

Aditya Kusupati

Google DeepMind
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RESEARCH INTERESTS

I focus on designing fundamental *Machine Learning* algorithms with strong empirical performance & real-world deployability geared towards enabling **adaptive intelligence**. They have been widely adopted by industry serving over a Billion users daily (Google, OpenAI, Pinterest, Apple, Microsoft) and open-source communities (Hugging Face, Nomic AI, etc.).

EDUCATION

University of Washington, Seattle 2019 - 2024
PhD in Computer Science and Engineering
Visiting Research Associate in Harvard Computer Science 2023 - 2024
Advisors: Prof. Ali Farhadi & Prof. Sham Kakade
Committee: Prof. Luke Zettlemoyer, Prof. Zaid Harchaoui & Dr. Rahul Sukthankar

Indian Institute of Technology Bombay 2013 - 2017
B.Tech (Honours) in Computer Science and Engineering with Minor in Electrical Engineering
Advisor: Prof. Soumen Chakrabarti

WORK EXPERIENCE

Google DeepMind July 2024 - Present
Senior Research Scientist
Manager: Dr. Rahul Sukthankar
Worked on making fundamental Machine Learning algorithms to make AI models and systems accurate and performant.

Google Research → DeepMind January 2022 - June 2024
Student Researcher in Perception
Advisors: Dr. Prateek Jain & Tom Duerig
Worked on making fundamental Machine Learning algorithms elastic, flexible, and end-to-end differentiable for efficient and accurate deployment in web-scale systems like Google Search & Ads along with top-tier publications. Lead multiple research and product adoption efforts with a team of interns, research, and software engineers.

NVIDIA Toronto AI Lab June - September, 2020
Research Scientist Intern
Advisor: Prof. Sanja Fidler
Explored missing modality (audio/visual/control) generation with cross-modal supervision for Atari video games using GANs.

Microsoft Research India May 2017 - July 2019
Research Fellow in Machine Learning and Optimization
Advisors: Dr. Manik Varma & Dr. Prateek Jain Worked on resource-efficient and large-scale machine learning resulting in top-tier publications & deployment in Bing.

PUBLICATIONS

Conference Publications

* - equal contribution

23. **ActionAtlas: A VideoQA Benchmark for Fine-grained Action Recognition**
Mohammadreza Salehi, Jae Sung Park, **Aditya Kusupati**, Ranjay Krishna, Yejin Choi, Hannaneh Hajishirzi, Ali Farhadi.
Neural Information Processing Systems (NeurIPS) Dataset and Benchmarks Track, 2024.
22. **Superposed Decoding: Multiple Generations from a Single Autoregressive Inference Pass**
Ethan Shen, Alan Fan, Sarah Pratt, Jae Sung Park, Matthew Wallingford, Sham Kakade, Ari Holtzman, Ranjay Krishna, Ali Farhadi, **Aditya Kusupati**.
Neural Information Processing Systems (NeurIPS), 2024.
21. **From an Image to a Scene: Learning to Imagine the World from a Million 360° Videos**
Matthew Wallingford, Anand Bhattad, **Aditya Kusupati**, Vivek Ramanujan, Matt Deitke, Sham Kakade, Aniruddha Kembhavi, Roozbeh Mottaghi, Wei-Chiu Ma, Ali Farhadi.
Neural Information Processing Systems (NeurIPS), 2024.

