Arpit Bansal

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Research Interests

My broad research interest lies in improving the understanding of Deep Neural Networks empirically and hence improving its training and inference. My research work ranges from algorithmic synthesis with neural networks to watermarking neural networks to investigating neural network's behaviors. Currently, I am understanding the mechanisms behind the working of diffusion models and thus improving them for different AI generation tasks.

Education

University of Maryland, College Park — *College Park*
PhD in Computer Science $(4.0/4.0)$ — *Jan 2021 - present*
- Advisor: Prof. Tom Goldstein
- Dean's Fellowship

Indian Institute of Technology, Kharagpur — *Kharagpur, India*
Bachelors + Masters in Electrical Engineering — *Aug 2014 - May 2019*
- Minor in Computer Science
- Advisor: Prof. Rajiv Ranjan Sahay

Industry Experience

July 2019 - Dec 2020	**Software Developer**, Visa Incorporated, India
May 2018 - July 2018	**Software Developer Intern**, Visa Incorporated, India
May 2017 - July 2017	**Software Developer Intern**, Fission Labs, India

Publications

End-to-end Algorithm Synthesis with Recurrent Networks: Logical Extrapolation Without Overthinking
A. Bansal*, A. Schwarzchild*, E. Borgnia, Z. Emam, F. Huang, M. Goldblum, T. Goldstein
Conference on Neural Information Processing Systems (Neurips) 2022

Certified Neural Network Watermarks with Randomized Smoothing
A. Bansal*, P. Yeh Chiang*, M. Curry, R. Jain, C. Wigington, V. Manjunatha, J. P Dickerson, T. Goldstein
International Conference on Machine Learning (ICML - Spotlight) 2022

Can You Learn the Same Model Twice? Investigating Reproducibility and Double Descent from the Decision Boundary Perspective
G. Somepalli, L. Fowl, **A. Bansal**, P. Yeh Chiang, Y. Dar, R. Baraniuk, M.GoldBlum, T. Goldstein
Conference on Computer Vision and Pattern Recognition (CVPR - Oral) 2022

Transfer Learning with Deep Tabular Models
R. Levin*, V. Cherepanova*, A. Schwarzschild†, **A. Bansal**†, C Bayan Bruss, T. Goldstein, A. G. Wilson, M. Goldblum
International Conference on Learning Representations (ICLR) 2023

Canary in a Coalmine: Better Membership Inference with Ensembled Adversarial Queries
Y. Wen, **A. Bansal**, H. Kazemi, E. Borgnia, M. Goldblum, J. Geiping, T. Goldstein
International Conference on Learning Representations (ICLR - Spotlight) 2023

Gradient-based optimization is not necessary for generalization in neural networks
P. Yeh Chiang, R. Ni, D. Yu Miller, **A. Bansal**, J. Geiping, M. Goldblum, T. Goldstein
International Conference on Learning Representations (ICLR - Spotlight) 2023

Preprints

Cold Diffusion: Inverting Arbitrary Image Transforms Without Noise
A. Bansal, E. Borgnia, H. Chu, J Li, H. Kazemi, F. Huang, M. Goldblum, J. Geiping, T. Goldstein

MetaBalance: High-Performance Neural Networks for Class-Imbalanced Data
A. Bansal, M. Goldblum, V. Cherepanova, A. Schwarzschild, C Bayan Bruss, T. Goldstein

Datasets for studying generalization from easy to hard examples
A. Schwarzschild, E. Borgnia, A. Gupta, **A. Bansal**, Z. Emam, F. Huang, M. Goldblum, T. Goldstein

Preventing unauthorized use of proprietary data: Poisoning for secure dataset release
L. Fowl, P. yeh Chiang, M. Goldblum, J. Geiping, **A. Bansal**, W. Czaja, T. Goldstein

Pag-net: Progressive attention guided depth super-resolution network
A. Bansal, S. Jonna, R. R Sahay

Teaching Experience

Fall 2021 **Control Systems**, Teaching Assistant — *University of Maryland, College Park*
Spring 2021 **Operating Systems**, Teaching Assistant — *University of Maryland, College Park*

Relevant Course-work

Machine Learning — Information Retrieval (IIT), Machine Learning (IIT), Speech and NLP (IIT), Deep Learning (UMD) Algorithms in Machine Learning (UMD)

Signal Processing — Digital Signal Processing (IIT), Statistical Signal Processing (IIT), Probability and Stochastic Processes (IIT), Random Processes (UMD), Information Theory (UMD), Numerical Analysis I (UMD), Advanced Numerical Optimization (UMD)