KARAN SINGH

PERSONAL INFORMATION

Princeton University
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RESEARCH INTERESTS

Theoretical and applied Machine Learning, with a focus on **Reinforcement Learning** and **Control** of Dynamical Systems. Online Learning, Learning with Partial Feedback, Convex & Non-convex Optimization, Private Learning.

EDUCATION

2015-Present **Princeton University**
PhD Candidate in Computer Science (final year), advised by Prof. Elad Hazan. GPA: 4.0/4

2011-2015 **Indian Institute of Technology, Kanpur**
Bachelor of Technology in Computer Science. GPA: 10.0/10

PUBLICATIONS

Naman Agarwal, Elad Hazan, **Karan Singh**. Logarithmic Regret for Online Control. In the *Advances in Neural Information Processing Systems 31 (NeurIPS), 2019*, **Oral Presentation**.

Elad Hazan, Sham Kakade, **Karan Singh**. The Nonstochastic Control Problem. In the *Proceedings of the 31st International Conference on Algorithmic Learning Theory (ALT), 2020*.

Naman Agarwal, Brian Bullins, Elad Hazan, Sham Kakade, **Karan Singh**. Online Control with Adversarial Disturbances. In the *Proceedings of the 36th International Conference on Machine Learning (ICML), 2019*.

Elad Hazan, Sham Kakade, **Karan Singh**, Abby Van Soest. Provably Efficient Maximum Entropy Exploration. In the *Proceedings of the 36th International Conference on Machine Learning (ICML), 2019*.

Naman Agarwal, Brian Bullins, Xinyi Chen, Elad Hazan, **Karan Singh**, Cyril Zhang and Yi Zhang. Efficient Full-Matrix Adaptive Regularization. In the *Proceedings of the 36th International Conference on Machine Learning (ICML), 2019*.

Elad Hazan, Holden Lee, **Karan Singh**, Cyril Zhang and Yi Zhang. Spectral Filtering for General Linear Dynamical Systems. In the *Advances in Neural Information Processing Systems 31 (NeurIPS), 2018*, **Oral Presentation**.

Sanjeev Arora, Elad Hazan, Holden Lee, **Karan Singh**, Cyril Zhang and Yi Zhang. Towards Provable Control for Unknown Linear Dynamical Systems. *International Conference on Learning Representations (ICLR), Workshop Track, 2018*.

Elad Hazan, **Karan Singh** and Cyril Zhang. Learning Linear Dynamical Systems via Spectral Filtering. In the *Advances in Neural Information Processing Systems 30 (NeurIPS), 2017*, **Spotlight**.

Naman Agarwal and **Karan Singh**. The Price of Differential Privacy for Online Learning. In the *Proceedings of the 34th International Conference on Machine Learning (ICML), 2017*.

Elad Hazan, **Karan Singh** and Cyril Zhang. Efficient Regret Minimization in Non-Convex Games. In the *Proceedings of the 34th International Conference on Machine Learning (ICML), 2017*.

AWARDS & HONORS

- The **Jacobus Fellowship** by the Princeton University in 2019 for *the highest scholarly excellence* at the graduate level.
- **SEAS Award for Excellence** in 2018 by the Graduate School at Princeton.
- The **Spotlight Prize** at the New York Academy of Sciences' 12^{th} Annual ML Symposium.
- **Best Paper Award** at the Optimization Foundations for Reinforcement Learning workshop at NeurIPS 2019.
- Selected **twice** for an **Oral Presentation** at NeurIPS – top 0.5% of the submissions.
- The **President's Gold Medal** for the best academic performance among all disciplines at IIT Kanpur.
- **Academic Excellence Award** for 3 years at IIT Kanpur.
- ICML 2017 **Travel Award**; titled as a **Best Reviewer** (top 5%) at NeurIPS 2019.

WORK EXPERIENCE

Summer 2018 Intern, **Google AI, Princeton** Host: Prof. Yoram Singer
Efficient optimizers for deep learning leveraging full-matrix adaptive regularization.

Summer 2014 Intern, **Microsoft Research, Redmond** Host: Dr. Sumit Gulwani
Translating natural language prompts into domain-specific programs using Program Synthesis.

TEACHING & EDITORIAL EXPERIENCE

- Reviewer for NeurIPS 2018/19, ICML 2018/19, COLT 2017/18/19, ALT 2019.
- Teaching assistant for Introduction to Machine Learning (COS 324), Artificial Intelligence and Machine Learning (COS 402), and Economics and Computation (COS 445) at Princeton; and Data Structures at IIT Kanpur.