Sen Na

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Contact Information

University of California, Berkeley
Department of Statistics and
International Computer Science Institute
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Research Interests

High-dimensional estimation and inference
Probabilistic graphical models
Semiparametric models
Large-scale stochastic optimization
Uncertainty quantification
Optimal control
Scientific applications in biology, neuroscience, and engineering

Academic Appointment

University of California, Berkeley, Berkeley, California USA — September 2021 - present

Department of Statistics and International Computer Science Institute
Postdoctoral Scholar
Advisor: Prof. Michael W. Mahoney

Education

University of Chicago, Chicago, Illinois USA — August 2016 - July 2021

Ph.D. in Statistics (GPA 4.0/4.0)
Thesis: Towards Solving Long-Horizon Nonlinear Dynamic Programs: Scalability and Robustness
Advisors: Prof. Mihai Anitescu and Prof. Mladen Kolar

Nanjing University, Nanjing, Jiangsu China — September 2012 - June 2016

B.S. in Mathematics (GPA 3.9/4.0, rank 1/120)
Thesis: A Stochastic Semi-Proximal-Based Peaceman-Rachford Splitting Method

University of California, Davis, Davis, California USA — March 2015 - September 2015

Department of Statistics, exchange student (GPA 4.0/4.0)

Research Experience

Argonne National Laboratory, Lemont, Illinois USA — June - Sept., 2018, 2019, 2020

Mathematics and Computer Science Division
Givens Associate in 2018, 2019, and W.J. Cody Associate in 2020
Projects: sensitivity analysis of nonlinear dynamic programs, convergence analysis of online model predictive control, convergence analysis of offline temporal decomposition procedure, applications on power grids and energy systems, implementation of Julia/JuMP, IPOPT, etc.

Teaching experience

University of Chicago, Department of Statistics

Teaching Assistant

- STAT376 Machine Learning and Large-Scale Data Analysis — Spring 2020
- STAT315 Stochastic Simulation — Spring 2019
- STAT244 Statistical Theory and Methods — Autumn 2017

- STAT234 Statistical Models and Methods — Winter 2016, Spring 2017, Winter 2017

Honors and Awards

SDSS 2023 Student & Early Career Award, ASA — 2023

Harper Dissertation Fellowship, University of Chicago — 2020
(one of the highest honors at UChicago in recognition of Ph.D. candidates' record of achievement and professional promise.)

Bao-steel Scholarship, Nanjing University — 2016
(one of the highest national honors given to undergraduate students for academic performance.)

Outstanding Graduate, Nanjing University — 2016

Exchange Program Scholarship, University of California, Davis — 2015

Electronics Technology Scholarship, Nanjing University — 2014

Aolei Scholarship, Nanjing University — 2013

Publications (Chronological order)

[16] Constrained Optimization via Exact Augmented Lagrangian and Randomized Iterative Sketching
I. Hong, **S. Na**, M. W. Mahoney, and M. Kolar (IH and SN have equal contribution)
International Conference on Machine Learning, 2023 Preprint

[15] A Fast Temporal Decomposition Procedure for Long-horizon Nonlinear Dynamic Programming
S. Na, M. Anitescu, and M. Kolar
To appear in Mathematics of Operations Research, 2023 Preprint

[14] Inequality Constrained Stochastic Nonlinear Optimization via Active-Set Sequential Quadratic Programming
S. Na, M. Anitescu, and M. Kolar
Mathematical Programming, 2023 DOI: 10.1007/s10107-023-01935-7

[13] Hessian averaging in stochastic Newton methods achieves superlinear convergence
S. Na, M. Dereziński, and M. W. Mahoney
Mathematical Programming, 2022 DOI: 10.1007/s10107-022-01913-5

[12] An adaptive stochastic sequential quadratic programming with differentiable exact augmented lagrangians
S. Na, M. Anitescu, and M. Kolar
Mathematical Programming, 2022 DOI: 10.1007/s10107-022-01846-z

[11] Superconvergence of Online Optimization for Model Predictive Control
S. Na and M. Anitescu
IEEE Transactions on Automatic Control, 2022 DOI: 10.1109/tac.2022.3223323

[10] On the Convergence of Overlapping Schwarz Decomposition for Nonlinear Optimal Control
S. Na, S. Shin, M. Anitescu, and V. M. Zavala (SN and SS have equal contribution)
IEEE Transactions on Automatic Control, 2022 DOI: 10.1109/tac.2022.3194087

[9] SFGAE: a self-feature-based graph autoencoder model for miRNA–disease associations prediction
M. Ma, **S. Na**, X. Zhang, C. Chen, and J. Xu
Briefings in Bioinformatics, 2022 DOI: 10.1093/bib/bbac340

[8] Global Convergence of Online Optimization for Nonlinear Model Predictive Control
S. Na
Advances in Neural Information Processing Systems, 2021 Preprint

