Ramnath Kumar

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

RESEARCH INTERESTS & SUMMARY

My research interests broadly span deep learning, with a focus on designing **robust** and **efficient** techniques for building practical deep learning systems. I am particularly interested in representation learning and the optimization of training paradigms for such models.

EDUCATION

University of California, Los Angeles (UCLA) — Los Angeles, USA
PhD. in Computer Science — *09/2024 – Present*
. Mentor: Cho-Jui Hsieh

Birla Institute of Technology and Science (BITS) — Hyderabad, India
B.E. in Computer Science, and MSc. in Economics — *08/2016 – 08/2021*

SELECTED RESEARCH/WORK EXPERIENCE

Google DeepMind — Bangalore, India
Pre-Doctoral Researcher at Google — *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 — Bangalore, India
Research Associate at Google — *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 — Montreal, 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 — Bangalore, 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 Dayton, USA
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

[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
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, 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

Awardee, NTSE Scholar. 2014-2020