Rushil Anirudh

Resumé

✉ *rushil15anirudh@gmail.com*
scholar.google.com/citations?user=WkoIlpQAAAAJ

Education

March 2016 **PhD**, *Arizona State University*, Tempe, *GPA 3.95/4.00*.
Advisor: Dr. Pavan Turaga
Thesis: Statistical and Dynamical Modeling of Riemannian Trajectories with Application to Human Movement Analysis [Thesis Online]

June 2012 **MS**, *Arizona State University*, Tempe.

April 2010 **B.Tech**, *National Institute of Technology Karnatka (NITK)*, Surathkal, India.

Experience

7/18 - Now **Computer Scientist**, *Machine Intelligence Group @ LLNL*.
Current Projects: (1) Generalization and robustness of ML models; (2) ML for high repetition lasers; (3) Rep learning for knowledge graphs; (4) computational imaging for 4D X-ray CT. ML consultant on several other efforts. [Group webpage]

10/19 - Now **Director**, *Open Data Initiative*, [webpage].
Leading the effort to curate and organize LLNL's rich data ecosystem towards the goal of open sourcing science datasets to drive scientific machine learning. Recognized by AI.gov under strategic pillars for AI R&D [link] and National Security Commission on Artificial Intelligence (NSCAI) as a "pathfinder mission" [page 448]

10/16 - 7/18 **Postdoctoral Researcher**, *Lawrence Livermore National Laboratory*.
Contributed to various research efforts in machine learning, deep learning, computer vision, and high dimensional data analysis.

4/16 - 10/16 **Postdoctoral Researcher**, *IBM Research - Almaden*, San Jose, CA.
Contributed to the image analytics/de-identification for PHI datasets for the medical sieve grand challenge. [Group web-page]

Summer 2015 **Research Scholar**, *Lawrence Livermore National Laboratory*, Livermore, CA.
Efficient lung nodule detection and segmentation from CT scans using 3D CNNs.
Mentors: Dr. Peer-Timo Bremer and Dr. Jayaram J. Thiagarajan.

Summer 2014 **Intern**, *Dropcam Inc. (now part of Nest Labs/Google)*, San Francisco, CA.
Explored methods to estimate accuracy of human detectors with minimal supervision.
Mentor: Dr. Jason Laska.

Summer 2013 **Research Intern**, *Intuitive Surgical Inc.*, Sunnyvale, CA.
Worked on developing, and testing new sensor processing and fusion algorithms for robust real-time surgical robotic navigation.
Mentor: Dr. Vincent Duindam.

Summer 2009 **Undergraduate Intern**, *Institut polytechnique de Grenoble (INPG)*, France.
Developed an interface to study the spatio-temporal model of the retina and understand how patients with macular degeneration performed image categorization.

Grant Awards

- PI on LDRD (DOE) grant to characterize extrapolation in DNNs: $1.725M (10/21 - 9/24)
- PI on ISCP (institutional) grant to curate LLNL's Data Ecosystem: $240K (10/19 - 09/22)
- Co-PI on LDRD grant next gen. ML (promoted to PI for FY21): $1.5M (10/18 - 09/21)
- Co-PI on LDRD grant on exploring rep. learning for ECG data: $560K (10/17 - 09/19)

Honors & Awards

- ICLR 2022 Highlighted Reviewer [Link] (Apr 2022)
- ICLR 2021 Outstanding Reviewer (May 2021)
- WACV 2021 Best Paper Honorable Mention Award for Generative Patch Priors (Jan 2021)
- Recognized as a top reviewer for ICML 2020. (Sept 2020)
- Part of GOLD award winning team at LLNL for our COVID-19 modeling efforts. (Aug 2020)
- Invited to participate in the Dagstuhl seminar on Interpretability in ML [Link] (Nov 2019)
- Placed 2/50 in LLNL's Annual Research Slam Competition with a prize of $3000. (Oct 2018)
- Awarded Outstanding Reviewer for Journal Computer Methods in Bio-medicine. (Aug 2018)
- My work was profiled by LLNL [Link] (Aug 2018)
- Featured on LLNL's Data Science Institute Spotlight [Link] (July 2018)
- NVIDIA's AI blog featured our paper on GANs for Inverse Problems [Link to Article] (June 2018)
- Invited to perform Academic Program Review at Arizona State University. (Apr 2018)
- Awarded Outstanding Reviewer for Journal Pattern Recognition. (Oct 2017)
- Travel grant of $350 to attend DCC 2015. (Apr 2015)
- Co-Chair of the annual tech symposium with a budget of $50K. (Oct 2009)
- Head of IEEE chapter with a 300+ strong student body. (July 2009 - April 2010)
- Gold medal for being among the top 0.1% in India in Chemistry by CBSE (June 2006)

