

Sachin Goyal

Ph.D. Student, Machine Learning Department
Carnegie Mellon University
Advisor: [Prof. Zico Kolter](#)

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EDUCATION

Carnegie Mellon University
Ph.D. in Machine Learning
Advisor: [Prof. Zico Kolter](#)

Pittsburgh, US
August '21 - Current

Indian Institute of Technology Bombay

B.Tech in Electrical Engineering with Minors in Computer Science and Engineering
GPA: 9.11/10
Advisor: [Prof. Subhasis Chaudhuri](#)

India
July '15 - August '19

WORK EXPERIENCE

Microsoft Research, India

Research Fellow in Machine Learning and Optimization Group
Advisors: [Dr. Prateek Jain](#) and [Dr. Harsha Vardhan Simhadri](#)

Worked on resource-efficient and large-scale machine learning resulting in top-tier publication and Microsoft product impact.

Bangalore
July '19 - June '21

RESEARCH INTERESTS

Domain Adaptation, Robust Fine-Tuning of Pretrained Models

PREPRINTS

Finetune like you pretrain: Improved finetuning of zero-shot vision models

Sachin Goyal, Ananya Kumar, Sankalp Garg, Zico Kolter, Aditi Raghunathan.
Under Review

PUBLICATIONS

MET : Masked Encoding for Tabular Data

Kushal Majmudar, **Sachin Goyal**, Praneeth Netrapalli and Prateek Jain.
Tabular Representation Learning Workshop @ NeurIPS, 2022 [Paper]

Test Time Adaptation via Conjugate Pseudo-Labels

Sachin Goyal*, Mingjie Sun*, Aditi Raghunathan and Zico Kolter.
Advances in Neural Information Processing Systems (NeurIPS), 2022. [Paper]

PAL: Pretext-based Active Learning.

Shubhang Bhatnagar, **Sachin Goyal**, Darshan Tank, Amit Sethi.
British Machine Vision Conference (BMVC), 2021. [Paper]

DROCC: Deep Robust One-Class Classification.

Sachin Goyal, Aditi Raghunathan, Moksh Jain, Harsha Simhadri and Prateek Jain.
In *International Conference on Machine Learning (ICML), 2020.* [Paper]

Indoor Distance Estimation using LSTMs over WLAN Network

Pranav Sankhe, Saqib Azim, **Sachin Goyal**, Tanya Choudhary, Kumar Appaiah, Sukumar Srikant
India Patent Application 201821047043, filed Dec' 2018. Patent Pending.
In *IEEE Workshop on Positioning, Navigation and Communications (WPNC), 2019.* [Paper]

Improving Self Super Resolution in Magnetic Resonance Images.

Sachin Goyal, Can Zhao, Amod Jog, Jerry L. Prince, Aaron Carass.
In *SPIE Conference on Medical Imaging and Biomedical Applications, 2018.* [Paper]

SELECTED PROJECTS

Robust fine-tuning of Image-Language Models

Advisor: Prof. Aditi Raghunathan and Prof. Zico Kolter

June '22 - Ongoing, CMU

Finetuning Image-Language models like CLIP give state-of-the-art accuracies on a variety of benchmarks. However, subtle differences in fine-tuning procedure lead to surprisingly large differences in in-distribution (ID) and out-of-distribution (OOD) accuracies. In our work, we show that simply using the same loss as pretraining, for fine-tuning the model on downstream labeled dataset outperforms alternative and complex fine-tuning approaches. Our work highlights that across various settings, using similar loss functions as pre-training leads to better adaptation to distribution shifts. (*Under Review*)

Test Time Domain Adaptation

Advisor: Prof. Zico Kolter and Prof. Aditi Raghunathan

Sept '21 - May '22, CMU

Distribution shifts between training and test data is a pretty ubiquitous phenomenon. Most of the approaches for adapting to distribution shifts, require a prior access to the unlabeled data from the target domain, which is not always feasible. In our work, we develop a general class of unsupervised loss functions, which one can optimize at test-time, over the test samples, to adapt to the test distribution in an online fashion i.e. adapt while making predictions at the same time. (*Published at NeurIPS '22*)

Low False Positive Rate (FPR) Classifiers for WakeWord Detection

[ICML 2020]

Advisors: Dr. Prateek Jain & Dr. Harsha Simhadri

Sept '19 - May '20, Microsoft Research

Wake-word systems (like Alexa and Cortana), activate when a particular “wake-word” is spoken. A low False Positive Rate (FPR) is a critical requirement in these systems. This is typically done by training a neural network on a corpus of both “wake-word” and “non-wake word” datasets, which is quite expensive. We proposed an efficient approach based on learning the “manifold” of wake-word samples, predicting inputs more than a threshold away from the manifold as a negative i.e. not a wake-word. This removes the requirement of training on a “non-wake word” corpus, significantly improving the efficiency. Our proposed approach, gave classifiers with upto 10% better recall at a fixed FPR across various data modalities like time-series data, tabular and image data. (*Published at ICML '20*)

EdgeML : Phonemes based KeyWord Spotting (KWS) on Resource Constrained Devices [Project]

Advisors: Dr. Prateek Jain & Dr. Harsha Simhadri

June '20 - May '21, Microsoft Research

Edge Machine Learning aims to develop ML algorithms deployable on severely-resource constrained devices like microcontrollers, where the RAM and Flash are as low as **2MB**. We developed state-of-the-art **1mB** size phoneme prediction models, which were then used for various downstream tasks like keyword spotting on an ARM Cortex M7 processor. (*EdgeML Official Microsoft Repository Link*)

STUDENT MENTORSHIP

Sankalp Garg : MS Student @ CMU MLD → Applied Scientist @ Amazon

Robust fine-tuning of image-language models.

Kushal Majmundar : Pre-doc Researcher @ Google Research India

Representation learning for unstructured tabular data.

Shubhang Bhatnagar : UG Student @ IIT Bombay → PhD Student @ UIUC

Active learning and efficient training of neural networks.

MISCELLANEOUS

Service

- Conference Reviewing: PODS @ ICML' 22, SafeML @ NeurIPS' 22, AISTATS' 23
- Undergraduate Teaching Assistant : Biology 101 2017
- Hostel System Administrator , IIT Bombay 2019
- National Cadet Corps (NCC), Indian Air Force '15-'17

REFERENCES

Prof. Zico Kolter

Associate Professor, Carnegie Mellon University
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Prof. Aditi Raghunathan

Assistant Professor, Carnegie Mellon University
Contact: raditi@cs.cmu.edu

Dr. Prateek Jain

Sr. Staff Research Scientist, Google AI
Contact: prajain@google.com