

Aditya Kusupati

Bill & Melinda Gates Center for Computer Science & Engineering
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RESEARCH INTERESTS

I focus on designing fundamental *Machine Learning* algorithms with strong empirical performance & real-world deployability geared towards enabling **efficient, elastic and contextual intelligence**.

EDUCATION

University of Washington, Seattle

2019 - present

PhD Candidate in Computer Science and Engineering

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 Research

January 2022 - Present

Student Researcher in Perception

Advisors: Dr. Prateek Jain, Tom Duerig & Dr. Rahul Sukthankar

Work 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. Leading multiple research and product adoption efforts with a team of interns, research, and software engineers.

Berkeley Artificial Intelligence Research Lab

Summer 2022

Visiting Researcher

Advisor: Prof. Alexei A. Efros

Worked on understanding the underlying discretization of the natural visual world through variable length representations.

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

2017 - 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

Preprints

* - equal contribution

2. **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.

Under Review, ICLR 2024.

Efficient Natural Language and Speech Processing workshop @ NeurIPS 2023 (Oral, 🏆 Best Paper Award).

Workshop on Advancing Neural Network Training @ NeurIPS 2023 (Oral).

1. **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.

Under Review, ICLR 2024.

Conference Publications

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**, Nilesh 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

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

- **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

• **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**

- 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

• *Co-instructor* – 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*

• *Undergraduate Teaching Assistantship* – 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

- *Reviewing*: IEEE TPAMI, TMLR, NeurIPS (2019 - present), ICML (2020 - present), ICLR (2021 - present), CVPR (2021 - present), ICCV/ECCV (2021 - present).
- *Workshop Organization*
 - ML in India Social NeurIPS 2021
 - Rethinking ML Papers ICLR 2021
- *Mentorship*
 - Students (Position → Next Placement)
 - * Ethan Shen [W.2]
BS Student, UW CSE 2023 -
 - * Devvrit [P.2]
PhD Student, UT Austin CS 2023 -
 - * Alan Fan [C.12, C.15]
BS Student, UW CSE 2023 -
 - * 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 -
 - * Umangi Jain
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, P.1]
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