gradient methods for regularized optimization”, invited talk, 2016 International Conference on Matrix Theory with Applications, December 2016.
- “Coordinate Descent and Incremental Method for Regularized Minimization”, International Conference for KMS 70th Anniversary(2016 KMS Annual Meeting), October 2016.
- “A coordinate descent homotopy method for bi-level problem and linearly constrained minimization”, invited talk, The Fifth International Conference on Continuous Optimization, August 2016.
- “A memory efficient incremental gradient method for nonsmooth optimization”, invited talk, KSIAM 2016 Spring Conference, May 2016.
- “An incremental gradient method with memory efficiency”, invited talk, KMS 2016 Spring Meeting, April 2016.
- “Iterative Reweighted Algorithm for Non-convex Poissonian Image Denoising Model”, invited talk, UKC2015, July 2015.
- “On the Convergence Rate Analysis of Cyclic Coordinate Gradient Descent Methods”, invited talk, KSIAM 2014 Annual Meeting, November 2014.
- “On the Sublinear Convergence Rate of Coordinate Descent Methods”, invited talk, KSIAM 2014 Spring Conference, May 2014.
- “Proximal Linearized Alternating Direction Method for Imaging Restoration”, invited talk, SIAM Conference on Imaging Science, May 2014.
- “Incrementally Updated Gradient Methods for Nonsmooth Minimization”, invited talk, The Fourth International Conference on Continuous Optimization, July 2013.
- “Incremental Gradient Methods for Nonsmooth Optimization”, invited talk, Hot Topics Workshop on Jordan Theory, Analysis and Optimization, May 2013.
- “Coordinate Gradient Descent Method and Incremental Gradient Method for Nonsmooth Optimization”, invited talk, Georgia Institute of Technology, January 2013.
- “An Incremental Gradient Method for Nonsmooth Optimization”, invited talk, KSIAM 2012 Annual Meeting, November 2012.

- “Methods for Nonsmooth Minimization with Sparsity”, invited talk, KAIST, May 2012.
- “Optimization Methods for Structured Nonsmooth Minimization”, invited talk, Yonsei University, April 2012.
- “Algorithms for Convex Optimization”, invited talk, CSE Seminar in Yonsei University, December 2011.
- “Splitting Methods for Image Restoration”, invited talk, Medical Imaging Seminar in Yonsei University, November 2011.
- “Linearized Alternating Minimization Method for a New Multiplicative Denoising Model”, invited talk, Forum ”Math-for Industry” 2011, October 2011.
- “Accelerated Proximal Gradient Algorithm for Frame-Based Image Restorations”, invited talk, KSIAM 2010 Annual Meeting, December 2010.
- “A Block Coordinate Gradient Descent Method for Log-determinant Semidefinite Programming”, invited talk, 2010 Global KMS International Conference, October 2010.
- “A Block Coordinate Gradient Descent Method for Regularized Convex Separable Optimization and Covariance Selection”, invited talk, The Ewha Womans University, April 2010.
- “Optimization Methods for ℓ_1 -minimization”, invited talk, 2009 NIMS Thematic Winter School, December 2009.
- “Convex Optimization and ℓ_1 -minimization”, invited talk, 2009 NIMS Thematic Winter School, December 2009.
- “An Accelerated Proximal Gradient Algorithm for Nuclear Norm Regularized Least Squares Problems”, invited talk, 2009 Workshop on Nonlinear analysis and Optimization, November 2009.
- “An Accelerated Proximal Gradient Algorithm for Nuclear Norm Regularized Least Squares Problems Arising in Matrix Completion”, invited talk, The Chungbuk National University and the Kyungpook National University, June 2009.
- “A Coordinate Gradient Descent Method for Sparse Optimization with ℓ_1 Regularization”, invited talk, The Kyungpook National University, June 2009.
- “A Coordinate Gradient Descent Method for ℓ_1 -regularized Convex Minimization”, invited talk, The Singapore-MIT Alliance 10th Anniversary Symposium, January 2009.
- “A Coordinate Gradient Descent Method for Linearly Constrained Smooth Optimization”, invited talk, INFORMS Annual Meeting, November 2007.
- “A Coordinate Gradient Descent Method for Linearly Constrained Nonsmooth Optimization and Support Vector Machines Training”, invited talk, The Second Mathematical Programming Society International Conference on Continuous Optimization, August 2007.
- “A Coordinate Gradient Descent Method for Nonsmooth Separable Minimization”, invited talk, The 19th International Symposium on Mathematical Programming, July 2006.

- “Inexact Coordinate Descent Method for Nonsmooth Separable Minimization”, invited talk, The eighth SIAM Conference on Optimization, May 2005.

SERVICE AND MEMBERSHIPS

- Academic Subcommittee for Optimization and Mathematical Programming of the Korean Society for Industrial and Applied Mathematics since 2013.
- Member of the Korean Society for Industrial and Applied Mathematics since 2012.
- Member of the Korean Mathematical Society since 2010.
- Member of the Mathematical Programming Society since 2008.
- Member of the Society for Industrial and Applied Mathematics since 2005.
- Member of the American Mathematical Society since 2001.
- Assistant Instructor for Yonsei Science Institute for talented youths, September 2000-June 2001. After-school program for sixth graders and middle school students (seventh and eighth graders). Preparing questions and lecturing.
- Assistant Instructor for Yonsei Math club for talented undergraduates, March 1999-December 1999. Helping members prepare the Math-Olympiad.
- Graduate Student Association, Department of Mathematics Representative, Yonsei University, March 1999-December 1999.