

**Sangwoon Yun**  
CURRICULUM VITAE

School of Computational Sciences  
Korea Institute for Advanced Study  
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**RESEARCH INTERESTS**

Convex and nonsmooth optimization, variational analysis, image processing.

**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**

- Research Fellow, School of Computational Sciences, Korea Institute for Advanced Study, October 2009 - Present.
- 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**

- 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

- Woo, Hyenkyun and Yun, Sangwoon, Proximal linearized alternating direction method for multiplicative denoising, June 2011, submitted to SIAM J. Sci. Comput.
- Yun, Sangwoon and Woo, Hyenkyun, A new multiplicative denoising variational model based on  $m$ -th root transformation, April 2011, submitted to IEEE Trans. on Image Processing.
- Woo, Hyenkyun and Yun, Sangwoon, Alternating minimization algorithm for speckle reduction with shifting technique, 2011, accepted to IEEE Trans. on Image Processing.
- Yun, Sangwoon, Tseng, Paul, and Toh, Kim-Chuan, A block coordinate gradient descent method for regularized convex separable optimization and covariance selection, Math. Prog. 129 (2011), 331 – 355.
- Shen, Zuowei, Toh, Kim-Chuan, and Yun, Sangwoon, An accelerated proximal gradient algorithm for frame based image restorations via the balanced approach, SIAM J. Imaging Sci. 4 (2011), 573 – 596.
- Yun, Sangwoon and Woo, Hyenkyun, Linearized proximal alternating minimization algorithm for motion deblurring by nonlocal regularization, Pattern Recognition 44 (2011), 1312 – 1326.
- Yun, Sangwoon and Toh, Kim-Chuan, A coordinate gradient descent method for  $\ell_1$ -regularized convex minimization, Comput. Optim. Appl. 48 (2011), 273 – 307.
- Tseng, Paul and Yun, Sangwoon, A coordinate gradient descent method for linearly constrained smooth optimization and support vector machines training, Comput. Optim. Appl. 47 (2010), 179 – 206.
- Toh, Kim-Chuan and Yun, Sangwoon, An accelerated proximal gradient algorithm for nuclear norm regularized linear least squares problems, Pacific J. Optim. 6 (2010), 615 – 640.
- Tseng, Paul and Yun, Sangwoon, Block-coordinate gradient descent method for linearly constrained nonsmooth separable optimization, J. Optim. Theory Appl. 140 (2009), 513 – 535.
- Tseng, Paul and Yun, Sangwoon, A coordinate gradient descent method for nonsmooth separable minimization, Math. Prog. 117 (2009), 387 – 423.

## TEACHING EXPERIENCE

- Math Tutor, National University of Singapore, September 2007 - May 2008.  
Courses: Linear Algebra I, Multivariable Calculus (responsibilities include leading recitation, giving a detailed explanation for given problem sets, and answering students' questions).
- Teaching Assistant, University of Washington, October 2001 - August 2007 (14 quarters).  
Courses: Calculus with Analytic Geometry II and III (responsibilities include leading recitation, holding office hours, and grading quizzes and exams), Introduction to Modern Algebra, Linear Optimization, Nonlinear Optimization, Combinatorial Theory, Topics in Applied Analysis (responsibilities include holding office hours, grading homeworks).

- Instructor, Calculus with Analytic Geometry II, University of Washington, Summer 2004, Summer 2005, Summer 2006.  
Responsibilities include choice of course structure, syllabus design, lecturing, problem set creation, coordinating with TA and the homework grader, web site creation and holding office hours.
- Math Tutor, Math Study Center at University of Washington, Autumn 2002 - Spring 2005 (4 quarters).  
Responsibilities include helping students to solve problems.
- Instructor, Advanced Calculus I, Kwangwoon University, March 2001 - June 2001.  
Responsibilities include choice of course structure, syllabus design, lecturing, problem set creation, and holding office hours.
- Teaching Assistant, Yonsei University, September 1997 - June 1999, March 2000 - December 2000.  
Courses: Calculus and Analytic Geometry II, Advanced Calculus I and II, Modern Algebra I, II, and III (responsibilities include leading recitation, holding office hours, and grading exams).

