

# Arpit Bansal

COLLEGE PARK MD, USA

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## Research Interests

My research primarily revolves around the empirical analysis and optimization of Deep Neural Network architectures with the aim of improving their training and inference mechanisms. I am particularly interested in a range of vision tasks, including text-to-image generation, image editing, and image reasoning. My work in these areas incorporates both diffusion and autoregressive methods to address various challenges in image processing. Additionally, I have investigated algorithmic synthesis via neural networks to enable logical reasoning and developed robust watermarking techniques to maintain the security and integrity of neural network models.

## Education

### University of Maryland, College Park

PHD CANDIDATE IN COMPUTER SCIENCE (3.925/4.0)

- Advisor: Prof. Tom Goldstein
- Dean's Fellowship

College Park

Jan 2021 - present

### Indian Institute of Technology, Kharagpur

BACHELORS + MASTERS IN ELECTRICAL ENGINEERING

- Minor in Computer Science
- Advisor: Prof. Rajiv Ranjan Sahay

Kharagpur, India

Aug 2014 - May 2019

## Industry Experience

May 2024 -  
Present

### Meta GenAI @ Llama

AI Research Scientist Intern

In collaboration with the Llama team, developing multi-modal Generative Models with a focus on image reasoning and multi-turn image editing in any-to-any models.

June 2023 -  
Aug 2023

### Amazon AWS AI labs

Applied Science Intern

Examined the challenges of existing Text-to-Image Diffusion models' low fidelity and devised a novel approach to produce high-fidelity images conditioned on text.

July 2019 -  
Dec 2020

### Visa Incorporated, India

Software Developer

Designed an NLP engine for intuitive English queries and an impactful Recommendation System, earning a Visa Trade Secret. Introduced a Merchant Rating system based on transaction nature, recognized with another Trade Secret for its Research and Development.

May 2018 -  
July 2018

### Visa Incorporated, India

Software Developer Intern

Developed a robust algorithm to discern relationships among thousands of database columns by analyzing their English-named titles and the frequency of their combined queries.

## Selected Publications

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### **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  
*Conference on Neural Information Processing Systems (Neurips) 2023*

### **Universal guidance for diffusion models**

**A. Bansal\***, H. Chu\*, A. Schwarzschild, S. Sengupta, M. Goldblum, J. Geiping, T. Goldstein  
*International Conference on Learning Representations (ICLR) 2024*

### **End-to-end Algorithm Synthesis with Recurrent Networks: Logical Extrapolation Without Overthinking**

**A. Bansal\***, A. Schwarzschild\*, 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  
*Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR - Oral) 2022*

### **Transfer Learning with Deep Tabular Models**

R. Levin\*, V. Cherepanova\*, A. Schwarzschild<sup>†</sup>, **A. Bansal<sup>†</sup>**, 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*

## Teaching Experience

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Fall 2021 **Control Systems**, Teaching Assistant  
Spring 2021 **Operating Systems**, Teaching Assistant

*University of Maryland, College Park*  
*University of Maryland, College Park*

## Relevant Course-work

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<b>Machine Learning</b>	Information Retrieval (IIT), Machine Learning (IIT), Speech and NLP (IIT), Deep Learning (UMD), Algorithms in Machine Learning (UMD)
<b>Signal Processing</b>	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)