Sharan Vaswani
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Academic Employment

Simon Fraser University — Vancouver, Canada
Assistant Professor (Computing Science) — *2022 -*

University of Alberta — Edmonton, Canada
Postdoctoral Researcher (Computing Science) — *2020 - 2021*
- Supervisor: Csaba Szepesvári

Mila, Université de Montréal — Montreal, Canada
Postdoctoral Researcher (Computer Science and Operations Research) — *2019-2020*
- Supervisor: Simon Lacoste-Julien

Education

University of British Columbia — Vancouver, Canada
Doctor of Philosophy (Computer Science) — *2015 - 2018*
- Supervisors: Mark Schmidt, Laks Lakshmanan
- Thesis: Structured Bandits and Applications

University of British Columbia — Vancouver, Canada
Master of Science (Computer Science) — *2013 - 2015*
- Supervisor: Laks Lakshmanan
- Thesis: Influence Maximization in Bandit and Adaptive settings
- GPA: 4.32 / 4.33

Birla Institute of Technology and Science, Pilani — Goa, India
Bachelor of Engineering (Computer Science) — *2008 - 2012*
- GPA: 9.37 / 10

Publications

Sequential Decision-making

[W] "Practical Principled Policy Optimization for Finite MDPs", Michael Lu, Matin Aghaei, Anant Raj, **Sharan Vaswani**. "Optimization for Machine Learning" workshop, NeurIPS, 2023 **(Oral Presentation)**.

[C] "Decision-Aware Actor-Critic with Function Approximation and Theoretical Guarantees", **Sharan Vaswani**, Amirreza Kazemi, Reza Babanezhad, Nicolas Le Roux. "Duality Principles for Modern ML" workshop, ICML, 2023. Neural Information Processing Systems (NeurIPS), 2023.

[C] "Near-Optimal Sample Complexity Bounds for Constrained MDPs", **Sharan Vaswani***, Lin F. Yang*, Csaba Szepesvári. Neural Information Processing Systems (NeurIPS), 2022.

[C] "Improved Policy Optimization for Online Imitation Learning", Jonathan Lavington, **Sharan Vaswani**, Mark Schmidt. Conference on Lifelong Learning Agents (CoLLAs), 2022.

Last updated: February 29, 2024
C: Conference, **W**: Workshop, **J**: Journal, **R**: Technical report.
* Equal contribution.

[C] "Towards Painless Policy Optimization for Constrained MDPs", Arushi Jain*, **Sharan Vaswani***, Reza Babanezhad, Doina Precup, Csaba Szepesvári, Conference on Uncertainty in Artificial Intelligence (UAI), 2022.

[C] "A general class of surrogate functions for stable and efficient reinforcement learning", **Sharan Vaswani**, Olivier Bachem, Simone Totaro, Robert Müller, Shivam Garg, Matthieu Geist, Marlos Machado, Pablo Samuel Castro, Nicolas Le Roux. International Conference on Artificial Intelligence and Statistics (AISTATS), 2022 **(Best Paper Honorable Mention)**. "Workshop on Reinforcement Learning Theory", ICML 2021.

[C] "Old Dog Learns New Tricks: Randomized UCB for Bandit Problems", **Sharan Vaswani**, Abbas Mehrabian, Audrey Durand, Branislav Kveton. International Conference on Artificial Intelligence and Statistics (AISTATS), 2020.

[J] "Combining Bayesian Optimization and Lipschitz Optimization", Mohamed Osama Ahmed, **Sharan Vaswani**, Mark Schmidt. Machine Learning Journal, 2020.

[C] "Garbage In, Reward Out: Bootstrapping Exploration in Multi-Armed Bandits", Branislav Kveton, Csaba Szepesvári, **Sharan Vaswani**, Zheng Wen, Mohammad Ghavamzadeh, Tor Lattimore. International Conference on Machine Learning (ICML), 2019.

[R] "New Insights into Bootstrapping for Bandits", **Sharan Vaswani**, Branislav Kveton, Zheng Wen, Anup Rao, Mark Schmidt, Yasin Abbasi-Yadkori. arXiv, 2018.

