Raúl Astudillo

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EDUCATION

Cornell University *August 2016-August 2022*
Ph.D. in Operations Research and Information Engineering
Advisor: Peter Frazier
Minors: Computer Science and Statistics

University of Guanajuato & Center for Research in Mathematics *August 2011-June 2016*
B.Sc. in Mathematics
GPA: 9.7/10
Highest GPA of the 2011-2016 class

ACADEMIC POSITIONS

California Institute of Technology *September 2022-Present*
Postdoctoral Scholar
Supervisor: Yisong Yue

INDUSTRY POSITIONS

Facebook
Visiting Researcher *October 2020-March 2021*
Supervisor: Eytan Bakshy
Research Intern *June-September 2020*
Supervisor: Daniel Jiang

ExxonMobil Upstream Research Company
Research Intern *June-August 2019*
Supervisors: Liz Curry and Xiao-Hui Wu
Research Intern *June-August 2018*
Supervisors: Damian Burch and Xiao-Hui Wu

RESEARCH INTERESTS

Bayesian Optimization, Preference Elicitation, Simulation Optimization, Active Learning, Uncertainty Quantification, Experimental Design, Optimal Learning, AI for Science

PUBLICATIONS

1. J. Bowden, R. Astudillo, C. Yeh, J. Song, Y. Chen, T. Desautels, and Y. Yue, "New insights on Bayesian optimization with deep kernel learning", *Preprint*.
2. J. Yang, R. Lal, J. Bowden, R. Astudillo, M. Hameedi, Y. Yue, and F. Arnold, "Active learning-assisted directed evolution", *Submitted*.
3. C. Cheng, R. Astudillo, T. Desautels, and Y. Yue, "Practical Bayesian algorithm execution via posterior sampling" (Finalist at the 2024 INFORMS Undergraduate Operations Research Prize Competition), *Submitted*.
4. Q. Xie, R. Astudillo, P. Frazier, Ziv Scully, and A. Terein, "Cost-aware Bayesian optimization via the Pandora's box Gittins index", *Submitted*.

5. V. Mishra, R. Astudillo, P. Frazier, and F. Zhang, "Probably-convergent source seeking with mobile agents" (Early version presented at the NeurIPS 2023 Workshop on Adaptive Experimental Design and Active Learning in the Real World), *Submitted*.

6. R. Astudillo, K. Li, M. Tucker, X. Chen, A. Ames, and Y. Yue, "Preferential multi-objective Bayesian optimization" (Early version presented at the ICML 2023 Workshop on The Many Facets of Preference-Based Learning), *Submitted*.

7. B. Sha, R. Astudillo, and P. Frazier, "Multi-attribute optimization under preference uncertainty" (Finalist at the 2020 INFORMS Undergraduate Operations Research Prize Competition), *Winter Simulation Conference, 2024 (Forthcoming)*.

8. P. Buathong, J. Wan, R. Astudillo, S. Daulton, M. Balandat, and P. Frazier, "Bayesian optimization of function networks with partial evaluations", *International Conference on Machine Learning, 2024*.

9. J. Jannink, R. Astudillo, and P. Frazier, "Insight into a two-part plant breeding scheme through Bayesian optimization of budget allocations", *Crop Science, 2023*.

10. R. Astudillo, Z. Lin, E. Bakshy, and P. Frazier, "qEUBO: A decision-theoretic acquisition function for preferential Bayesian optimization", *International Conference on Artificial Intelligence and Statistics, 2023*.

11. Z. Cosenza, R. Astudillo, P. Frazier, K. Baar, and D. Block, "Multi-information source Bayesian optimization of culture media for cellular agriculture" (Spotlight presentation at the ICML 2022 Adaptive Experimental Design and Active Learning in the Real World Workshop, 7%), *Biotechnology and Bioengineering, 2022*.

12. Z. Lin, R. Astudillo, P. Frazier, and E. Bakshy, "Preference exploration for efficient Bayesian optimization with multiple outcomes", *International Conference on Artificial Intelligence and Statistics, 2022*.

13. R. Astudillo, and P. Frazier, "Thinking inside the box: A tutorial on grey-box Bayesian optimization", *Advanced Tutorial at the Winter Simulation Conference, 2021*.

