Ritik Raina
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Education

- **Stony Brook University** — Stony Brook, NY
  Ph.D. in Cognitive Science — **08/2023 – 06/2027 (***expected)*
  - **Research directions**: Developing multimodal generative models, bridging human and machine visual perception.
- **University of California, San Diego** — La Jolla, CA
  B.S. in Cognitive Science — **09/2018 – 06/2022**

Work Experience

- **EyeCog Lab - Stony Brook University**, Graduate Student Researcher — **08/2023 - Present**
  Advisor: *Dr. Gregory Zelinsky*
  - Leading a project utilizing diffusion models to synthesize latent object representations that reverse engineer human perceptual mechanisms, providing key insights into the computational basis of human object perception.
- **de Sa Lab - UC San Diego**, Pre-doctoral Researcher — **02/2021 - 06/2023**
  Advisor: *Dr. Virginia R. de Sa*
  - Developed and integrated DivNormEI, a novel bio-inspired convolutional unit, on ResNet/VGG backbones for enhanced image classification and semantic segmentation.
  - Worked on building adaptive convolutional RNNs with dynamic halting to learn conditional compute allocation for zero-shot generalization on visual reasoning tasks like Pathfinder and Mazes.
  - Built a novel synthetic face image dataset with controlled variations to facial tone and morphology. Utilized this dataset to explore the racial biases exhibited by various state-of-the-art FER networks.
  - Papers summarizing our research accepted at NeurIPS, VSS, and COSYNE.
- **Intel Corporation**, Researcher — **01/2022 - 06/2023**
  Mentors: *Dr. Jamel Tayeb, Dr. Farnaz Abdollahi, Dr. Bijan Arbab, Dr. Virginia R. de Sa*
  - Led a project to develop a novel edge-based multi-modal anomaly detection library on PC performance metrics aimed at enhancing metric prediction and user experience.
  - Built real-time facial sentiment analysis pipeline using 3D CNN and EfficientNet-B7 models on webcam video. Integrated predictions to enhance context for edge anomaly detection.
  - Designed few-shot Bi-LSTM architectures optimized for PC metric prediction from limited samples. Achieved >90% accuracy despite sparse training data.

Select Publications

- **Generating objects in peripheral vision using diffusion models**
  Raina, R., Ahn, S. & Zelinsky, G.
  Vision Sciences Society (**VSS**) 2024
- **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.
  Neural Information Processing Systems (**NeurIPS**) 2023
- **Cortically motivated recurrence enables visual task extrapolation** [Poster]
  Veerabadran, V., Ravishankar, S., Tang, Y., **Raina, R.**, & de Sa, V. R.
  Vision Sciences Society (**VSS**) 2023, Computational and Systems Neuroscience (**COSYNE**) 2023

- **Analyzing Biases in AU Activation Estimation Toward Fairer Facial Expression Recognition** [Paper]
  Monares, M., Tang, Y., **Raina, R.**, & de Sa, V.R.
  ACM SIGKDD Conference on Knowledge Discovery and Data Mining (**KDD**) 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.
  SyntheticData4ML Workshop (**NeurIPS**) 2022

- **Bio-inspired divisive normalization improves object recognition performance in ANNs** [Poster]
  Veerabadran, V., **Raina, R.**, & de Sa, V. R.
  Vision Sciences Society (**VSS**) 2022

- **Bio-inspired learnable divisive normalization for ANNs** [Paper] [Poster]
  Veerabadran, V., **Raina, R.**, & de Sa, V. R.
  SVRHM Workshop (**NeurIPS**) 2021

Honors & Awards

- Financial grants awarded for supporting my research:
  IBM-UCSD Research Collaboration (07/2020 - 04/2021)
  UCSD-HDSI & Intel DCA Collaboration (01/2022 - 06/2023)

Skills

Languages	Python (proficient), C++ (moderate), Julia, MATLAB, R, Bash, LaTeX
Frameworks	PyTorch (proficient), TensorFlow / Keras (proficient), OpenAI Gym, CUDA, OpenCV, git
Technologies	Mechanical Turk, AWS, Google Cloud

Mentoring

- **Stony Brook University**, Graduate Teaching Assistant
  Survey in Cognition and Perception, Prof. Gregory Zelinsky **Spring 2024**

- ***Stony Brook University***, Graduate Teaching Assistant
  Memory, Prof. Suparna Rajaram **Fall 2023**

Professional Service

- Reviewer for NeurIPS (2022, 2023)