20. **Mixture of Nested Experts: Adaptive Processing of Visual Tokens**
Gagan Jain, Nidhi Hegde, **Aditya Kusupati**, Arsha Nagrani, Shyamal Buch, Prateek Jain, Anurag Arnab, Sujoy Paul.
Neural Information Processing Systems (NeurIPS), 2024.
19. **MatFormer: Nested Transformer for Elastic Inference**
Devvrit*, Sneha Kudugunta*, **Aditya Kusupati***, Tim Dettmers, Kaifeng Chen, Inderjit Dhillon, Yulia Tsvetkov, Hannaneh Hajishirzi, Sham Kakade, Ali Farhadi and Prateek Jain.
Neural Information Processing Systems (NeurIPS), 2024.
Efficient Natural Language and Speech Processing workshop @ NeurIPS 2023 (Oral, 🏆 Best Paper Award).
Workshop on Advancing Neural Network Training @ NeurIPS 2023 (Oral).
18. **EHI: End-to-end learning of Hierarchical Index for Efficient Dense Retrieval**
Ramnath Kumar*, Anshul Mittal*, Nilesh Gupta, **Aditya Kusupati**, Inderjit Dhillon and Prateek Jain.
Transactions on Machine Learning Research (TMLR), 2024.
17. **Gecko: Versatile Text Embeddings Distilled from Large Language Models**
Jinhyuk Lee*, Zhuyun Dai*, Xiaoqi Ren*, Blair Chen, Daniel Cer, Jeremy R. Cole, Kai Hui, Michael Boratko, Rajvi Kapadia, Wen Ding, Yi Luan, Sai Meher Karthik Duddu, Gustavo Hernandez Abrego, Weiqiang Shi, Nithi Gupta, **Aditya Kusupati**, Prateek Jain, Siddhartha Reddy Jonnalagadda, Ming-Wei Chang and Iftexhar Naim.
Google Technical Report, 2024.
16. **SHARCS: Efficient Transformers through Routing with Dynamic Width Sub-networks**
Mohammadreza Salehi, Sachin Mehta, **Aditya Kusupati**, Ali Farhadi and Hanna Hajishirzi.
Empirical Methods in Natural Language Processing (EMNLP) Findings, 2023.
15. **Objaverse-XL: A Universe of 10M+ 3D Objects**
Matt Deitke, Ruoshi Liu, Matthew Wallingford, Huong Ngo, Oscar Michel, **Aditya Kusupati**, Alan Fan, Christian Laforte, Vikram Voleti, Samir Yitzhak Gadre, Aniruddha Kembhavi, Carl Vondrick, Georgia Gkioxari, Kiana Ehsani, Ludwig Schmidt and Ali Farhadi.
Neural Information Processing Systems (NeurIPS) Dataset and Benchmarks Track, 2023.
14. **MADLAD-400: Monolingual And Document-Level Large Audited Dataset**
Sneha Kudugunta, Isaac Caswell, Biao Zhang, Xavier Garcia, Christopher A. Choquette-Choo, Katherine Lee, Derrick Xin, **Aditya Kusupati**, Romi Stella, Ankur Bapna and Orhan Firat.
Neural Information Processing Systems (NeurIPS) Dataset and Benchmarks Track, 2023.
13. **Neural Priming for Sample-Efficient Adaptation**
Matthew Wallingford*, Vivek Ramanujan*, Alex Fang, **Aditya Kusupati**, Roozbeh Mottaghi, Aniruddha Kembhavi, Ludwig Schmidt and Ali Farhadi.
Neural Information Processing Systems (NeurIPS), 2023.
12. **AdANNS: A Framework for Adaptive Semantic Search**
Aniket Rege*, **Aditya Kusupati***, Sharan Ranjit, Alan Fan, Qingqing Cao, Sham Kakade, Prateek Jain and Ali Farhadi.
Neural Information Processing Systems (NeurIPS), 2023.
Practical ML for Developing Countries workshop @ ICLR 2023 (Oral).
11. **FLUID: A Unified Evaluation Framework for Flexible Sequential Data**
Matthew Wallingford, **Aditya Kusupati***, Keivan Alizadeh-Vahid*, Aaron Walsman, Aniruddha Kembhavi and Ali Farhadi.
Transactions on Machine Learning Research (TMLR), 2023.
10. **Neural Radiance Field Codebooks**
Matthew Wallingford, **Aditya Kusupati**, Alex Fang, Vivek Ramanujan, Aniruddha Kembhavi, Roozbeh Mottaghi and Ali Farhadi
International Conference on Learning Representations (ICLR), 2023.
9. **Matryoshka Representation Learning.**
Aditya Kusupati*, Gantavya Bhatt*, Aniket Rege*, Matthew Wallingford, Aditya Sinha, Vivek Ramanujan, William Howard-Snyder, Kaifeng Chen, Sham Kakade, Prateek Jain, and Ali Farhadi.
Neural Information Processing Systems (NeurIPS), 2022.
Vision Transformers: Theory and Applications workshop @ NeurIPS, 2022 (Oral).
Self-Supervised Learning - Theory and Practice workshop @ NeurIPS, 2022.
Computer Vision in the Wild workshop @ ECCV, 2022.

