Rohit Kumar Jena

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Education

University of Pennsylvania — Philadelphia, PA
Ph.D. in Computer and Information Science — *2021 – Present*
Advisors: Prof. James Gee, Prof. Pratik Chaudhari

Carnegie Mellon University — Pittsburgh, PA
Master of Science in Robotics — *2019 – 2021*
Advisor: Prof. Katia Sycara — *GPA: 4.19/4.0*

Indian Institute of Technology, Bombay — Mumbai, India
B.Tech. with Honors in Computer Science and Engineering — *2015-2019*
Advisor: Prof. Suyash Awate — *GPA: 9.54/10*
Received the **Research Excellence Award** for outstanding research work during undergraduate

Research Interests

Computer Vision, Deep Learning, Medical Image Computing

Conference and Journal Publications

Beyond mAP: Towards better evaluation of instance segmentation
Rohit Jena, Lukas Zhornyak, Nehal Doiphode, Pratik Chaudhari, Vivek Buch, James Gee, Jianbo Shi
Conference on Computer Vision and Pattern Recognition (**CVPR**) 2023
Highlight paper (top 10% of accepted submissions, 2.5% of all submissions)

Self supervised Vessel Enhancement using Flow-Based Consistencies
Rohit Jena, Sumedha Singla, Kayhan Batmanghelich
International Conference on Medical Image Computing and Computer-Assisted Intervention (**MICCAI**) 2021
Early Accept, MICCAI 2021 Student Travel Award

Transfer Learning for Human Navigation and Triage Strategies Prediction in Search and Rescue Task
Yue Guo, **Rohit Jena**, Dana Hughes, Michael Lewis, Katia Sycara
International Conference on Robot and Human Interactive Communication (**RO-MAN**) 2021

Augmenting GAIL with behavior cloning for sample efficient imitation learning
Rohit Jena, Changliu Liu, Katia Sycara
(Long version) Conference on Robot Learning (**CoRL**) 2020
(Short version) RSS Workshop on Advances & Challenges in Imitation Learning for Robotics 2020, *Invited Paper*

Learning Image Inpainting from Incomplete Images using Self-Supervision
Sriram Yenamandra, Ansh Khurana, ***Rohit Jena***, Suyash Awate
International Conference on Pattern Recognition (**ICPR**) 2020

A Bayesian Neural Net to Segment Images with Uncertainty Estimates and Good Calibration
Rohit Jena, Suyash Awate
International conference on Information Processing in Medical Imaging (**IPMI**) 2019
Oral Presentation, *opening talk of conference, acceptance rate ∼11%*

Perfect MCMC Sampling in Bayesian MRFs for Uncertainty Estimation in Segmentation
Suyash P. Awate, Saurabh Garg, ***Rohit Jena***
Medical Image Analysis (**MedIA**) 2019, 55:181-196, Elsevier

Workshop publications

MA^3: Model Agnostic Adversarial Augmentation for Few Shot learning
Rohit Jena, Shirsendu Sukanta Halder, Katia Sycara
Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops 2020
CVPR Workshop on Learning with Limited Labels 2020
🏆 **Oral Presentation, Best Paper Award**

Automated Density Estimation in Microcirculation using Advection-diffusion
Rohit Jena, Pratik Chaudhari, James Gee, John Greenwood
The 14th International Conference on Information Processing in Computer-Assisted Interventions (**IPCAI**) 2023

Addressing reward bias in Adversarial Imitation Learning with unbiased reward functions
Rohit Jena, Siddharth Agrawal, Katia Sycara
Deep Reinforcement Learning Workshop, **NeurIPS** 2020

Predicting Human Strategies in Simulated Search and Rescue Task
Vidhi Jain, ***Rohit Jena***, Huao Li, Tejus Gupta, Katia Sycara, Dana Hughes, Micheal Lewis
AI + Humanitarian Assistance and Disaster Response Workshop, **NeurIPS** 2020

Preprints

Mesh Strikes Back: Fast and Efficient Human Reconstruction from RGB videos
Rohit Jena, Pratik Chaudhari, James Gee, Ganesh Iyer, Siddharth Chaudhary, Brandon M. Smith
Under submission

Theses

Learning Mental Models of Experts in a Simulated Search and Rescue Scenario
Rohit Jena, Katia Sycara
Master Thesis, Robotics, Carnegie Mellon University, 2021

Perfect Sampling and Uncertainty Estimation in Deep Networks
Rohit Jena, Suyash Awate
Undergraduate Thesis, Computer Science and Engineering, IIT Bombay, 2019

Work Experience

Research Scientist Intern May 2022 - July 2022
Amazon Lab 126 *Sunnyvale, CA*
Manager: Brandon M. Smith
Implemented NeRF-mesh hybrids for human avatar reconstruction from monocular video sequences. Proposed a novel optimization scheme that reduces training time from 48hours and multiple GPUs to 50 minutes with a single GPU, leading to 24x speedups in training time and 192x speedups in inference. Manuscript submitted to top computer vision conference for peer review.

Research Assistant Aug 2021 - Present
University of Pennsylvania *Philadelphia, PA*
Advisor: Prof. Jianbo Shi, Prof. James Gee
Implemented a contrastive flow field and semantic sorting algorithm for instance segmentation. Improved F1-score on five datasets by upto a factor of 2.71× and proposed a Semantic NMS which has a 6.03× speedup over Mask NMS.

