Jan Harold Mercado Alcantara

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Research Interests

Nonconvex Optimization, Feasibility Problems, Splitting Algorithms, Variational Inequalities

Education

Doctor of Philosophy in Mathematics 02/2018 - 06/2020
National Taiwan Normal University
Dissertation: Dynamical Systems Approach to Complementarity Problems
Advisor: Prof. Jein-Shan Chen

Master of Science in Mathematics 05/2013 - 04/2015
De La Salle University

Bachelor of Secondary Education major in Mathematics 05/2009 - 09/2012
De La Salle University

Academic Experience

Postdoctoral Researcher 04/2023 - present
Center for Advanced Intelligence Project (AIP), RIKEN, Japan
Member, Mathematical Informatics Laboratory, The University of Tokyo
Supervisor: Prof. Akiko Takeda

Postdoctoral Scholar 08/2021 - 03/2023
Institute of Statistical Science, Academia Sinica, Taiwan
Supervisor: Prof. Ching-pei Lee

Postdoctoral Fellow 08/2020 - 07/2021
Department of Mathematics, National Taiwan Normal University, Taiwan
Supervisor: Prof. Jein-Shan Chen

Teaching Experience

Assistant Professor 01/2017 - 12/2017
Mathematics and Statistics Department, De La Salle University

Teaching Associate 01/2016 - 12/2016
Mathematics and Statistics Department, De La Salle University

Lecturer 08/2015 - 12/2015
Mathematics and Statistics Department, De La Salle University

Lecturer 06/2015 - 10/2015
Mathematics Department, Adamson University 11/2012 - 03/2013

- **Courses taught**

Graduate courses: Linear Algebra and Calculus
Undergraduate courses: Abstract Algebra, Differential Equations, Differential Calculus, Integral Calculus, Multivariable Calculus, Differential Equations, Algebra and Trigonometry

Visiting Experience

Department of Applied Mathematics, The Hong Kong Polytechnic University 02/2023
Host: Prof. Defeng Sun

Department of Mathematics, National University of Singapore 08/2022 - 10/2022
Host: Prof. Kim-Chuan Toh

Publications

Articles

1. **Jan Harold Alcantara**, Ching-pei Lee, "Global convergence and acceleration of projection methods for feasibility problems involving union convex sets", *Journal of Optimization Theory and Applications*, vol. 204, Article 19 (2025).

2. Chieu Thanh Nguyen, **Jan Harold Alcantara**, Zijun Hao, Jein-Shan Chen, "Smoothing penalty approach for solving second-order cone complementarity problems", *Journal of Global Optimization* (2024).

3. **Jan Harold Alcantara**, Chieu Thanh Nguyen, Takayuki Okuno, Akiko Takeda, Jein-Shan Chen, "Unified smoothing approach for best hyperparameter selection problem using a bilevel optimization strategy", *Mathematical Programming* (2024).

4. Jingyong Tang, Jinchuan Zhou, **Jan Harold Alcantara**, Jein-Shan Chen, "A family of smooth NCP functions and an inexact Levenberg-Marquardt method for nonlinear complementarity problems", *Journal of Nonlinear and Convex Anaysis*, vol. 24, no. 11, pp. 2361–2385 (2023).

5. **Jan Harold Alcantara**, Jein-Shan Chen, Matthew K. Tam, "Method of alternating projections for the general absolute value equation", *Journal of Fixed Point Theory and Applications*, vol. 25, no. 1, Article 39 (2023).

6. **Jan Harold Alcantara**, Ching-pei Lee, "Accelerated projected gradient algorithms for sparsity constrained optimization problems", *Advances in Neural Information Processing Systems (NeurIPS)* vol. 35, pp. 26723-–26735 (2022).

7. **Jan Harold Alcantara**, Jein-Shan Chen, "A new class of neural networks for NCPs using smooth perturbations of the natural residual function", *Journal of Computational and Applied Mathematics*, vol. 407, 114092 (2022).

8. Juhe Sun, Weichen Fu, **Jan Harold Alcantara**, Jein-Shan Chen, "A neural network based on the metric projector for solving SOCCVI problem", *IEEE Transactions on Neural Networks and Learning Systems*, vol. 32, no. 7, pp. 2886–2900 (2021).

9. Caiying Wu, Jing Wang, **Jan Harold Alcantara**, Jein-Shan Chen, "Smoothing strategy along with conjugate gradient algorithm for signal reconstruction", *Journal of Scientific Computing*, vol. 87, no. 1, Article 21 (2021).

10. **Jan Harold Alcantara**, Jein-Shan Chen, "A novel generalization of the natural residual function and a neural network approach for the NCP", *Neurocomputing*, vol. 413, pp. 368–382 (2020).

11. **Jan Harold Alcantara**, Chen-Han Lee, Chieu Thanh Nguyen, Yu-Lin Chang, Jein-Shan Chen, "On construction of new NCP functions", *Operations Research Letters*, vol. 48, pp. 115–121 (2020).

12. **Jan Harold Alcantara**, Jein-Shan Chen, "Neural networks based on three classes of NCP-functions for solving nonlinear complementarity problems", *Neurocomputing*, vol. 359, pp. 102–113 (2019).

