VASU SINGLA

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RESEARCH STATEMENT

My research interests center on multimodal learning, robustness, and responsible AI. Recently, I have focused on developing improved text+image datasets and addressing safety and privacy risks associated with generative models, particularly in text-to-image generation.

EDUCATION

University of Maryland, College Park August 2021 - May 2025 (Expected)
Ph.D. in Computer Science
Advisor: Prof. Tom Goldstein, Prof. David Jacobs

University of Maryland, College Park August 2019 - May 2021
M.S in Computer Science GPA: 4.0/4.0

Punjab Engineering College, Chandigarh July 2014 - June 2018
B.Tech. + Minors GPA: 8.2/10

SELECTED PUBLICATIONS

Visit my Google Scholar Link for all publications
∗ denotes equal contribution

- Transferring Encoders From Small Vision-Language Models to Giants — Under Review
  K. Yue, **V. Singla**, M. Jia, R. Qadri, Z. Cai, T. Goldstein, A. Bhatele, F. Huang
- From Pixels to Prose: A Large Dataset of Dense Image Captions — Tech Report
  V. Singla*, K. Yue*, S. Paul, R. Shirkavand, M. Jayawardhana, A. Ganjdanesh, H. Huang, A. Bhatele, G. Somepalli, T. Goldstein
- PUP 3D-GS: Principled Uncertainty Pruning for 3D Gaussian Splatting — Under Review
  A. Hanson, A. Tu, **V. Singla**, M. Jayawardhana, M. Zwicker, T. Goldstein
- A Simple and Efficient Baseline for Data Attribution on Images — NeurIPS ATTRIB Workshop
  V. Singla, P. Segura, M. Goldblum, J. Geiping, T. Goldstein
- Understanding and Mitigating Copying in Diffusion Models — NeurIPS 2023
  G. Somepalli, **V. Singla**, M. Goldblum, J. Geiping, T. Goldstein
- What Can We Learn from Unlearnable Datasets? — NeurIPS 2023
  Pedro Sandoval-Segura, **Vasu Singla**, Jonas Geiping, Micah Goldblum, Tom Goldstein
- Learning with noisy labels using low-dimensional model trajectory — NeurIPS DistShift Workshop
  V. Singla, T. Koike-Akino, M. Brand, K. Parsons, S. Aeron, Y. Wang
- Diffusion Art or Digital Forgery? Investigating Data Replication in Diffusion Models — CVPR 2023
  G. Somepalli, **V. Singla**, M. Goldblum, J. Geiping, T. Goldstein
- Autoregressive Perturbations for Data Poisoning — NeurIPS 2022
  P. Segura*, **V. Singla***, J. Geiping, M. Goldblum, T. Goldstein, D. Jacobs
- Poisons that are learned faster are more effective — CVPR AROW Workshop
  P. Segura, **V. Singla**, L. Fowl, J. Geiping, M. Goldblum, D. Jacobs, T. Goldstein

- Shift Invariance Can Reduce Adversarial Robustness — NeurIPS 2021
  V. Singla*, S. Ge*, R. Basri, D. Jacobs
- Low Curvature Activations Reduce Overfitting in Adversarial Training — ICCV 2021
  V. Singla, S. Singla, S. Feizi, D. Jacobs

RESEARCH EXPERIENCE

Google Research — July 2024 - Nov 2024
Student Researcher

- Worked on multi-modal foundation models for climate change.

Cruise Research — Jan 2023 - May 2023
Research Intern

- Developed novel applications of diffusion models for Autonomous Vehicle systems.
- Trained image-conditioned inpainting diffusion models for internal datasets.

Mitsubishi Electric Research Labs — June 2022 - Aug 2022
Research Intern

- Proposed new optimization algorithms to improve accuracy on datasets with noisy labels. Explored the role of data quality and labels on the robustness of ML systems.

Apple — June 2021 - Aug 2021
Research Intern

- Selected as the **top-8 out of 100s of interns** to present work to the **Senior VP of AI/ML Organization at Apple**.
- Proposed new data augmentation techniques to boost performance on low-resource accents for Automatic Speech Recognition models.

University of Maryland — January 2020 - Present
Research Assistant

- Worked with Prof. Tom Goldstein on safety and privacy risks of generative models.
- Worked with Prof. David Jacobs on adversarial examples.

Indian Institute of Technology (IIT), Bombay — January 2019 - July 2019
Research Staff

- Developed a novel system for automated symbol detection, text detection and object association in documents for structured parsing, analysis and information retrieval.

AWARDS

NeurIPS 2023 Travel Award, ICLR 2021 Travel Award, UMD Dean's Fellowship

ACADEMIC SERVICE

Grants - Co-wrote and won Amazon Research Award Grant for Building Safer Diffusion models, winning over 50K USD in funding.
Reviewer Conferences - CVPR 2022, ECCV 2022, CVPR 2023, ICCV 2023, NeurIPS 2023, ICLR 2024, NeurIPS 2024
Reviewer Journals - CVIU, Pattern Recognition Letters
Volunteer Services - ICML 2021, NeurIPS 2023, Peer Mentoring Service @ UMD