8. **MERLOT RESERVE: Neural Script Knowledge through Vision and Language and Sound**
Rowan Zellers, Jiasen Lu, Ximing Lu, Youngjae Yu, Yanpeng Zhao, Mohammadreza Salehi, **Aditya Kusupati**, Jack Hessel, Ali Farhadi and Yejin Choi.
IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2022 (Oral).
7. **ProtoSound: Personalized, Scalable Sound Recognition for d/Deaf and Hard of Hearing Users through In-the-Wild Few-Shot Interactions.**
Dhruv Jain, Khoa Nguyen, Steven Goodman, Rachel Grossman-Kahn, Hung Ngo, **Aditya Kusupati**, Ruofei Du, Alex Olwal, Leah Findlater and Jon Froehlich.
ACM CHI Conference on Human Factors in Computing Systems (CHI), 2022 (Talk).
6. **LLC: Accurate, Multi-purpose Learnt Low-dimensional Binary Codes**
Aditya Kusupati, Matthew Wallingford, Vivek Ramanujan, Raghav Somani, Jae Sung Park, Krishna Pillutla, Prateek Jain, Sham Kakade and Ali Farhadi.
Neural Information Processing Systems (NeurIPS), 2021 (Virtual Talk).
5. **RNNPool: Efficient Non-linear Pooling for RAM Constrained Inference**
Oindrila Saha, **Aditya Kusupati**, Harsha Vardhan Simhadri, Manik Varma and Prateek Jain.
Neural Information Processing Systems (NeurIPS), 2020 (Virtual Spotlight).
WiCV workshop @ CVPR, 2020.
4. **Soft Threshold Weight Reparameterization for Learnable Sparsity**
Aditya Kusupati, Vivek Ramanujan*, Raghav Somani*, Mitchell Wortsman*, Prateek Jain, Sham Kakade and Ali Farhadi.
International Conference on Machine Learning (ICML), 2020 (Virtual Talk).
3. **Extreme Regression for Dynamic Search Advertising**
Yashoteja Prabhu, **Aditya Kusupati**, Nilesch Gupta and Manik Varma.
International Conference on Web Search and Data Mining (WSDM), 2020 (Long Oral).
eXtreme Classification: Theory and Applications workshop @ ICML, 2020.
2. **One Size Does Not Fit All: Multi-Scale, Cascaded RNNs for Radar Classification**
Dhrubojyoti Roy*, Sangeeta Srivatsava*, **Aditya Kusupati**, Pranshu Jain, Manik Varma and Anish Arora.
International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (BuildSys), 2019.
🏆 **Best Paper Runner-Up Award.**
1. **FastGRNN: A Fast, Accurate, Stable and Tiny Kilobyte Sized Gated Recurrent Neural Network**
Aditya Kusupati, Manish Singh, Kush Bhatia, Ashish Kumar, Prateek Jain and Manik Varma.
Neural Information Processing Systems (NeurIPS), 2018.

Workshop Publications

2. **Are "Hierarchical" Visual Representations Hierarchical?**
Ethan Shen, Ali Farhadi and **Aditya Kusupati**.
Workshop on Symmetry and Geometry in Neural Representations @ NeurIPS 2023.
1. **Disrupting Model Training with Adversarial Shortcuts**
Ivan Evtimov, Ian Covert, **Aditya Kusupati** and Tadayoshi Kohno.
Workshop on Adversarial Machine Learning @ ICML 2021.

Journal Publications

1. **One Size Does Not Fit All: Multi-Scale, Cascaded RNNs for Radar Classification**
Dhrubojyoti Roy*, Sangeeta Srivatsava*, **Aditya Kusupati**, Pranshu Jain, Manik Varma and Anish Arora.
ACM Transactions on Sensor Networks (TOSN), 17(2), January 2021. (Best Paper Nomination).

Demos

1. **Lightweight, Deep RNNs for Radar Classification**
Dhrubojyoti Roy*, Sangeeta Srivatsava*, Pranshu Jain, **Aditya Kusupati**, Manik Varma and Anish Arora.
International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (BuildSys), 2019.

Theses

2. **Towards Adaptive Intelligence**
Aditya Kusupati.
PhD Thesis, Paul G. Allen School of Computer Science and Engineering, University of Washington, 2019 - 24.

