Rishabh **Tiwari**

Pre-Doctoral Researcher, Google Research

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Education

Aug 2022 – Jul 2018 | **Indian Institute of Technology, (ISM) Dhanbad** **GPA: 9.01/10**
Bachelor of Technology in Engineering Physics, Minor in Artificial Intelligence
Dept. Rank 2
-> Received merit-cum-means scholarship in recognition of exceptional academic performance.

Research Experience

Jul 2022 – Present | **Google Research** **Bangalore, India**
Pre-Doctoral Researcher | Advisor: Dr. Pradeep Shenoy
-> Worked on research problems around simplicity bias, robust distillation and interpretable AI
-> Led mutliple collaborations with IIT Bombay, IIT Madras and Google Deepmind.
-> Resulted in 3 publications in top tier conferences [AAAI'23, ICML'23, WACV'24].

May 2021 – Apr 2022 | **Google Research** **Bangalore, India**
Research Intern, Student Researcher | Advisor: Dr. Pradeep Shenoy, Prof. Rishabh Iyer
-> Collaborated with UT Dallas on a research problem around replay based continual learning, presented our work at [CVPR'22].
-> Recognized for the quality of contributions, subsequently offered a part-time Student Researcher position to continue the research while completing my bachelors and a pre-placement offer to join full time.

May 2020 – Present | **Transmute AI Research** **Tromsø, Norway**
Co-founding member, Senior Researcher | Advisor: Dr. Deepak K. Gupta, Prof. Dilip K. Prasad
-> **co-founded** a research lab to foster research culture among peers and aspiring researchers, solicited funding by Texmin Hub and Bio-AI Lab of UiT Norway.
-> Guided **10+ UG students** from different colleges to pursue research.
-> Worked on research problems around network compression, meta-learning and efficient ML leading to 4 publications so far [ICLR'21, ICIP'21, CVPR'22, ICASSP'23].

Conference Publications

[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]**

[C.6] **Interactive Concept Bottleneck Models** [🔗]
Kushal Chauhan, **Rishabh Tiwari**, Jan Freyberg, Pradeep Shenoy, Krishnamurthy Dvijotham
The 38th Annual AAAI Conference on Artificial Intelligence **[AAAI'23]**

[C.5] **On designing light-weight object trackers through network pruning: Use CNNs or transformers?** [🔗]
Saksham Aggarwal, Taneesh Gupta, Pawan K. Sahu, Arnav Chavan,
Rishabh Tiwari, Dilip K. Prasad, Deepak K. Gupta
2023 IEEE International Conference on Acoustics, Speech and Signal Processing **[ICASSP'23]**

[C.4] **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.3] **Dynamic Kernel Selection for Improved Generalization and Memory Efficiency in Meta-learning** [🔗]
Arnav Chavan*, **Rishabh Tiwari***, Udbhav Bamba, Deepak K. Gupta
The IEEE/CVF Conference on Computer Vision and Pattern Recognition 2022 **[CVPR'22]**

[C.2] **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.1] **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]**

Workshop Publications

[W.1] **RCV2023 Challenges: Benchmarking Model Training and Inference for Resource-Constrained Deep Learning** [🔗]
Rishabh Tiwari*, Arnav Chavan*, Deepak K. Gupta* et. al.
RCV Workshop, ICCV 2023 **[ICCV-W'23]**

Selected Research Projects

Mitigating Featural Biases in Neural Nets
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
Advisors: Dr. Pradeep Shenoy, Prof. Rishabh Iyer

- Developed 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.

Resource Efficient Machine Learning
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 — 2023
    Intern, Google Research India (w/ Dr. Pradeep Shenoy)
  - Saksham Aggarwal, Taneesh Gupta, Pawan Kumar Sahu — 2021-23
    Research Intern, Transmute AI Research (w/ Dr. Deepak K. Gupta)
- **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