Ayush Jain

CLVR Lab, Lira Lab
Computer Science Department, USC

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Education

University of Southern California Aug 2018 - Dec 2024
PhD in Computer Science (Joseph J Lim & Erdem Bıyık), GPA: 4.0/4.0

University of Southern California May 2024
MS in Computer Science, GPA: 4.0/4.0

Indian Institute of Technology Delhi July 2012 - June 2016
B.Tech in Electrical Engineering, GPA: 8.99/10

Research Interest & Experience: Reinforcement Learning

PhD Thesis: Decision Making in Complex Action Spaces
My goal is to build *adaptive agents* in both physical and virtual worlds. My work enables agents to learn under **complex action spaces** that are *large, unseen, varying, or difficult to optimize.*

Reinforcement Learning Applications: Robotics, Recommendation systems, Tool-reasoning.
Instruction-Following Agents: Minecraft and Android.

Publications

[Preprint] **A. Jain**, N. Kosaka, X. Li, K. Kim, E. Bıyık, J. Lim. "Mitigating Suboptimality of Deterministic Policy Gradients in **Complex Q-functions**". [ArXiv]

[ICLR 2025] G. Zhang*, **A. Jain***, I. Hwang, S. Sun, J. Lim. "QMP: Q-switch Mixture of Policies for **Multi-Task Behavior Sharing**". *International Conference on Learning Representations.* [Paper]

[ICLR 2022] **A. Jain***, N. Kosaka*, K. Kim, J. Lim. "Know Your Action Set: **Learning Action Relations** for Reinforcement Learning". *International Conference on Learning Representations.* [Paper]

[ICML 2020] **A. Jain***, A. Szot*, and J. Lim. "**Generalization to New Actions** in Reinforcement Learning". *International Conference on Machine Learning.* [Paper | Talk | Environment]

A. Jain, V. Singh, S. Ranjan, R. Rajkumar, S. Agarwal. "Uniform Information Density Effects on Syntactic Choice in Hindi". *Workshop on Linguistic Complexity and NLP*, COLING 2018. [Paper]

A. Jain, V. Singh, S. Agarwal, and R. Rajkumar. "Uniform Information Density models for language production". *39th Annual Conference of the German Linguistic Society*, DGfS 2017. [Abstract | Slides]

Industry Experience

Meta Reality Labs Research, Redmond, USA May 2024 – Dec 2024
Research Intern with Nitin Kamra
→ Reinforcement learning based virtual agents for instruction-following in **Android** devices.

Microsoft Research, Montreal, Canada May 2023 – Jan 2024
Research Intern with Eric Yuan, Marc-Alexandre Côté
→ Combine discrete prompt optimization in large language models (LLM) with gradient-optimization in neural networks for natural-language reasoning tasks and instruction-following **Minecraft** agents.

Naver AI Research, Seoul, South Korea (remote) May 2022 - Aug 2022
Research Intern with Kyung-Min Kim (Naver CLOVA), Joseph J Lim June 2021 – Dec 2021
→ Reinforcement Learning in **recommender systems** for large and varying action spaces, like streaming news recommendations, using graph attention networks to address varying listwise slate-actions.

Samsung Research, Seoul, South Korea Sep 2016 – June 2018
Engineer at Data Analytics Lab with James Geraci, Yunsu Lee
→ Market share prediction and data unification for various Samsung appliances using time series models.
→ Failure prediction with time-series anomaly detection and information extraction from text modeling.

Samsung Electronics, Suwon, South Korea May 2015 – July 2015
Software Engineer Intern with Sungmok Seo
→ Design of smart thermostat algorithm that learns and adapts to user schedules.

Patent

J. Lee, M. Kim, **A. Jain**, T. Hwang, J. Kim, H. Cho. "Method and Apparatus for Managing Operation Data of Appliance for Failure Prediction". U.S. Patent No. 11,182,235. 23 Nov. 2021.

Achievements

- Director's award for being in the top 7% of IIT Delhi for three semesters (2013-14).
- All India Rank of 198 in IITJEE taken by over half a million students (2012).
- All India Rank of 91 in AIEEE taken by over a million students (2012).
- Central Board of Secondary Education Merit Certificate for securing India top 0.1% (2012).
- KVPY Fellowship Award and National Talent Search Examination (NTSE) Scholarship Award.
- All India Rank of 3 in National Science Talent Search Examination, NSTSE (2011).
- India Top 1% in National Standard Examinations (2011) in Physics, Chemistry, and Astronomy.
- India Top 30 in Indian National Astronomy Olympiad (2012).

Teaching

Teaching Assistant, CSCI-566, USC Fa19, S19, Fa20, Sp23, Sp24, Fa24
Deep Learning and its Applications, USC (Joseph J Lim, Jesse Thomason, Yue Zhao, Yan Liu).

Reviewer Services

- **ICML**: 2025
- **ICLR**: 2023, 2024, 2025
- **NeurIPS**: 2023, 2024
- **CoRL**: 2021, 2022, 2023, 2024