Raul Astudillo

Contact information

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Education

2016-Present **Cornell University**, *USA*.
Ph.D. in Operations Research and Information Engineering
- Expected graduation date: August 2022
- Advisor: Peter I. Frazier
- Minors: Computer Science and Statistics

2011-2016 **University of Guanajuato & Center for Research in Mathematics**, *Mexico*.
B.S. in Mathematics. GPA: 9.7/10
- Highest GPA of the class 2011-2016

Research interests

Bayesian Optimization, Preference Elicitation, Simulation Optimization, Adaptive Experimentation, Optimal Learning

Publications and working papers

1. B. Sha, R. Astudillo, and P.I. Frazier, "Mixed integer linear programming under preference uncertainty " (A preliminary version of this paper was finalist at the 2020 INFORMS Undergraduate Operations Research Prize Competition), *Working paper*.
2. Z. Cosenza, R. Astudillo, P.I. Frazier, K. Baar, and D.E. Block "Multi-information source Bayesian optimization of cell culture media", *Submitted to Biotechnology and Bioengineering*.
3. Z. Lin, R. Astudillo, P.I. Frazier, and E. Bakshy, "Preference exploration for efficient Bayesian optimization with multiple outcomes", *Forthcoming in International Conference on Artificial Intelligence and Statistics, 2022*.
4. R. Astudillo, and P.I. Frazier, "Thinking inside the box: A tutorial on grey-box Bayesian optimization", *Advanced Tutorial at the Winter Simulation Conference, 2021*.
5. R. Astudillo, D.R. Jiang, M. Balandat, E. Bakshy, and P.I. Frazier, "Multi-step budgeted Bayesian optimization with unknown evaluation costs", *Advances in Neural Information Processing Systems, 2021*.
6. R. Astudillo and P.I. Frazier, "Bayesian optimization of function networks", *Advances in Neural Information Processing Systems, 2021*.
7. S. Cakmak, R. Astudillo, P.I. Frazier and E. Zhou, "Bayesian optimization of risk measures", *Advances in Neural Information Processing Systems, 2020*.
8. R. Astudillo and P.I. Frazier, "Multi-attribute Bayesian optimization with interactive preference learning", *International Conference on Artificial Intelligence and Statistics, 2020*.
9. R. Astudillo and P.I. Frazier, "Bayesian optimization of composite functions", *International Conference on Machine Learning, 2019*.
10. R. Astudillo and P.I. Frazier, "Multi-attribute Bayesian optimization under utility uncertainty", *NIPS Workshop on Bayesian Optimization, 2017*.

Selected presentations

Dec 2021 "Thinking inside the box: A tutorial on grey-box Bayesian optimization", *Advanced Tutorial at the Winter Simulation Conference, Phoenix, AZ.*

Dec 2021 "Multi-step budgeted Bayesian optimization with unknown evaluation costs", *NeurIPS 2021, Virtual.*

Dec 2021 "Bayesian optimization of nested functions", *NeurIPS 2021, Virtual.*

Oct 2021 "Grey-box Bayesian optimization", *Young Researchers Workshop, Cornell University's School of ORIE, Ithaca, NY.*

Mar 2021 "Bayesian optimization of function networks", *SIAM Conference on Computational Science and Engineering, Virtual.*

Feb 2020 "Interactive Bayesian optimization with uncertain preferences", *Facebook Adaptive Experimentation Workshop, New York City, NY.*

Jul 2019 "Bayesian optimization of composite functions with application to computationally expensive inverse Problems", *Applied Inverse Problems Conference, Grenoble, France.*

Jun 2019 "Bayesian optimization of composite functions", *International Conference on Machine Learning, Long Beach, CA.*

May 2019 "Bayesian optimization of composite functions", *2nd Uber Science Symposium, San Francisco, CA.*

Selected graduate coursework

- Applied Stochastic Processes
- Mathematical Programming
- Bayesian Statistics and Data Analysis
- Numerical Methods for Data Science
- Bayesian Machine Learning
- Statistical Learning Theory
- Advanced Machine Learning
- Optimal Learning

Industry experience

Oct 2020 -Mar 2021 **Facebook**, *Menlo Park, CA.*
Visiting Researcher
- Developed novel non-myopic Bayesian optimization algorithms for problems with unknown evaluation costs and implemented them on Facebook's adaptive experimentation pipeline

Jun-Sep 2020 **Facebook**, *Menlo Park, CA.*
Intern
- Developed novel non-myopic Bayesian optimization algorithms for problems with unknown evaluation costs
- Mentor: Daniel R. Jiang

Jul-Aug 2019 **ExxonMobil Upstream Research Company**, *Houston, TX.*
Intern
- Developed novel Bayesian optimization algorithms for reservoir development planning under geological uncertainty
- Mentors: Liz Curry and Xiao-Hui Wu

Jun-Aug 2018 **ExxonMobil Upstream Research Company**, *Houston, TX.*
Intern
- Developed novel Bayesian optimization algorithms for reservoir development planning under geological uncertainty
- Mentors: Damian Burch and Xiao-Hui Wu

Teaching experience

Cornell University, *USA.*
Instructor

Summer 2021	Engineering Stochastic Processes	Undergraduate
	Cornell University, *USA*. Teaching Assistant	
Fall 2018	Statistical Principles	Graduate
Spring 2017	Engineering Stochastic Processes	Undergraduate
Fall 2016	Basic Probability and Statistics	Undergraduate
	Center for Research in Mathematics (CIMAT), *Mexico*. Teaching Assistant	
Fall 2015	Measure Theory and Probability	Graduate
	University of Guanajuato, *Mexico*. Teaching Assistant	
Spring 2015	Complex Analysis	Undergraduate
Fall 2014	Elementary Number Theory	Undergraduate

Selected awards

2021 NeurIPS 2021 Outstanding Reviewer Award

2015 Second Prize - XXII International Mathematics Competition for University Students, Blagoevgrad, Bulgaria.

2014 Third Prize - XXI International Mathematics Competition for University Students, Blagoevgrad, Bulgaria.

2014 *Orgullo UG* Academic Excellence Award - University of Guanajuato.

2012-2016 Academic Excellence Fellowship - Center for Research in Mathematics.

Computer skills

Development MATLAB, Python, R

Tools Git, LaTeX

Languages

English (proficient), Spanish (native)