

# Ritik Raina

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<https://github.com/rainarit>

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## EDUCATION

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- **UC San Diego** La Jolla, CA  
*B.S. in Cognitive Science with Specialization in Machine Learning and Neural Computation* Sept 2018 – June 2022
  - **Research directions:** Brain-inspired deep learning for computer vision, unsupervised learning.

## RESEARCH EXPERIENCE

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- **Intel Corporation** 01/2022 - Present  
*Student Researcher*  
Advisors: *Dr. Virginia R. de Sa, Dr. Jamel Tayeb*
  - Working on facial expression analysis and its incorporation in edge-based computing.
- **de Sa Lab, UC San Diego** 02/2021 - Present  
*Research Assistant*  
Advisors: *Vijay Veerabadrán, Dr. Virginia R. de Sa*
  - Researched in developing DivNormEI, a novel bio-inspired convolutional network that performs divisive normalization, along with lateral inhibition/excitation interactions, tailored for integration into modern deep neural networks. This research is supported by the **Sony Research Award Program**.
  - Integrated DivNormEI into existing deep learning models for semantic segmentation to produce increased accuracy and robustness.
  - DivNorm models outperformed Baseline-VGG9 models on the ImageNet-100 validation set by 1.8% on image classification.
  - Work accepted in **Shared Visual Representations in Human & Machine Intelligence (SVRHM) Workshop at NeurIPS 2021**.
  - Work submitted as part of **Collaborative Research in Computational Neuroscience (CRCNS) 2022** grant.
- **CSAIL, MIT** 06/2021 - 09/2021  
*Visiting Student*  
Advisors: *Vaikkunth Mugunthan, Dr. Lalana Kagal*
  - Working on federated learning capabilities with autonomous driving vehicles.
  - Researching to find out whether the use of multi-task learning via multiple model connections would improve the current SOTA accuracy on autonomous driving.
- **IBM-CMI AI Horizons Network** 07/2020 - 04/2021  
*Undergraduate Researcher - Machine Learning*  
Academic Mentor: *Dr. Yoshiaki Vasquez Baeza*  
Industry Mentors: *Dr. Niina Haiminen, Dr. Laxmi Parida, Dr. Ho-Cheol Kim*
  - Worked with the Artificial Intelligence for Healthy Living (AIHL) team to make microbial ontology classification scale efficiently.
  - Developed CostaClassifier, a Hybrid BioBERT-RF Model that predicts hierarchical ontologies using data corresponding to both metagenomic and metadata profiles.
  - Finetuned BioBERT for biomedical text-mining tasks under metagenomics profiles.
  - Evaluated strategies to optimize memory and GPU utilization while deploying models at scale.

## EMPLOYMENT

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- **STAR Capital**

07/2019 - 09/2019

*Research Intern*

Mentor: *Dr. Tony Liu*

- Worked with the Data Science team to research and develop a deep learning based system for long-term face tracking from proprietary databases.
- Applied a Cascade-CNN model with the utilization of a VGG16 network for face detection/verification.
- Deployed further improvements such as applying a multi-patch tracking for tracking faces in consequent frames.
- Developed a QT desktop application to utilize my model and further populate the facial database.

## PUBLICATIONS

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- **Bio-inspired learnable divisive normalization for ANNs**

Veerabadran, V., Raina, R., de Sa, V.R. (2021). NeurIPS workshop on Shared Visual Representations in Human & Machine Intelligence, 2021.

[\[Paper link\]](#)

## SELECT PROJECTS / CODE

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- **Bio-inspired Model Benchmarking**

02/2021 - Present

[https://github.com/rainarit/segmentation\\_benchmark](https://github.com/rainarit/segmentation_benchmark)

- Research project based upon the task of developing and testing bio-inspired models in semantic segmentation and object recognition. This is done in PyTorch.

## HONORS & AWARDS

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- Financial grants awarded for supporting my undergraduate research:  
IBM-UCSD Research Collaboration (07/2020 - 04/2021)

## SELECTED COURSEWORK

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- COGS 188 (Prof. Anjum Gupta). Artificial Intelligence Algorithms
- COGS 118A (Prof. Jason Fleischer). Intro to Machine Learning I (Supervised Learning) (**Upcoming**)
- COGS 118B (Prof. Virginia de Sa). Intro to Machine Learning II (Unsupervised Learning)
- CSE 152A (Prof. Hao Su). Intro to Computer Vision I

## INVITED TALKS

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- Barts and The London School of Medicine and Dentistry

March 2021

## PROGRAMMING SKILLS

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- **Languages:** Python, Java, C++, Matlab, Swift
- **Frameworks:** PyTorch, Tensorflow, Caffe, scikit-learn
- **Miscellaneous:** Kubernetes, Mechanical Turk, Google Cloud