Rishabh **Tiwari**

Pre-Doctoral Researcher, Google Research

@ UserID - akchitra99@gmail.com   🌐 Homepage   🐙 Github   🎓 Google Scholar

Education

Aug 2022 **Jul 2018**	**Indian Institute of Technology, (ISM) Dhanbad** *Bachelor of Technology in Engineering Physics, Minor in Artificial Intelligence* › Received full tuition scholarship in recognition of exceptional academic performance.	**GPA: 9.02/10** *Dept. Rank 2*

Research Experience

Jul 2022 **Present**	**Pre-Doctoral Researcher, Google Research** *Advisor: Dr. Pradeep Shenoy* Research Topics: Simplicity Bias [C8], Robust distillation [C7], Interpretable AI [C5]	**Bangalore, India**
May 2021 **Apr 2022**	**Student Researcher, Google Research** *Advisors: Dr. Pradeep Shenoy, Prof. Rishabh Iyer* Research Topics: Continual Learning [C6]	**Bangalore, India**
May 2021	**Founding Member, Transmute AI Labs** *Advisor: Dr. Deepak K. Gupta, Prof. Dilip K. Prasad* Research Topics: Network Compression [C3], Meta Learning [C2]	**UiT Norway**
May 2020 **May 2021**	**Student Researcher, University of Amsterdam** *Advisor: Dr. Deepak K. Gupta* Research Topics: Network Compression [C4]	**Remote**

Conference Publications

Robustness

[C.8] **Overcoming Simplicity Bias in Deep Networks Using a Feature Sieve** [🔗]
Rishabh Tiwari, Pradeep Shenoy
Fortieth International Conference on Machine Learning — **[ICML'23]**

[C.7] **Using Early Readouts to Mediate Featural Bias in Distillation** [🔗]
Rishabh Tiwari, Durga Sivasubramanian, Anmol Mekala, Ganesh Ramakrishnan, Pradeep Shenoy
IEEE/CVF Winter Conference on Applications of Computer Vision — **[WACV'24]**

Interactive and Adaptive ML

[C.6] **GCR: Gradient Coreset based Replay Buffer Selection for Continual Learning** [🔗]
Rishabh Tiwari, Krishnateja Killamsetty, Rishabh Iyer, Pradeep Shenoy
The IEEE/CVF Conference on Computer Vision and Pattern Recognition 2022 — **[CVPR'22]**

[C.5] **Interactive Concept Bottleneck Models** [🔗]
Kushal Chauhan, **Rishabh Tiwari**, Jan Freyberg, Pradeep Shenoy, Krishnamurthy Dvijotham
The 38th Annual AAAI Conference on Artificial Intelligence — **[AAAI'23]**

Efficient ML

[C.4] **Chipnet: Budget-aware pruning with heaviside continuous approximations** [🔗]
Rishabh Tiwari, Udbhav Bamba, Arnav Chavan, Deepak K. Gupta
The Ninth International Conference on Learning Representations — **[ICLR'21]**

[C.3] **Rescaling cnn through learnable repetition of network parameters** [🔗]
Arnav Chavan, Udbhav Bamba, **Rishabh Tiwari**, Deepak K. Gupta
The 28th IEEE International Conference on Image Processing — **[ICIP'21]**

[C.2] **Dynamic Kernel Selection for Improved Generalization and Memory Efficiency in Meta-learning** [🔗]
Rishabh Tiwari*, Arnav Chavan*, Udbhav Bamba, Deepak K. Gupta
The IEEE/CVF Conference on Computer Vision and Pattern Recognition 2022 — **[CVPR'22]**

[C.1] **On designing light-weight object trackers through network pruning: Use CNNs or transformers?** [🔗]
S. Aggarwal, T. Gupta, P. Sahu, A. Chavan, **Rishabh Tiwari**, Dilip K. Prasad, Deepak K. Gupta
2023 IEEE International Conference on Acoustics, Speech and Signal Processing — **[ICASSP'23]**

Workshop Organization @ ICCV '23

[W.1] **Workshop on Resource Efficient Deep Learning for Computer Vision** [🔗]
Rishabh Tiwari*, Arnav Chavan*, Deepak K. Gupta* et. al.
Speakers: Prof. Song Han, Prof. Anima Anandkumar, Dr. Prateek Jain, Prof. Efstratios Gavves
Competitions Organized: Training Track, Inference track   [**ICCV-W'23**]

Selected Research Projects

Mitigating Featural Biases in Neural Nets   Google Research
Advisors: Dr. Pradeep Shenoy, Dr. Praneeth Netrapalli

> Developed an interventional method for **addressing simplicity bias** in DNNs, called as *feature sieve*.

> Obtained upto **11.4% relative gain** in accuracy over state-of-the-art methods on Imagenet-A. [ICML'23]

> Proposed an early readout mechanism to produce more robust models via distillation. [WACV'24]

> Improved resnet18 student model by **5.2% in worst-group accuracy** on CelebA.

Replay Buffer Selection for Continual Learning   UT Dallas
Advisors: Dr. Pradeep Shenoy, Prof. Rishabh Iyer

> Proposed an optimization-driven criterion for **selecting and updating coresets** in continual learning. [CVPR'22]

> Works in **all settings** - offline/online, task/class-incremental

> Achieved over **2-4% improvements** in offline settings and upto **5%** in online settings over sota.

Interactive Concept Bottleneck Models   Google Deepmind
Advisor: Dr. Pradeep Shenoy, Dr. Krishnamurthy (Dj) Dvijotham

> Extended concept bottleneck models to interactive predictive settings. [AAAI'23]

> Achieved accuracy gains of **5-10%** with only 5 interactions over competitive baselines on the Caltech-UCSD Birds, CheX-pert and OAI datasets.

Resource Efficient Machine Learning   University of Amsterdam
Advisor: Dr. Deepak K. Gupta

> Developed a flexible **budget aware structured pruning** approach *ChipNet* that is stable for extreme pruning. [ICLR'21]

> Outperformed sota structured pruning methods by remarkable margins of **16.1% accuracy**.

> A framework to produce **compressed task specific models** in meta-learning achieving **3x FLOPs reduction** on mini-ImageNet dataset. [CVPR'22]

Selected Honors and Awards

> **Kaggle Competitions Master**: Became the youngest Indian Kaggle Competitions Master at the age of 18 in 2020. [Profile]

> **Winner** of first ever national level **Amazon ML Challenge 2021** with over 3k+ participating teams, received an internship offer and a cash price of 1 lakhs INR.

> **Winner** at Innerve 4.0, Pune's largest hackathon; developed a AI assisted medical system '*Medidoc*' to detect severe yet curable diseases at an early stage. [Demo]

> **Received Scholarship** to attend Naamii 2019, the second Nepal Winter School of AI held at Pokhara, Nepal; awarded to international students with exceptional profile.

Notable Positions of Responsibility

> **Workshop Organization**
> > Resource Efficient Deep Learning for Computer Vision   ICCV'23

> **Mentorship**
> > Aarush Jain, Intern, Google Research India   2023
> > Saksham Aggarwal, Taneesh Gupta, Pawan Kumar Sahu, Research Intern, Transmute AI Research   2021-23

> **Volunteer** at COLT 2023, Bangalore   2023

> **Student Coordinator** at Cyber Labs, the official cyber society of IIT (ISM), Dhanbad   2020-22

Key Courses Undertaken

Machine Learning	Deep Learning Specialization (Deeplearning.ai), CS231n (Stanford University), Machine Learning (Stanford University, AndrewNg)
CS and Maths	Data Structures and Algorithms, Linear Algebra, Numerical, Statistical Methods