Ramnath Kumar

◇ ramnathkumar181.github.io 🌐 ◇ Google Scholar 🎓 ◇

RESEARCH INTERESTS & SUMMARY

My research centers on Deep Learning, with a particular emphasis on developing **robust** and **efficient** methods for building practical, real-world systems. I am especially interested in *representation learning* and in rethinking the optimization strategies that underpin modern training paradigms - seeking approaches that are not only scalable and generalizable but also adaptive to the diverse demands of deployment environments.

EDUCATION

University of California, Los Angeles (UCLA) U.S.A.
PhD. in Computer Science *09/2024 – 06/2028*
. Mentor: Cho-Jui Hsieh

BITS Pilani, Hyderabad Campus India
B.E. in Computer Science, and MSc. in Economics *08/2016 – 08/2021*

SELECTED RESEARCH/WORK EXPERIENCE

Google DeepMind India
Pre-Doctoral Researcher *07/2022 – 08/2024*
. Mentors: Prateek Jain and Inderjit S. Dhillon
. Led a cross-functional team in developing and deploying RGD in product-driven research, improving performance of ViT by up to **1.01%** on ImageNet-1K [1].
. Developed an End-to-End efficient retrieval architecture (EHI), 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 [2].
. 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 🌐.

Google Research India
Research Associate *04/2022 – 07/ 2022*
. Mentor: Dheeraj Nagaraj
. Developed Introspective Experience Replay (IER), a novel replay buffer sampling strategy inspired by Reverse Experience Replay (RER), demonstrating up to **7×** faster convergence in Reinforcement Learning algorithms such as DQN and TD3 [5].

Mila - Quebec Artificial Intelligence Institute Canada
Consultant *07/2021 – 03/2022*
. 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 the "*Association for the Advancement of Artificial Intelligence*" (AAAI) that challenged the conventional wisdom of diversity being strictly useful to meta-learning [3].

Amazon ML India
Applied Scientist Intern *01/2021 – 06/2021*
. Mentor: Gokul Swamy
. Led a study on causal attribution within Amazon's sales model as first author, with findings presented at Amazon's internal conference (AMLC 2021).

Kno.e.sis, Wright State University U.S.A.
Research Intern *05/2019 – 08/2019*
. Mentors: Amit P. Sheth and Krishnaprasad Thirunarayan
. Collaborated with a cross-functional research team across multiple time zones as first author on the *eDarkFind* project, where I developed an unsupervised multi-view framework for Sybil detection, specifically targeting Darknet market activities [4].

PUBLICATIONS

* Indicates that the authors contributed equally to this work.

[1] 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.

[2] 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.

[3] The Effect of diversity in Meta-Learning
Ramnath Kumar, Tristan Deleu, and Yoshua Bengio
Association for the Advancement of Artificial Intelligence (AAAI), 2023 (**Oral** Paper).
SyncedReview Blog Coverage.

[4] 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.

[5] Introspective Experience Replay: Look Back When Surprised
Ramnath Kumar and Dheeraj Nagaraj
Transactions on Machine Learning Research, 2024.
Google Research Blog Coverage.

[6] Rethinking Learning Dynamics in RL using Adversarial Networks
Ramnath Kumar, Tristan Deleu, and Yoshua Bengio
NeurIPS Workshop on DeepRL, 2022.

[7] Temporal Dynamics and Spatial Content in IoT Malware detection
Ramnath Kumar and G Geethakumari
IEEE TENCON, 2019.

SELECTED AWARDS AND HIGHLIGHTS

Quad Fellowship, Took part in a summit at the White House (U.S.A.) to discuss emerging technologies and their policy implications.	2024
Graduate Dean's Scholars Award, UCLA scholarship.	2024
Awardee, NTSE Scholar (India).	2014-2020