Sen Na

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Contact Information

University of California, Berkeley
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Research Interests

High-Dimensional Estimation & Inference
Graphical Models & Semiparametric Models
Large-Scale Stochastic Optimization
Uncertainty Quantification
Sequential Decision-Making & Optimal Control & Networks
AI for Science: applications in biology, neuroscience, physics, 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
Committee members: Prof. Lek-Heng Lim and Prof. Tengyuan Liang

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

- STAT245 Statistical Theory and Methods (II) — Winter 2021
- STAT244 Statistical Theory and Methods (I) — Autumn 2017
- STAT234 Statistical Models and Methods — Spring 2017, Winter 2017, Winter 2018

Honors and Awards

ORIE Young Researcher, Cornell University 2023

SDSS 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)

[18] Fully Stochastic Trust-Region Sequential Quadratic Programming for Equality-Constrained Optimization Problems
Y. Fang, **S. Na**, M. W. Mahoney, and M. Kolar
To appear in SIAM Journal on Optimization, 2024 Preprint

[17] Convergence Analysis of Accelerated Stochastic Gradient Descent under the Growth Condition
Y.-L. Chen, **S. Na**, and M. Kolar *(YLC and SN have equal contribution)
To appear in Mathematics of Operations Research, 2023 Preprint

[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
Mathematics of Operations Research, 2023 DOI: 10.1287/moor.2023.1378

[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)

[3] An Asymptotically Optimal Method for Constrained Stochastic Optimization
S. Na, Y. Gao, M. K. Ng, and M. W. Mahoney *(SN and YG have equal contribution)
In submission to Annals of Statistics, 2024 Preprint

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

[1] Statistical Inference of Constrained Stochastic Optimization via Sketched Sequential Quadratic Programming
S. Na and M. W. Mahoney
arXiv preprint arXiv:2205.13687, 2022 Preprint

WORKING PAPERS (AVAILABLE UPON REQUEST)

[4] W. Kuang, **S. Na**, M. W. Mahoney, and M. Anitescu. Online Covariance Matrix Estimation in Stochastic Inexact Newton Methods. 2023+ (accepted in part in the NeurIPS workshop, 2023)

[3] Y. Fang, **S. Na**, M. W. Mahoney, and M. Kolar. Trust-Region Sequential Quadratic Programming for Stochastic Optimization with Random Models. 2023+ (accepted in part in the NeurIPS workshop, 2022)

[2] R. Ni, **S. Na**, S. Shin, and M. Anitescu. Fast Overlapping Decomposition for Graph-Structured Nonlinear Programs. 2023+

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

Talks

[8]	INFORMS Annual Meeting	Phoenix, Oct. 2023
[7]	Cornell ORIE Young Researchers Workshop	Cornell, Oct. 2023
[6]	International Conference on Machine Learning	Honolulu, July 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
- Mathematics of Operations Research
- 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