Ritik Raina

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EDUCATION

Stony Brook University **08/23 – 06/27** *(expected)*
Ph.D. in Cognitive Science *Stony Brook, NY*

University of California, San Diego **09/18 – 06/22**
B.S. in Cognitive Science and *Minor* in Computer Science *La Jolla, CA*

WORK EXPERIENCE

Stony Brook University, *Graduate Student Researcher* **08/23 – Present**

- Developed a multi-resolution latent diffusion model conditioned on sparse eye-tracking features that efficiently generates photorealistic scenes from minimal visual input, modeling egocentric human scene understanding. (CCN'25)
- Leading development of a 3D-aware latent diffusion framework for compositional scene generation, leveraging triplanar representations to learn object-centric 3D features from single 2D images; enables novel view synthesis of multi-object scenes without multi-view supervision.

Intel Corporation, *Researcher* **01/22 – 06/23**

- Developed inline real-time PC anomaly detection integrated with Intel's telemetry pipeline, using bi-LSTM forecasting and outlier detection on hardware/OS metrics for proactive performance monitoring.
- Integrated edge-based multi-task facial emotion recognition with telemetry anomaly detection to enable context-aware user frustration detection.

de Sa Lab (UCSD), *Pre-doctoral Researcher* **02/21 – 06/23**

- Developed bio-inspired CNN architectures and adaptive RNNs, enabling dynamic halting for improved image classification and zero-shot reasoning in various visual reasoning tasks. (NeurIPS'23, VSS'23, COSYNE'23, NeurIPS'21)
- Investigated bias mitigation in deep facial recognition models using synthetic data generation, quantifying how facial morphology and skin tone impacted performance in emotion classification and AU detection tasks. (NeurIPS'22)

SELECT PUBLICATIONS

- **Generating metamers of human scene understanding**
  Raina, R., Leite, A., Graikos, A., Ahn, S., Samaras, D., Zelinsky, G.| Under Submission
- **Seen2Scene: a generative model of fixation-by-fixation scene understanding** [Paper]
  Raina, R., Leite, A., Graikos, A., Ahn, S., Zelinsky, G. | CCN 2025
- **Modeling human scene understanding fixation-by-fixation using generative models** [Paper]
  Raina, R., Graikos, A., Leite, A., Ahn, S. & Zelinsky, G. | VSS 2025 **(Talk)**
- **Generating objects in peripheral vision using attention-guided diffusion models** [Paper]
  Raina, R., Ahn, S. & Zelinsky, G. | VSS 2024, OPAM 2024 **(Best Poster Award)**
- **Adaptive recurrent vision performs zero-shot computation scaling to unseen difficulty levels** [Paper]
  Veerabadran, V., Ravishankar, S., Tang, Y., **Raina, R.**, & de Sa, V. R. | NeurIPS 2023
- **Cortically motivated recurrence enables visual task extrapolation** [Poster]
  Veerabadran, V., Ravishankar, S., Tang, Y., **Raina, R.**, & de Sa, V. R. | VSS 2023, COSYNE 2023
- **Exploring Biases in Facial Expression Analysis using Synthetic Faces** [Paper]
  Raina, R., Monares, M., Xu, M., Fabi, S., Xu, X., Li, L., Sumerfield, W., Gan, J., & de Sa, V.R. | SD4ML (NeurIPS Workshop) 2022
- **Bio-inspired learnable divisive normalization for ANNs** [Paper]
  Veerabadran, V., **Raina, R.**, & de Sa, V. R.| SVRHM (NeurIPS Workshop) 2021

PROJECTS

- **Self-supervised Contrastive Learning Framework for Satellite Image Representations** [Code]
  Developed a self-supervised contrastive learning model for satellite image classification, leveraging synthetic training images generated by latent diffusion and ViT MAE to improve representation robustness and classification accuracy.
- **Brain-inspired Modeling and Benchmarking** [Code]
  Research project based upon the task of developing and testing bio-inspired models in robust semantic segmentation, object recognition tasks.

TECHNICAL SKILLS

Languages: Python (proficient), C/C++ (moderate), Julia, MATLAB, R, Bash, LaTeX
Frameworks: PyTorch (proficient), TensorFlow / Keras (proficient), OpenAI Gym, CUDA, OpenCV, Jupyter, git
Misc tools: Kubernetes, Mechanical Turk