[C] "Online Influence Maximization under Independent Cascade Model with Semi-Bandit Feedback", Zheng Wen, Branislav Kveton, Michal Valko, **Sharan Vaswani**. Neural Information Processing Systems (NIPS), 2017.

[C] "Model-Independent Online Learning for Influence Maximization", **Sharan Vaswani**, Branislav Kveton, Zheng Wen, Mohammad Ghavamzadeh, Laks Lakshmanan, Mark Schmidt. International Conference on Machine Learning (ICML), 2017.

[C] "Horde of Bandits using Gaussian Markov Random Fields", **Sharan Vaswani**, Mark Schmidt, Laks Lakshmanan. International Conference on Artificial Intelligence and Statistics (AISTATS), 2017. **(Oral Presentation)**

[W] "Influence Maximization with Bandits", **Sharan Vaswani**, Laks Lakshmanan, Mark Schmidt. "Networks in Social and Information Sciences" workshop, NIPS, 2015.

Large-scale Optimization

[W] "Noise-adaptive (Accelerated) Stochastic Heavy-Ball Momentum", Anh Dang, Reza Babanezhad, **Sharan Vaswani**. "Optimization for Machine Learning" workshop, NeurIPS, 2023. *Under conference submission*

[W] "From Inverse Optimization to Feasibility to ERM", Saurabh Mishra, Anant Raj, **Sharan Vaswani**. "Optimization for Machine Learning" workshop, NeurIPS, 2023. *Under conference submission*

[W] "Surrogate Minimization: An Optimization Algorithm for Training Large Neural Networks with Model Parallelism", Reza Asad, Reza Babanezhad, Issam Laradji, Nicolas Le Roux, **Sharan Vaswani**. "Optimization for Machine Learning" workshop, NeurIPS, 2023.

[W] "MSL: An Adaptive Momentem-based Stochastic Line-search Framework", Chen Fan, **Sharan Vaswani**, Christos Thrampoulidis, Mark Schmidt. "Optimization for Machine Learning" workshop, NeurIPS, 2023.

[C] "Target-based Surrogates for Stochastic Optimization", Jonathan Lavington*, **Sharan Vaswani***, Reza Babanezhad, Mark Schmidt, Nicolas Le Roux. International Conference on Machine Learning (ICML), 2023. "Optimization for Machine Learning" workshop, NeurIPS, 2022.

[C] "Towards Noise-adaptive, Problem-adaptive (Accelerated) Stochastic Gradient Descent", **Sharan Vaswani**, Benjamin Dubois-Taine, Reza Babanezhad. International Conference on Machine Learning (ICML), 2022 **(Oral Presentation)**. "Optimization for Machine Learning" workshop, NeurIPS, 2021.

[J] "SVRG meets AdaGrad: Painless Variance Reduction", Benjamin Dubois-Taine*, **Sharan Vaswani***, Reza Babanezhad, Mark Schmidt, Simon Lacoste-Julien. Machine Learning Journal, 2022.

[W] "Adaptive Gradient Methods Converge Faster with Over-Parameterization (but you should do a line-search)", **Sharan Vaswani**, Issam Laradji, Frederik Kunstner, Si Yi Meng, Mark Schmidt, Simon Lacoste-Julien. "Optimization for Machine Learning" workshop, NeurIPS, 2020 **(Spotlight)**.

[C] "Stochastic Polyak Step-size for SGD: An Adaptive Learning Rate for Fast Convergence", Nicolas Loizou, **Sharan Vaswani**, Issam Laradji, Simon Lacoste-Julien. International Conference on Artificial Intelligence and Statistics (AISTATS), 2021. "Optimization for Machine Learning" workshop, NeurIPS, 2020 **(Spotlight)**.

[W] "How to Make Your Optimizer Generalize Better", **Sharan Vaswani**, Reza Babanezhad, Jose Gallego, Aaron Mishkin, Simon Lacoste-Julien, Nicolas Le Roux. "Optimization for Machine Learning" workshop, NeurIPS, 2020 **(Spotlight)**.