Graduate Research Assistant Oct 2019 - Aug 2021
Carnegie Mellon University *Pittsburgh, PA*
Advisor: Prof. Katia Sycara
Deployed Machine Theory of Mind models to predict intent and subgoals of human players in a rescue scenario, outperforming human observers by 2.74 %. The model was effective at action prediction and intervention.

Research Assistant April 2020 - August 2021
Carnegie Mellon University / University of Pittsburgh *Pittsburgh, PA*

Advisor: Prof. Kayhan Batmanghelich
Proposed a Deep Learning framework for self-supervised vessel segmentation without ground truth labels, outperforming other SOTA unsupervised methods by 7% Dice score. Our method gets rid of hyperparameter tuning, and converges faster than other self-supervised methods.

Undergraduate Research Assistant January 2018 - May 2019
Indian Institute of Technology, Bombay *Mumbai, India*
Proposed a novel mathematics framework for *exact* analytic formulation of aleatoric uncertainty, outperforming baselines in a suite of over 12 metrics. The proposed formulation also leads to reduction in expected calibration error (ECE) by upto 11%.

Remote Research Assistant July 2018 - Dec 2018
WhiteRabbit.ai *Mumbai, India*
Proposed and implemented various spatial attention architectures with Spatial Transformer Networks for cancer detection in mammography images.

Data Scientist Intern Summer 2018
Microsoft R&D India *Hyderabad, India*
Proposed a lightweight, end-to-end framework for object segmentation that can run on smartphones natively.

Undergraduate Research Assistant July 2018 - April 2019
Indian Institute of Technology, Bombay *Mumbai, India*
Advisor: Prof. Arjun Jain
Combined Part Affinity Fields and Detectron models to minimize false negatives in multi-human pose estimation.

Review Experience

- Conference on Computer Vision and Pattern Recognition (**CVPR**) - 2022, 2023
- International Conference on Computer Vision (**ICCV**) - 2023
- European Conference on Computer Vision (**ECCV**) - 2022
- International Journal of Computer Vision (**IJCV**)
- International Conference on Machine Learning (**ICML**) - 2020, 2021
- International Conference on Learning Representations (**ICLR**) - 2023, 2024
- Neural Information Processing Systems (**NeurIPS**) - 2021
- Medical Image Computing and Computer Assisted Intervention (**MICCAI**) - 2020, 2021, 2022
- SPIE Medical Imaging 2024
- CVPR workshop on Learning with Limited Labels, 2020

Selected Awards and Honors

- Received **Research Excellence Award** for outstanding research work during undergraduate 2019
- Awarded Travel Grant from the C'1992 Legacy Project Funds to present at IPMI 2019 2019
- Ranked **1st** out of 116 students in the course 'Artificial Intelligence' 2018
- Ranked **1st** out of 97 students in the course 'Fundamentals of Digital Image Processing' 2017
- Honorable Mention in ACM ICPC Regionals held at Bangalore 2016
- **Ranked 57th** in IIT JEE-Advanced 2015 out of over 150,000 candidates 2015
- Secured 99.97 percentile in JEE-Main 2015 out of 1.3 million candidates 2015
- Secured **All India Rank 175** in the KVPY examination 2014

Projects

Addressing reward bias in Adversarial Imitation Learning with unbiased reward functions 2020
Official Implementation in Tensorflow [Paper] [Code]

Augmenting GAIL with BC for sample efficient imitation learning 2020
Official Implementation in PyTorch [Paper] [Code]

MA^3: Model Agnostic Adversarial Augmentation for Few Shot learning 2020
Official Implementation in PyTorch [Paper] [Code]

Variational Autoencoder with Arbitrary Conditioning 2019
ICLR Reproducibility Challenge 2019 [Paper] [Code]

Adversarial Pose Estimation 2019
Unofficial Implementation of ICCV 2017 paper "Adversarial PoseNet" [Paper] [Code]

Objects that Sound 2018
Unofficial Implementation of ECCV 2018 paper "Objects that Sound" [Paper] [Code]

Image Quilting for Texture Synthesis 2018
Unofficial Implementation of the paper "Image Quilting for Texture Synthesis and Transfer" [Paper] [Code]

Automatic Watermark Detection and Removal 2017
Unofficial Implementation of the CVPR 2017 paper "On The Effectiveness Of Watermarks" [Paper] [Code]

Key Skills

Languages: Python, C++ (& CUDA), C, bash, MATLAB, HTML, CSS, Javascript, C#, Coq

Libraries: PyTorch, Tensorflow, sklearn, scikit-image, OpenCV, Tensorboard, jQuery, AngularJS

Tools: Vim, slurm, Git, LaTeX, AndroidSDK, VSCode, Inkscape

Teaching Experience

Undergraduate Teaching Assistant **IIT Bombay**

- Computer Programming, *Prof. Ganesh Ramakrishnan* Spring 2019
- Data Interpretation and Analysis, *Prof. Ajit Rajwade & Prof. Suyash Awate* Autumn 2018
- Software Systems Lab, *Prof. Kavi Arya* Autumn 2017
- Calculus, *Prof. Amiya K. Pani* Autumn 2016