[7] High-dimensional index volatility models via Stein's identity
S. Na and M. Kolar
Bernoulli, 27(2): p. 794–817, 2021 DOI: 10.3150/20-bej1238

[6] AEGCN: An Autoencoder-Constrained Graph Convolutional Network
M. Ma, **S. Na**, and H. Wang

Neurocomputing, 432: p. 21–31, 2021 DOI: 10.1016/j.neucom.2020.12.061

[5] The graph-based behavior-aware recommendation for interactive news
M. Ma, **S. Na**, H. Wang, C. Chen, and J. Xu
Applied Intelligence, 52(2): p. 1913–1929, 2021 DOI: 10.1007/s10489-021-02497-x

[4] Estimating differential latent variable graphical models with applications to brain connectivity
S. Na, M. Kolar, and O. Koyejo
Biometrika, 108(2): p. 425–442, 2020 DOI: 10.1093/biomet/asaa066

[3] Exponential Decay in the Sensitivity Analysis of Nonlinear Dynamic Programming
S. Na and M. Anitescu
SIAM Journal on Optimization, 30(2): p. 1527–1554, 2020 DOI: 10.1137/19m1265065

[2] Semiparametric Nonlinear Bipartite Graph Representation Learning with Provable Guarantees
S. Na, Y. Luo, Z. Yang, Z. Wang, and M. Kolar
International Conference on Machine Learning, 2020 Preprint

[1] High-dimensional Varying Index Coefficient Models via Stein's Identity
S. Na, Z. Yang, Z. Wang, and M. Kolar
Journal of Machine Learning Research, 20(152): p. 1–44, 2019 Preprint

** Towards Solving Long-Horizon Nonlinear Dynamic Programs: Scalability and Robustness
S. Na
University of Chicago (PhD Thesis), 2021

Technical Reports (Under Review)

[4] Fully Stochastic Trust-Region Sequential Quadratic Programming for Equality-Constrained Optimization Problems
Y. Fang, **S. Na**, M. W. Mahoney, and M. Kolar
arXiv preprint arXiv:2211.15943, 2022 Preprint

[3] Near-Optimal Performance of Stochastic Predictive Control
S. Shin, **S. Na**, and M. Anitescu
arXiv preprint arXiv:2210.08599, 2022 Preprint

[2] Asymptotic Convergence Rate and Statistical Inference for Stochastic Sequential Quadratic Programming
S. Na and M. W. Mahoney
arXiv preprint arXiv:2205.13687, 2022 Preprint

[1] Convergence Analysis of Accelerated Stochastic Gradient Descent under the Growth Condition
Y.-L. Chen, **S. Na**, and M. Kolar
arXiv preprint arXiv:2006.06782, 2020 Preprint

Working papers (available upon request)

[2] Y. Fang, **S. Na**, M. W. Mahoney, and M. Kolar. Trust-Region Sequential Quadratic Programming for Stochastic Optimization with Random Models. 2023+ (A short draft is accepted by NeurIPS Higher-Order Optimization in Machine Learning (HOO) workshop, 2022)

[1] M. Li, **S. Na**, and M. Kolar. Exact Augmented Lagrangian on Manifold Optimization. 2023+

Talks

[6] INFORMS Annual Meeting — Phoenix, Oct. 2023

[5] SIAM Conference on Optimization — Seattle, May 2023

[4] Symposium on Data Science & Statistics (referred) — St. Louis, May 2023

[3] Advances in Neural Information Processing Systems — Virtual, Dec. 2021

[2] International Conference on Machine Learning — Virtual, July 2020

[1] Summer Student Mini-Symposium, Argonne National Laboratory — Lemont, Sept. 2018-2020

Professional Service

Referee Service

I have served as a referee for several prestigious journals in the fields of mathematics and statistics, including:

- SIAM Journal on Optimization
- IMA Journal of Numerical Analysis
- Journal of Machine Learning Research
- Electronic Journal of Statistics
- Statistics & Probability Letters

Reviewer of conferences: NeurIPS, ICML, ICLR, IJCAI, AIStats etc.

Organizer of conference sessions: SIAM Conference on Optimization, INFORMS Annual Meeting

Mentoring Experience

I am fortunate to supervise self-motivated junior students on various research problems

- Xiaoran Chen (UChicago, Stat, MS), Yang Chu (Berkeley, Stat, PhD), Yuchen Fang (UChicago, CAM, MS), Yihang Gao (HKU, Math, PhD), Ilgee Hong (UChicago, Stat, MS), Simiao Jiao (UChicago, Stat, MS), Wei Kuang (UChicago, Stat, PhD), Miao Li (UChicago, CAM, MS), Heming Liu (UChicago, Stat, MS), Xiaoyu Niu (Berkeley, Math, PhD)

Skills

Programming Languages

- Matlab, Python, Julia, R, Git, Linux Shell

Languages

- Native: Mandarin, Chinese
- Fluent: English

Activities

Professional ping pong player until ninth grade

Recreation: soccer, hiking, walking the dog, road tripping

References

Provided upon request