[C] "Fast and Furious Convergence: Stochastic Second Order Methods under Interpolation", Si Yi Meng*, **Sharan Vaswani***, Issam Laradji, Mark Schmidt, Simon Lacoste-Julien. International Conference on Artificial Intelligence and Statistics (AISTATS), 2020. "Beyond First Order Methods in Machine Learning" workshop, NeurIPS 2019 **(Spotlight)**.

[C] "Painless Stochastic Gradient: Interpolation, Line-Search, and Convergence Rates", **Sharan Vaswani**, Aaron Mishkin, Issam Laradji, Mark Schmidt, Gauthier Gidel, Simon Lacoste-Julien. Neural Information Processing Systems (NeurIPS), 2019.

[W] "Accelerating boosting via accelerated greedy coordinate descent", Xiaomeng Ju*, Yifan Sun*, **Sharan Vaswani***, Mark Schmidt. "Optimization for Machine Learning" workshop, NeurIPS 2019.

[C] "Fast and Faster Convergence of SGD for Over-Parameterized Models and an Accelerated Perceptron", **Sharan Vaswani**, Francis Bach, Mark Schmidt. International Conference on Artificial Intelligence and Statistics (AISTATS), 2019.

Social Networks

[R] "Adaptive Influence Maximization in Social Networks: Why Commit when You can Adapt?", **Sharan Vaswani**, Laks V.S. Lakshmanan. ArXiv, 2016.

[C] "Modeling Non-Progressive Phenomena for Influence Propagation", Vincent Yun Lou, Smriti Bhagat, Laks Lakshmanan, **Sharan Vaswani**. ACM Conference on Online Social Networks (COSN), 2014.

Parallel Computing

[C] "Performance Evaluation of Medical Imaging Algorithms on Intel MIC Platform", Jyotsna Khemka, Mrugesh Gajjar, **Sharan Vaswani**, Nagavijayalakshmi Vydyanathan, Rama Malladi, Vinutha V. IEEE International Conference on High Performance Computing (HiPC), 2013.

[J] "Fast 3D Salient Region Detection in Medical Images using GPUs", Thota, Rahul, **Sharan Vaswani**, Amit Kale, Nagavijayalakshmi Vydyanathan. Machine Intelligence and Signal Processing. Springer India, 2016.

[C] "Fast 3D Structure Localization in Medical Volumes using CUDA-enabled GPUs", **Sharan Vaswani**, Rahul Thota, Nagavijayalakshmi Vydyanathan, Amit Kale. IEEE International Conference on Parallel, Distributed and Grid Computing, 2012. **(Best Paper Award)**

Awards

- Discovery Grant awarded by the Natural Sciences and Engineering Research Council of Canada (2022-2027) [157, 500 CAD for 5 years].
- Postdoctoral Scholarship awarded by The Institute for Data Valorization (IVADO) (2019 - 2020).
- Four Year Doctoral Fellowship awarded by the University of British Columbia (2015 - 2018).
- Merit Scholarship awarded by the Birla Institute of Technology and Science, Pilani (2008-2010).
- Travel award for AISTATS 2017, ICML 2017-2019, NeurIPS 2017, 2019.
- Outstanding reviewer for ICLR 2021, ICML 2021, 2022.
- Top 30% of highest scoring reviewers for NeurIPS 2018, 2019.

Teaching

Simon Fraser University
Instructor *2022-*

- CMPT 210: Probability and Computing (undergraduate course)
  - Summer, 2022. Class size: 50.
  - Spring, 2023. Class size: 41.
  - Spring, 2024. Class size: 75.
- CMPT 409/981: Optimization for Machine Learning (cross-listed undergraduate/graduate course)
  - Fall, 2022. Class size: 33 (5 undergraduate students, 28 graduate students).
- CMPT 419/983: Theoretical Foundations of Reinforcement Learning (cross-listed undergraduate/graduate course)
  - Fall, 2023. Class size: 25 (6 undergraduate students, 19 graduate students).