Service

- Area Chair for WACV 2022.
- Co-Organizer of DiffCVML Workshop at CVPR 2021. [workshop webpage]
- Session Chair at Asilomar 2020
- Program Committee: ICLR, NeurIPS, CVPR, ICCV, AAAI, ICML, ECCV, WACV, FG, ICVGIP
- Journal Reviewer: IEEE Transactions on Medical Imaging, ACM-Computing Surveys, Pattern Recognition Letters, Pattern Recognition, Computer Vision and Image Understanding, IEEE Trans. Image Processing.

Selected Publications

(H-index: 19, Citations: 1100+, as of Mar 2023)
Some recent papers are listed, broadly grouped by topic; see my Google Scholar profile for an exhaustive list

Generative Modeling and its applications

1. M. Olson, S. Liu, **R. Anirudh**, et al., *Cross-GAN Auditing: Unsupervised Identification of Attribute Level Similarities and Differences between Pre-trained Generative Models*, accepted to CVPR (2023).
2. S. Liu, **R. Anirudh**, J. J. Thiagarajan, P. T., Bremer, *Sparsity Improves Unsupervised Attribute Discovery in StyleGAN*, in ICASSP [paper] (2022).

3. M. Olson, S. Liu, **R. Anirudh** et al., *Unsupervised Attribute Alignment for Characterizing Distribution Shift* in DistShift NeurIPS Workshop, [paper] (2021).
4. **R. Anirudh**, S. Lohit, P. Turaga, *Generative Patch Priors for Practical Compressive Image Recovery* in WACV (Best Paper Honorable Mention) [paper] [code], (2021).
5. S. Lohit, **R. Anirudh**, P. Turaga, *Recovering Trajectories of Unmarked Joints in 3D Human Actions Using Latent Space Optimization* in WACV [paper] (2021).
6. Q. Li, B. Kailkhura, **R. Anirudh** et al. *MR-GAN: Manifold Regularized Generative Adversarial Networks for Scientific Data* in SIAM Journal on Mathematics of Data Science [paper], (2021).
7. **R. Anirudh**, J.J. Thiagarajan, B. Kailkhura, P.T. Bremer, *MimicGAN: Robust Projection onto Image Manifolds with Corruption Mimicking* in IJCV [paper], (2020).
8. V. Narayanaswamy, J. J. Thiagarajan, **R. Anirudh**, A. Spanias, *Unsupervised audio source separation using generative priors*, in INTERSPEECH [paper] (2020).
9. **R. Anirudh** et al. *Improving Limited Angle CT Reconstruction with a Robust GAN Prior*, in Deep Inverse Workshop at NeurIPS (2019).
10. **R. Anirudh** et al. *Exploring Generative Physics Models with Scientific Priors in Inertial Confinement Fusion*, in Machine Learning for Physical Sciences Workshop at NeurIPS [paper] (2019).

