

# Ramnath Kumar

◇ [ramnathkumar181.github.io](https://ramnathkumar181.github.io)  ◇ [Google Scholar](#)  ◇

## RESEARCH INTERESTS & SUMMARY

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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

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### 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

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### 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

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- [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

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

## RELEVANT COURSEWORK AND SKILLS

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- **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