13. **Jan Harold Alcantara**, Angelyn Lao, Leonor Ruivivar, "Stability analysis of the ODE model representation of amyloidogenic processing in Alzheimer's disease in the presence of SORLA", *Molecular BioSystems*, vol. 12, pp. 1468–1477 (2016).

Preprints

14. **Jan Harold Alcantara**, Akiko Takeda, "Douglas-Rachford algorithm for nonmonotone multioperator inclusion problems", arXiv:2501.02752 (2025).

15. **Jan Harold Alcantara**, Ching-pei Lee, Akiko Takeda, "A four-operator splitting algorithm for nonconvex and nonsmooth optimization", arXiv:2406.16025 (2024).

16. **Jan Harold Alcantara**, Akiko Takeda, "Theoretical smoothing frameworks for general nonsmooth bilevel problems", arXiv:2401.17852 (2024).

Conference Talks

- "Theoretical smoothing frameworks for general nonsmooth bilevel problems", Contributed talk at the 25th International Symposium on Mathematical Programming (ISMP 2024), Montréal, Canada, July 2024.

- "Global convergence and acceleration of fixed point iterations of union upper semicontinuous operators with applications to feasibility problems and optimization ", Contributed talk at the 2023 Taiwan Society of Industrial and Applied Mathematics (TWSIAM) Annual Conference, Taipei, Taiwan, May 2023.

- "Accelerated projected gradient algorithms for sparsity constrained optimization problems", Poster presentation at NeurIPS 2022, New Orleans, USA, December 2022.

- "Method of alternating projections for solving absolute value equations", Contributed talk at the International Conference on Continuous Optimization, Pennsylvania, USA, July 2022.

- "Proximal algorithms for a class of nonconvex nonsmooth minimization problems involving piecewise smooth and min-weakly-convex functions", Invited Speaker for the Special Session of 2021 Taiwan Mathematical Society Annual Meeting, Taipei, Taiwan, January 2022.

- "Neural networks based on three classes of NCP-functions for solving nonlinear complementarity problems", Oral presentation delivered at Taiwan Mathematical Society Annual Meeting, Taipei, Taiwan, December 2018.

- "The dynamics of a breast cancer model with Raphanus sativus extract", Oral presentation delivered at the 2017 Mathematical Society of the Philippines Annual Convention, Legazpi City, Philippines, May 2017.

- "The dynamics of SORLA's influence on amyloidogenic processing", Oral presentation delivered at the 2016 Mathematical Society of the Philippines Annual Convention, Cebu City, Philippines, May 2016.

- "Stability Analysis of the ODE Model Representation of Amyloidogenic Processing in Alzheimer's Disease in the presence of SORLA", Oral presentation delivered at the 3rd Asian Regional Conference on Systems Biology (ARCSB2015-TriSys), Selangor, Malaysia, September 2015.

Invited Talks

- "Smoothing approach for hyperparameter learning using bilevel programming", 2023 National Center for Theoretical Sciences Optimization Workshop, National Taiwan Normal University, Taipei, Taiwan, May 2023.
- "Hyperparameter learning and sparse optimization: Theory and algorithms", Seminar (Online), RIKEN Center for Advanced Intelligence Project, Tokyo, Japan, October 2022.
- "Smooth nonconvex regularizers for sparse recovery problems and an efficient conjugate gradient algorithm", 2020 National Center for Theoretical Sciences Optimization Day for Young Researchers, National Taiwan Normal University, Taipei, Taiwan, December 2020.
- "Smoothed neural networks for nonlinear complementarity problems", Workshop on Advances in Continuous Optimization, University of Tokyo, Tokyo, Japan, September 2019.

Invited Lectures

- "Projection methods for feasibility problems", DLSU Mathematics and Statistics Lecture Series, De La Salle University, Manila, Philippines, August 2021.
- "Qualitative Analysis of Solutions and Introduction to Bifurcation", DLSU Mathematics Lecture Series, Manila, Philippines, 2017.
- "On Stability and Bifurcation Analysis", First Lecture Series for AY2016-2017, Mathematical Society of the Philippines – National Capital Region held at Mapua Institute of Technology 2016.
- "Mathematical Modelling of Dynamical Systems: Stability Analysis of ODE Models", DLSU Mathematics Lecture Series, Manila, Philippines, 2016.

Grants and Awards

- Participant, Global Young Scientists Summit (GYSS), 2023.
- Travel Grant for Young Scholars Attending International Conferences Abroad, Academia Sinica, 2022.
- Department of Science and Technology – Accelerated Science and Technology Human Resource Development Program (DOST-ASTHRDP) Scholarship, Department of Science and Technology – Science Education Institute, 2013-2015.
- St. La Salle Scholarship, De La Salle University, 2009-2012.

Professional Service

- Organizer
  - Bilevel Optimization Session of Continuous Optimization Cluster (Variational Analysis, Variational Inequalities and Complementarity), 25th International Symposium on Mathematical Programming (ISMP 2024)

- Reviewer

  - Computational Optimization and Applied Mathematics
  - Journal of Applied Mathematics and Computing
  - Journal of Computational and Applied Mathematics
  - Journal of Global Optimization
  - Journal of Machine Learning Research
  - Journal of Scientific Computing
  - Neural Computing and Applications
  - Optimization
  - Pacific Journal of Optimization
  - Taiwanese Journal of Mathematics

References

Jein-Shan Chen, Ph.D.
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Ching-pei Lee, Ph.D.
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