1. Efficient Spatial Representation for Entity-Typing

Anand Dhoot*, **Aditya Kusupati*** and Soumen Chakrabarti.

Undergraduate Thesis, Computer Science and Engineering, IIT Bombay, 2016 - 17.

SOFTWARE

1. EdgeML: Machine Learning for Resource-constrained Edge Devices.

Dennis et al., including **Aditya Kusupati**.

Microsoft Research India, 2017.

Stats: ★ >1,200, 📄 >320, 👁 >300,000, 📦 >4,500.

SELECT AWARDS AND HONORS

- **Best Paper Award** at ENLSP workshop @ NeurIPS '23 2023
- **JUWELS Booster Compute Grant** worth 100K A100 GPU hours 2023
- **Best Poster Award** and a Research Grant worth \$25,000 at Citadel Securities PhD Summit 2023
- Google **Level 3: Accelerate** Research Grant worth \$300,000 extendable up to 1M dollars 2022
- Academic Research **GCP Credit Award** worth \$100,000 2021 - 2023
- **Expert Reviewer** for ICML '21 2021
- **Best Paper Runner-Up Award** at BuildSys '19 2019
- Young Researcher at Heidelberg Laureate Forum (**HLF '19**) with Romberg Grant & MSR Travel Grant 2019
- **Facebook AI Research International Scholarship** for DPhil at VGG, Oxford (2019 - 22, declined) 2019
- IIT Bombay CSE **Teaching Assistant of the month** (Feb '16 and Feb '17) award 2016 - 2017
- **All India Rank 44** in JEE Advanced (IIT-JEE) 2013 among 150,000 candidates qualified from 1.5 million 2013
- Gold Medal and rank **6 out of top 40** in India at OCSC for International Chemistry Olympiad '13 2013
- KVPY Fellowship from Government of India - All India Rank 22. 2011
- NTSE Scholarship from Government of India. 2008
- **Best/Top/Outstanding Reviewer** award for NeurIPS '19, '20, '22; ICML '20, '21; CVPR '21 & ICLR '22

TALKS

- **Towards Adaptive Intelligence**
 - Exa AI September 2024
 - Sage Bionetworks August 2024
 - University of Washington June 2024
 - Microsoft Research AI Frontiers May 2024
 - Snowflake May 2024
 - Google DeepMind May 2024
 - UT Austin Computer Science Colloquium April 2024
 - NVIDIA Research April 2024
 - Google Research April 2024
 - Microsoft Research India March 2024
 - IIT Bombay Computer Science & C-MInDS March 2024
 - Harvard University Computer Science & Kempner Institute Lecture February 2024
 - Columbia University Computer Science Colloquium February 2024
- **Indexing the World**
 - Hazy Research Lab @ Stanford November 2023
 - Scaled Foundations October 2023
 - MIT Vision and Graphics Seminar March 2023
 - Harvard Machine Learning Foundations Seminar March 2023
 - Google Research India February 2023

– H2Lab Seminar @ UW CSE	January 2023
• Matryoshka Representation Learning	
– Jina AI	March 2024
– ThursdAI	February 2024
– Weaviate Podcast	February 2024
– Mosaic ML	June 2023
– Neural Information Processing Systems (NeurIPS)	December 2022
– Pinterest Labs	September 2022
– Perception Spotlight @ Google Research	August 2022
– DeepPhenomena @ Google Research	August 2022
– Image Understanding @ Google Research	June 2022
• LLC: Accurate, Multi-purpose Learnt Low-dimensional Binary Codes	
– Image Understanding @ Google Research	February 2022
– Neural Information Processing Systems (NeurIPS)	December 2021
– Microsoft Research India	November 2021
– UC Berkeley Computer Vision Seminar	November 2021
– University of Washington CSE Colloquium	October 2021
• Soft Threshold Weight Reparameterization for Learnable Sparsity	
– International Conference on Machine Learning (ICML)	July 2020
– NVIDIA Research	July 2020
– Deep Learning: Classics and Trends	June 2020
• The Edge of Machine Learning	
– University of Washington CSE Colloquium & Sensor Systems Seminar	October 2019
– VGG @ Oxford University, UK	April 2019
– Microsoft Research Redmond	March 2019
– Microsoft Research India	August 2018
• The Extremes of Machine Learning	
– Microsoft Bing	March 2019