University of British Columbia
Teaching Assistant *2013-2018*

- Theory of Computation (2013), Computational Optimization (2014), Artificial Intelligence (2014).
- Undergraduate Machine learning (2015, 2017, 2018).
- Graduate Machine learning (2016, 2017).

Birla Institute of Technology and Science, Pilani
Teaching Assistant *2011*

- Data Structures and Algorithms (2011)

Supervision

- Students supervised (as the primary supervisor at Simon Fraser University)
  - Reza Asad, PhD (co-supervised with Manolis Savva) *(Started in September 2020)*
  - Matin Aghaei, MSc *(Started September 2022)*
  - Anh Dang, MSc *(Started September 2022)*
  - Xingtu Liu, MSc *(Started September 2023)*
  - Saurabh Mishra, MSc *(Started January 2023)*

- Students mentored/unofficially co-supervised (as Assistant Professor):
  - Michael Lu, PhD, Simon Fraser University. Supervisor: Mo Chen.
  - Amirreza Kazemi, MSc, Simon Fraser University. Supervisor: Martin Ester.
  - Jonathan Lavington, PhD, University of British Columbia. Supervisor: Mark Schmidt.
  - Valentin Tiriac, MSc, University of Alberta. Supervisor: Csaba Szepesvári.
  - Arushi Jain, PhD, Mila, McGill University. Supervisor: Doina Precup.
- Students mentored/unofficially co-supervised (as Postdoctoral Researcher):
  - Si Yi Meng, MSc, University of British Columbia. Supervisor: Mark Schmidt.
    Next position: PhD, Cornell University.
  - Aaron Mishkin, MSc, University of British Columbia. Supervisor: Mark Schmidt.
    Next position: PhD, Stanford University.
  - Benjamin Paul-Dubois-Taine, MSc, Paris-Saclay University. Supervisor: Alessandro Rudi.
    Next position: PhD, Paris-Saclay University.
  - Shivam Garg, Research assistant, University of Alberta. Supervisor: Csaba Szepesvári.
    Next position: PhD, University of Alberta.
  - Jose Gallego, PhD, Mila, Université de Montréal. Supervisor: Simon Lacoste-Julien.
  - Frederik Kunstner, PhD, University of British Columbia. Supervisor: Mark Schmidt.
- Committee Member (at Simon Fraser University)
  - Michael Lu, Ph.D. Supervisor: Mo Chen.
  - Shuman Peng, Ph.D. Supervisor: Martin Ester.
  - Sriraj Meenavilli, MSc, 2023. Supervisor: Mo Chen.
  - Amirreza Kazemi, MSc, 2023. Supervisor: Martin Ester
- Examiner (at Simon Fraser University)
  - Dekai Lin, MSc, 2023. Supervisor: Ke Wang
- External Examiner
  - Stephen Scinocca, MSc, 2022. University of Victoria. Supervisor: Nishant Mehta.

Internal Service

- Member of Undergraduate Program committee (Jan'22 - August'22), Graduate Program committee (September'22 - Present) at Simon Fraser University.
- Volunteer in the UBC Computer Science Graduate Admissions committee for 2016-2017, 2017-2018.
- Student representative in the UBC Computer Science Faculty Recruiting committee for 2015-2016.
- Co-organizer of reading groups at UBC: Machine learning (2018), Deep learning (2015).

External Service

- Organizer of the "Mathematics of Machine Learning" research theme at the 2022 annual meeting of the Canadian Applied and Industrial Mathematics Society.
- Conference Area Chair: NeurIPS'22, '23, ICML'23,'24.
- Reviewer: JMLR'18-'23, AISTATS'19 - '21, ICLR'18-'21, ICML'17-'22, IEEE TNNLS, NeurIPS'17-'21, New In ML workshop (NeurIPS'19), OPT-ML workshop (NeurIPS'20 - '21).
- Conference volunteer for NIPS'16.
- Conference sub-reviewer for SIGMOD'18, AAAI'17,'18, WWW'17, SDM'15,'17, KDD'16,'17, ICDM'14.
- Contributor to the Optimization chapter of the "Machine Learning, Second Edition: A Probabilistic Perspective" book by Kevin Murphy.

