

Ramnath Kumar

ramnathkumar181@gmail.com ✉ ◇ ramnathkumar181.github.io 🌐 ◇ Google Scholar 📄

RESEARCH INTERESTS & SUMMARY

My research interests broadly cover deep learning, focusing on designing **robust** and **efficiency** techniques for designing practical deep learning systems. I am specifically interested in applications surrounding representation learning and optimization of training paradigms for these models.

EDUCATION

University of California, Los Angeles (UCLA)

PhD. in Computer Science

. Mentor: [Cho-Jui Hsieh](#) , UCLA Samueli School of Engineering

Los Angeles, USA

09/2024 – Present

BITS Pilani, Hyderabad Campus

B.E. in Computer Science, MSc. in Economics

Hyderabad, India

08/2016 – 08/2021

SELECTED RESEARCH/WORK EXPERIENCE

Google DeepMind

Pre-Doctoral Researcher in MLO Group & Ads ML Team

. Mentors: [Prateek Jain](#) and [Inderjit S. Dhillon](#)

- . Developed an end-to-end efficient retrieval architecture (EHI) [3], that improved upon prior retrieval benchmarks by up to **1.45%** at a fixed compute budget. This effort is slated for integration into various Google products.
- . Led a cross-functional team in developing and deploying RGD [2] solutions in product-driven research, improving performance of ViT by up to **1.01%** on ImageNet-1K.
- . Received [recognition](#) for efforts in improving related product retrieval for users across the world. Took initiative in proposing a novel end-to-end retrieval architecture, improving efficiency and robustness in ongoing projects, with contributions recognized in 🌐.

Bangalore, India

07/2022 – 08/2024

Google Research

Research Associate in Machine Learning and Optimization Group (MLO)

. Mentor: [Dheeraj Nagaraj](#)

- . Devised Introspective Experience Replay (IER), a replay buffer sampler inspired by other reverse-experience-replay (RER), with potential to enhance convergence of RL algorithms such as DQN, TD3, and more [6] by up to **7x** speedup.

Bangalore, India

04/2022 – 07/ 2022

Mila - Quebec Artificial Intelligence Institute

Consultant

. Mentor: [Yoshua Bengio](#)

- . Initiated and led a project exploring the impact of diversity in meta-learning, collaborating closely with his group. Designed and executed experiments, leading to an oral presentation at AAAI [4] that challenged the conventional wisdom of diversity being strictly useful to meta-learning.

Montreal, Canada

07/2021 – 03/2022

Amazon ML

Applied Scientist Intern

. Mentor: Gokul Swamy

- . Published at Amazon's internal conference (AMLC 2021) and investigated causal attributions and its significance within the Amazon sales model at capacity of first-author.

Bangalore, India



01/2021 – 06/2021

- Mentors: [Amit P. Sheth](#) and [Krishnaprasad Thirunarayan](#)
- Collaborated with a large team from multiple time-zones and worked on a research project at the capacity of a first-author. Developed a sybil detection system in darknet markets using an unsupervised multi-view framework [5].

PUBLICATIONS

- [1] [Towards Building efficient Routed systems for Retrieval](#)
Ramnath Kumar, Prateek Jain, and Cho-Jui Hsieh
U.S. Patent Application, 2025; Preprint will be released shortly.
- [2] [Stochastic Re-weighted Gradient Descent via Distributionally Robust Optimization](#)
Ramnath Kumar, Kushal Alpesh Majmundar, Dheeraj Mysore Nagaraj, and Arun Suggala
Transactions on Machine Learning Research, 2024.
[Google AI Blog Coverage](#).
- [3] [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, 2024.
- [4] [The Effect of diversity in Meta-Learning](#) 
Ramnath Kumar, Tristan Deleu, and Yoshua Bengio
AAAI, 2023 (Oral Paper).
[SyncedReview Blog Coverage](#).
- [5] [eDarkFind: Unsupervised Multi-view Learning for Sybil Account Detection](#) 
Ramnath Kumar, Shweta Yadav, Raminta Daniulaityte, Francois Lamy, Krishnaprasad Thirunarayan, Usha Lokala, and Amit Sheth
The Web Conference (WWW), 2020.
- [6] [Introspective Experience Replay: Look Back When Surprised](#) 
Ramnath Kumar and Dheeraj Nagaraj
Transactions on Machine Learning Research, 2024.
[Google Research: “Algorithms for efficient deep learning” Blog Coverage](#).
- [7] [Rethinking Learning Dynamics in RL using Adversarial Networks](#) 
Ramnath Kumar, Tristan Deleu, and Yoshua Bengio
NeurIPS Workshop on DeepRL, 2022.
- [8] [Temporal Dynamics and Spatial Content in IoT Malware detection](#) 
Ramnath Kumar and G Geethakumari
TENCON 2019.

SELECTED AWARDS AND HIGHLIGHTS

Quad Fellowship , Participated in a summit at the White House to discuss the role of emergent technologies and their policies 	2024
Graduate Dean’s Scholars Award , UCLA scholarship.	2024
Google Blog , RGD work [2] was highlighted, and well accepted 	2023
Awardee , NTSE Scholar.	2014-2020

RELEVANT COURSEWORK AND SKILLS

- **Math, Stats and Machine Learning:** Large-Scale Machine Learning, Convex Optimization, Calculus, Linear Algebra, Probability and Statistics, Differential Equations, Foundations of Data Science, Artificial Intelligence, Machine Learning, Information Retrieval
- **Programming Languages and Libraries:** Python, C++, Pytorch, Tensorflow, Jax, OpenCV