TEACHING EXPERIENCE

• <i>Co-instructor</i> – Computer Science and Engineering, University of Washington	
– CSE 493G1/599G1: Deep Learning w/ Prof. Ali Farhadi	Fall 2023
– CSE 493G1/599G1: Deep Learning w/ Prof. Ranjay Krishna	Spring 2023
• <i>Undergraduate Teaching Assistantship</i> – Computer Science and Engineering, IIT Bombay	
– Digital Logic Design - Prof. Supratik Chakraborty - TA of the month, Feb '17	Spring 2017
– Software Systems Lab - Prof. Sharat Chandran	Autumn 2016
– Digital Logic Design - Prof. Supratik Chakraborty - TA of the month, Feb '16	Spring 2016
– Computer Programming and Utilisation - Prof. Varsha Apte	Autumn 2015
– Computer Programming and Utilisation - Prof. Kavi Arya	Spring 2015

PROFESSIONAL SERVICE

• <i>Reviewing</i> : IEEE TPAMI, TMLR, NeurIPS (2019 - present), ICML (2020 - present), ICLR (2021 - present), CVPR (2021 - present), ICCV/ECCV (2021 - present), AAAI 2025.	
• <i>Workshop Organization</i>	
– ML in India Social	NeurIPS 2021
– Rethinking ML Papers	ICLR 2021
• <i>Mentorship</i>	
– Students (Position → Next Placement)	

* Ethan Shen [C.22, W.2] BS Student, UW CSE	2023 - 24
* Devvrit [C.19] PhD Student, UT Austin CS	2023 - 24
* Alan Fan [C.22, C.12, C.15] BS Student, UW CSE → Software Engineer @ LinkedIn	2023 - 24
* Pruthvi Raju Software Engineer, Google	2022 - 23
* Sharan Ranjit [C.12] MS student, UW ECE → Machine Learning Engineer @ Autodesk	2022 - 23
* Venkata Sailesh Sanampudi Software Engineer, Google	2022 - 24
* Umangi Jain [C.17] Pre-doc Researcher, Google Research India → PhD Student @ UofT CS	2022 - 23
* Avishree Khare Software Engineer, Google → Research Fellow @ MSR India → PhD Student @ UPenn CS	2022
* Gantavya Bhatt [C.9] PhD Student, UW ECE	2022 - 23
* Aniket Rege [C.9, C.12] MS Thesis, UW ECE → PhD Student @ UW–Madison CS	2022 - 23
* William Howard-Snyder [C.9] BS/MS Student, UW CSE	Fall 2021
* Sahil Verma PhD Student UW CSE	2021 - 22
* Oindrila Saha [C.5] Research Fellow, MSR India → PhD Student @ UMass CS	2019 - 21
* Sachin Goyal Research Fellow, MSR India → PhD Student @ CMU MLD	2019 - 21
* Nilesh Gupta [C.3, C.18] Research Fellow, MSR India → PhD Student @ UT Austin CS	2019 - 20
* Sahil Bhatia Research Fellow, MSR India → PhD Student @ UC Berkeley EECS	2018 - 20
* Sheshansh Agrawal Bachelor's Thesis, IIT Bombay → RSDE @ MSR India	2018 - 19
* Manish Singh [C.1] Bachelor's Thesis, IIT Delhi → PhD Student @ MIT EECS	2017 - 18

🏆 Best Undergraduate Thesis Award (2018), IIT Delhi

- New In ML session @ NeurIPS '19 2019
- MSR India Summer Workshop 2018: Machine Learning on Constrained Devices Summer 2018
- *Faculty Recruiting Liaison* - Paul G. Allen School of CSE, University of Washington 2020 - 2022
- *Student Area Chair (ML/AI): PhD Admissions* - Paul G. Allen School of CSE, University of Washington 2020 - 2022
- *Co-Founder & Organizing Committee Member* - Allen School PhD Pre-Application Mentorship Service (PAMS) 2021
- *Co-Founder & Co-Lead* - Allen School PhD Pre-Application Review Service (PARS) 2020
- *Department General Secretary* - Computer Science and Engineering, IIT Bombay 2016 - 2017