14. R. Astudillo, D.R. Jiang, M. Balandat, E. Bakshy, and P. Frazier, "Multi-step budgeted Bayesian optimization with unknown evaluation costs", *Advances in Neural Information Processing Systems, 2021*.

15. R. Astudillo and P. Frazier, "Bayesian optimization of function networks", *Advances in Neural Information Processing Systems, 2021*.

16. S. Cakmak, R. Astudillo, P. Frazier and E. Zhou, "Bayesian optimization of risk measures", *Advances in Neural Information Processing Systems, 2020*.

17. R. Astudillo and P. Frazier, "Multi-attribute Bayesian optimization with interactive preference learning", *International Conference on Artificial Intelligence and Statistics, 2020*.

18. R. Astudillo and P. Frazier, "Bayesian optimization of composite functions", *International Conference on Machine Learning, 2019*.

SELECTED AWARDS

Rising Star in Data Science - UChicago and UC San Diego	*2024*
Rising Star in Management Science & Engineering - Stanford University	*2024*
Outstanding Reviewer Award - NeurIPS	*2021*
Second Prize - XXII International Mathematics Competition for University Students	*2015*

Orgullo UG Academic Excellence Award - University of Guanajuato *2014*
Academic Excellence Fellowship - Center for Research in Mathematics *2012-2016*

SELECTED PRESENTATIONS

1. "Composite Bayesian optimization for efficient and scalable adaptive experimentation", *Online Reading Group on Modern Adaptive Experimental Design and Active Learning in the Real World, Virtual, 2024.*
2. "Thinking inside the box: A tutorial on grey-box Bayesian optimization", *Advanced Tutorial at the Winter Simulation Conference, Phoenix, AZ, October 2021.*
3. "Grey-box Bayesian optimization", *Young Researchers Workshop, Cornell University's School of Operations Research and Information Engineering, Ithaca, NY, 2021.*
4. "Bayesian optimization of function networks", *SIAM Conference on Computational Science and Engineering, Virtual, 2021.*
5. "Interactive Bayesian optimization with uncertain preferences", *Facebook Adaptive Experimentation Workshop, New York City, NY, 2020.*
6. "Bayesian optimization of composite functions with application to computationally expensive inverse problems", *Applied Inverse Problems Conference, Grenoble, France, 2019.*
7. "Bayesian optimization of composite functions", *International Conference on Machine Learning, Long Beach, CA, 2019.*
8. "Bayesian optimization of composite functions", *2nd Uber Science Symposium, San Francisco, CA*, 2019.

MENTORING EXPERIENCE

Graduate Students

- Victor Amaya Carvajal - Duke University *June 2024-Present*
- Felix Huber - University of Stuttgart *June 2024-Present*
- Eliezer Fuentes - Cornell University *Feb 2024-Present*
- Qian Xie - Cornell University *August 2023-Present*
- Poompol Buathong - Cornell University *June 2022-May 2024*

Undergraduate Students

- Eric Lee - California Institute of Technology *Jul 2024-Present*
- Andrew Zabelo - California Institute of Technology *March 2024-Present*
- Chu Xin (Cloris) Cheng - California Institute of Technology *Nov 2023-Present*
- Bhavik Sha - Cornell University *Feb 2020-October 2020*

TEACHING EXPERIENCE

Instructor

- Uncertainty Quantification (Graduate) - California Institute of Technology *Spring 2023*
- Engineering Stochastic Processes (Undergraduate) - Cornell University *Summer 2021*

Teaching Assistant

- Statistical Principles (Graduate) - Cornell University *Fall 2018*

- Engineering Stochastic Processes (Undergraduate) - Cornell University *Fall 2017*
- Basic Probability and Statistics (Undergraduate)- Cornell University *Fall 2016*
- Measure Theory and Probability (Graduate) - Center for Research in Mathematics *Fall 2015*
- Complex Analysis (Undergraduate) - University of Guanajuato *Spring 2015*

ACADEMIC SERVICE

Conference Reviewing
AISTATS, ICLR, ICML, NeurIPS

Journal Reviewing
Artificial Intelligence, INFORMS Journal on Computing, Neural Computation, Operations Research, SIAM Review, Technometrics

LANGUAGES

English (proficient), Spanish (native)