## **RESEARCH EXPERIENCE**

- Postdoctoral Research, Korea Institute for Advanced Study (KIAS), Convex and Nonsmooth Optimization, Image Processing, October 2009 - Present.
- Postdoctoral Research with Kim-Chuan Toh, Singapore-MIT Alliance (NUS), Convex and Nonsmooth Optimization, August 2008 - September 2009.
- Postdoctoral Research with Kim-Chuan Toh, Department of Mathematics, National University of Singapore, Convex and Nonsmooth Optimization, August 2007 - July 2008.
- Ph.D. Research with Paul Tseng, Department of Mathematics, University of Washington, Nonsmooth Optimization, June 2004 - August 2007.
- Research Assistant (NSF grant), Autumn 2005, Spring 2006, Spring 2007, Summer 2007.
- Reading with R. Tyrrell Rockafellar, Department of Mathematics, University of Washington, Convex Analysis, Variational Analysis, January 2005 - June 2005.
- Reading with Paul Tseng, Department of Mathematics, University of Washington, Primal-dual Interior Point Methods, September 2003 - May 2004.
- Master Research with June Bok Lee, Department of Mathematics, Yonsei University, Finite Fields, Cryptography, March 1998 - August 1999.

## **CONFERENCES ATTENDED**

- Forum "Math-for-Industry, Manoa, USA, October 2011.
- KSIAM 2010 Annual Meeting, Busan, Korea, December 2010.
- 2010 Global KMS International Conference, Pohang, Korea, October 2010.

- 2009 Workshop on Nonlinear Analysis and Optimization, Taipei, Taiwan, November 2009.
- The Singapore-MIT Alliance 10th Anniversary Symposium, Singapore, January 2009.
- INFORMS Annual Meeting, Seattle, USA, November 2007.
- The Second Mathematical Programming Society International Conference on Continuous Optimization, Hamilton, Canada, August 2007.
- The 19th International Symposium on Mathematical Programming, Rio de Janeiro, Brazil, July and August 2006.
- West Coast Optimization Meeting, Seattle, USA, April 2004, April 2005, May 2006, April 2007.
- CMS Winter 2005 Meeting, Victoria, Canada, December 2005.
- The eighth SIAM Conference on Optimization. Stockholm, Sweden, May 2005.

## TALKS GIVEN

- “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  $\ell_1$ -minimization”, invited talk, 2009 NIMS Thematic Winter School, December 2009.
- “Convex Optimization and  $\ell_1$ -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  $\ell_1$  Regularization”, invited talk, The Kyungpook National University, June 2009.

- “A Coordinate Gradient Descent Method for  $\ell_1$ -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.

(All slides for above talks available at <http://newton.kias.re.kr/yswcs/index.html>)

## SERVICE AND MEMBERSHIPS

- Member of the Korean Mathematical Society since 2010.
- Member of the Mathematical Programming Society since 2008.
- Member of the American Mathematical Society since 2001.
- Member of the Institute for Operations Research and the Management Sciences, July 2007-December 2008.
- Member of the Society for Industrial and Applied Mathematics, January 2005-December 2007.
- 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.

## PERSONAL

- Nationality: Korea.
- Enjoying soccer, badminton and hiking in the mountains.

## REFERENCES

- Paul Tseng, C-344 Padelford Hall, Department of Mathematics, University of Washington, Box 354350, Seattle, WA 98195-4350, USA (PhD thesis advisor).

- June Bok Lee, Science Building 205, Department of Mathematics, Yonsei University, Seoul 120-749, Korea, leejb@yonsei.ac.kr (Master thesis advisor).
- Kim-Chuan Toh, S14-04-06, Department of Mathematics, National University of Singapore, 2 Science Drive 2, Singapore 117543, Singapore, mattohkc@math.nus.edu.sg.
- Zhaosong Lu, 14-220, Department of Mathematics, Simon Fraser University, Surrey, British Columbia V3T 0A3, CANADA, zhaosong@sfu.ca.
- Mehran Mesbahi, 315C Guggenheim, Department of Aeronautics & Astronautics, University of Washington, Box 352400, Seattle, WA 98195-2400, USA, mesbahi@aa.washington.edu.
- James V. Burke, C-443 Padelford Hall, Department of Mathematics, University of Washington, Box 354350, Seattle, WA 98195-4350, USA, burke@math.washington.edu.
- Patrick T. Perkins, B-014 Communications, Department of Mathematics, University of Washington, Box 354350, Seattle, WA 98195-4350, USA, perkins@math.washington.edu (teaching).