Lovish Madaan

Meta | UCL

lvm@fastmail.com

https://lovishmadaan.github.io

Education

University College London and Meta — London, UK
Ph.D. in Computer Science — *Sept 2023 - Present*

Indian Institute of Technology (IIT), Delhi — New Delhi, India
B.Tech + M.Tech in Computer Science — *July 2015 - July 2020*

Work Experience and Research

Meta, Research Assistant — London, UK
Scaling Research Team — *Sept 2023 - Present*

- *Research*: Working on predictable scaling for Reinforcement Learning for LLMs and scaling RL for long-horizon tasks. Relevant Publications: Predictable Scaling in RL, Iterative Self-Improvement .
- *Llama Reasoning*: Worked on Reinforcement Learning recipes and long thinking post-training for new Llama models.
- *Llama 3*: Core contributor for math-specific post-training along with evaluations for models in the Llama 3 family.

Google Research, Pre-Doctoral Researcher — Bangalore, India
Machine Learning and Optimization Team — *July 2021 - July 2023*

- *Efficient Transformers*: Developed *Treeformer*, a new self attention module leveraging decision trees to reduce FLOPs and inference time in the attention layer by 6x while matching performance on benchmarks like GLUE and LRA. Proposed bootstrapping techniques for stable training of the discrete trees in the end-to-end neural pipeline.
- *LLM Inference*: Evaluated the performance of weight-based pruning and post-training quantization techniques on accuracy and inference time of large language models like LaMDA. Investigated neural architecture search (NAS) techniques to reduce the size of feed-forward layers and the communication cost across multiple TPU devices.
- *Scaling with Efficiency*: Probed ways to scale large transformer models for longer sequence lengths using sparse structures for the attention and feed-forward layers.

Google Research, Research Associate — Bangalore, India
AI for Social Good Team — *Dec 2020 - July 2021*

- *Resource-Constrained Planning*: Developed a Restless Multi-Armed Bandits (RMABs) solution for intervention planning problems with resource constraints for real-world deployment. Used demographic information and engagement data to infer the transition probabilities of the MDPs in RMAB.
- *Pilot Study*: Conducted a pilot study on 23,000 beneficiaries in collaboration with a non-profit, showing efficacy of RMABs in improving retention of the beneficiaries by over 32%. Coverage: Google AI Blog

Level AI, Applied AI Engineer — New Delhi, India
Applied NLP and Engineering Team — *July 2020 - Dec 2020*

- Implemented the question answering module over textual knowledge base and incorporated in the chat-based product. Developed the annotation pipeline in the product to collect data and perform automatic evaluation of existing models. Developed an extract and rank search system over text documents using Elastic Search and semantic similarity models.

Data Analytics and Intelligence Research Lab — IIT Delhi
Advisors: Prof. Parag Singla, Prof. Sayan Ranu — *Jan 2019 - July 2020*

- *Master's Thesis*: Designed semi-supervised models for Machine Translation (MT) leveraging monolingual data and linguistic structure. Built SoTA MT models for low [web] resource languages using transfer learning.
- *Research Project*: Worked with Graph Attention Networks in node classification and link prediction tasks for small and large scale graphs. Explored unsupervised pre-training in Graph Neural Networks for n-ary link prediction.

Appropriate Computing Technologies for Development Lab — IIT Delhi
Research Project, Advisor: Prof. Aaditeshwar Seth — *Jan 2018 - Jan 2019*

- Worked on forecasting and anomaly detection in commodity prices using multivariate time series and neural models.

Select Publications

- Devvrit Khatri*, **Lovish Madaan***, Rishabh Tiwari, Rachit Bansal, Sai Surya Duvvuri, Manzil Zaheer, Inderjit S. Dhillon, David Branfonbrener, Rishabh Agarwal. "The Art of Scaling Reinforcement Learning Compute for LLMs". *ICLR 2026*. Paper
- **Lovish Madaan**, Aniket Didolkar, Suchin Gururangan, John Quan, Ruan Silva, Ruslan Salakhutdinov, Manzil Zaheer, Sanjeev Arora, Anirudh Goyal. "Rethinking Thinking Tokens: LLMs as Improvement Operators". Paper
- Yunhao Tang, Sid Wang, **Lovish Madaan**, Rémi Munos. "Beyond Verifiable Rewards: Scaling Reinforcement Learning for Language Models to Unverifiable Data". *NeurIPS 2025*. Paper
- Deepak Nathani, **Lovish Madaan**, Nicholas Roberts, Nikolay Bashlykov, ..., Roberta Raileanu. "MLGym: A New Framework and Benchmark for Advancing AI Research Agents". *COLM 2025*. Paper
- Albert S. Yue, **Lovish Madaan**, Ted Moskovitz, DJ Strouse, Aaditya K. Singh. "HARP: A challenging human-annotated math reasoning benchmark". Paper
- **Lovish Madaan**, David Esiobu, Pontus Stenetorp, Barbara Plank, Dieuwke Hupkes. "Lost in Inference: Rediscovering the Role of Natural Language Inference for Large Language Models". *NAACL 2025*. Paper
- **Core Contributor**, Llama Team. "The Llama 3 Herd of Models". Paper
- **Lovish Madaan**, Aaditya K. Singh, Rylan Schaeffer, Andrew Poulton, Sanmi Koyejo, Pontus Stenetorp, Sharan Narang, Dieuwke Hupkes. "Quantifying Variance in Evaluation Benchmarks". *RegML Workshop, NeurIPS 2024*. Paper
- **Lovish Madaan**, Srinadh Bhojanapalli, Himanshu Jain, Prateek Jain. "Treeformer: Dense Gradient Trees for Efficient Attention Computation". *ICLR 2023*. Paper
- 🏆 **Lovish Madaan***, Aditya Mate*, Aparna Taneja, Neha Madhiwalla, Shresth Verma, Gargi Singh, Aparna Hegde, Pradeep Varakantham, Milind Tambe. "Field Study in Deploying Restless Multi-Armed Bandits: Assisting Non-Profits in Improving Maternal and Child Health". *AAAI 2022*. Paper. **Best Paper Award** in the Workshop on Machine Learning in Public Health (MLPH), NeurIPS 2021.

  * - indicates equal contribution.

Awards & Honors

- *Best Paper Award*: Machine Learning for Health (MLPH) Workshop, NeurIPS 2021
- *HPC-IITD Award for Research, 2019-20*: Awarded computational credits worth 10,741 USD for Master's Thesis Project
- *Microsoft Research Travel Grant, 2019*: Presentation of paper in COMPASS Conference held at Accra, Ghana
- *Impact Challenge, 2018*: Ranked first for positive impact of summer internship project at AXA XL
- *JEE Advanced, 2015*: All India Rank 124 out of 150,000 candidates
- *National Top 1%, 2015*: National Standard Examination in Physics and Chemistry conducted by HBCSE
- *KVPY Scholar, 2013*: Accorded fellowship by Department of Science and Technology, Government of India
- *NTSE Scholar, 2011*: Secured sixth position nationwide in National Talent Search Examination

Teaching Experience

- *Teaching Assistant*: Natural Language Processing, Spring 2024/2025, University College London
- *Teaching Assistant*: Machine Learning, Spring 2020, IIT Delhi
- *Teaching Assistant*: Reinforcement Learning, Fall 2019, IIT Delhi