Other Employment

Inria Paris — Paris, France
Intern — *May - July, 2018*
- Supervisor: Francis Bach

Apple — Seattle, USA
Intern — *June - August, 2017*
- Supervisors: Hoyt Koepke, Srikrishna Sridhar

Limespot — Vancouver, Canada
Machine Learning Consultant — *March - May 2017; Sept - Oct, 2017*

Adobe Research — San Jose, USA
Data Scientist Intern — *August - Oct, 2016*
- Supervisors: Branislav Kveton, Zheng Wen, Mohammad Ghavamzadeh

Siemens Corporate Research and Technologies — Bangalore, India
Research Engineer, Parallel Systems — *July 2012 - June 2013*
- Supervisors: Nagavijayalakshmi Vydyanathan, Amit Kale, Saptarshi Das

Research Intern, Parallel Systems — *January - June, 2012*
- Supervisors: Nagavijayalakshmi Vydyanathan, Amit Kale

Indira Gandhi Centre for Atomic Research — Kalpakkam, India
Intern — *May 2010 - July 2010*
- Supervisor: M.L. Jayalal

Patents

- "Influence Maximization Determination in a Social Network System", **Sharan Vaswani**, Branislav Kveton, Zheng Wen, Mohammad Ghavamzadeh. US Patent App. 15/611,597, 2018.

Invited Talks

- "A Walk with SGD: Interpolation, Problem and Noise Adaptivity"
  - Department of Combinatorics and Optimization, University of Waterloo, January, 2024.

- "Exploiting Problem Structure for Efficient Optimization in Machine Learning"
  - Operations Research Seminar, Simon Fraser University, Vancouver, October, 2023.
- "Decision-Aware Actor-Critic with Function Approximation and Theoretical Guarantees"
  - Vector Institute, Toronto, June, 2023.
- "Target-based Surrogates for Efficient Sequential decision-making"
  - Microsoft Research, Montreal, June, 2023.
  - AI Seminar, Simon Fraser University, Vancouver, March 2023.
- "A general class of surrogate functions for stable and efficient reinforcement learning"
  - Theory of RL Workshop, Alberta, May 2023.
  - RL Seminar, Mila, Montreal, March 2022.
  - Facebook AI Research, Paris, April 2022.
- "Towards Noise-adaptive, Problem-adaptive Stochastic Gradient Descent"
  - Siam Conference on Optimization, Seattle, June 2023.
  - Optimization Seminar, Mila, Montreal, November 2021.
  - RWTH Aachen University, April, 2022.
- "Rethinking Stochastic Optimization for Modern Machine Learning"
  - Simon Fraser University, Vancouver, March 2021.
  - York University, Toronto, March 2021.
  - West Coast Optimization Meeting, Okanagan, May 2021.
  - SIAM Conference on Optimization, July, 2021.
- "Old Dog Learns New Tricks: Randomized UCB for Bandit Problems", RL Seminar, Mila, Montreal, August 2020.
- "Painless Stochastic Gradient: Interpolation, Line-Search, and Convergence Rates"
  - Huawei Research, Montreal, October 2019.
  - Optimization Seminar, Mila, Montreal, August 2019.
  - Element AI, Montreal, July 2019.
  - Google Brain, Montreal, July 2019.
- "Influence Maximization with Bandits", UBC-Element AI workshop, August, 2018.
- "New Insights into Bootstrapping for Bandits", Inria Paris, May 2018.

References

- Nicolas Le Roux (nicolas.le.roux@gmail.com), Sr Principal Researcher, Microsoft Research.
- Csaba Szepesvári (csaba.szepesvari@gmail.com), Professor, University of Alberta.
- Mark Schmidt (schmidtm@cs.ubc.ca), Associate Professor, University of British Columbia.
- Simon Lacoste-Julien (slacoste@iro.umontreal.ca), Associate Professor, Université de Montréal.