Robustness, Uncertainty Quant., and Interpretability

11. E. Jeon, S. Lohit, **R. Anirudh**, P. Turaga, *Robust Time Series Recovery and Classification Using Test-Time Noise Simulator Networks*, accepted to IEEE ICASSP (2023).
12. V. Narayanaswamy, Y. Mubaraka, **R. Anirudh**,et al., *Know Your Space: Inlier and Outlier Construction for Calibrating Medical OOD Detectors.* accepted to MIDL [paper] (2023).
13. T. Gokhale, **R. Anirudh** et al. *Improving Diversity with Adversarially Learned Transformations for Domain Generalization*, accepted to IEEE WACV [paper] [code] (2023).
14. J. J. Thiagarajan*, **R. Anirudh***, V. Narayanaswamy, PT. Bremer, *Single Model Uncertainty Estimation via Stochastic Data Centering* [paper] [code] NeurIPS (2022).
15. **R. Anirudh**, J. J. Thiagarajan, *Out of Distribution Detection using Neural Network Anchoring,* in Proc. of the Asian Conf. on Machine Learning (ACML) [paper] [code] (2022).
16. J. J. Thiagarajan, **R. Anirudh** et al., *Data-Efficient Scientific Design Optimization with Neural Network Surrogates* in ReALML ICML Workshop (2022).
17. V. Narayanaswamy, Y. Mubaraka, **R. Anirudh** et al., *Improved Medical Out-of-Distribution Detectors For Modality and Semantic Shifts* in Principles of Distribution Shift (PODS) ICML Workshops (2022).
18. V. Narayanaswamy, **R. Anirudh**, I. Kim, Y. Mubaraka, A. Spanias, J. J. Thiagarajan, *Predicting the Generalization Gap in Deep Models using Anchoring*, in ICASSP [paper] (2022).
19. T. Gokhale, **R. Anirudh** et al. *Attribute-guided Adversarial Training for Robustness to Natural Perturbations* in AAAI [paper], (2021).
20. J. J. Thiagarajan, V. Narayanaswamy, **R. Anirudh**, PT. Bremer, A. Spanias, *Accurate and Robust Feature Importance Estimation under Distribution Shifts*, AAAI [paper] (2021).
21. **R. Anirudh***, J. J. Thiagarajan*, R. Sridhar, and P. T. Bremer, *MARGIN: Uncovering Deep Neural Networks Using Graph Signal Analysis* in Frontiers in Big Data, [paper] (2021).
22. J. J. Thiagarajan, I. Kim, **R. Anirudh**, and P. T. Bremer, *Understanding deep neural networks through input uncertainties* In ICASSP [paper] (2019).

* = equal contribution

23. K. Thopalli, **R. Anirudh**, J. J. Thiagarajan, P. Turaga, *Multiple subspace alignment improves domain adaptation*, in ICASSP [paper], (2019).

ML application areas: healthcare, sciences, imaging

24. J. Liu, **R. Anirudh** et al., *DOLCE: A Model-Based Probabilistic Diffusion Framework for Limited-Angle CT Reconstruction* in Preprint [paper] (2023).
25. **R. Anirudh** et al., *Accurate Calibration of Agent-based Epidemiological Models with Neural Network Surrogates* in AI4COVID ICML Workshop [paper] (2022).
26. A. W. Reed, H. Kim, **R. Anirudh**, K. A. Mohan, K. Champley, J. Kang, S. Jayasuriya, *Dynamic CT Reconstruction from Limited Views with Implicit Neural Representations and Parametric Motion Fields* in ICCV. [paper], (2021).
27. **R. Anirudh**, H. Kim, J.J. Thiagarajan, K.A. Mohan, K. Champley, T. Bremer, *Lose The Views: Limited Angle CT Reconstruction via Implicit Sinogram Completion*. (Spotlight: ∼10% acceptance rate) in CVPR [paper], (2018).
28. **R. Anirudh**, J.J. Thiagarajan, P.T. Bremer, B. K. Spears, *Improved Surrogates in Inertial Confinement Fusion with Manifold and Cycle Consistencies* in PNAS [paper], (2020).
29. J. J. Thiagarajan, B. Venkatesh , **R. Anirudh**, P.T. Bremer, J. Gaffney, G. Anderson, B.K. Spears, *Designing Accurate Emulators for Scientific Processes using Calibration-Driven Deep Models* in Nature Communications (Editor's picks) [paper] (2020).
30. S. Liu, **R. Anirudh**, J.J. Thiagarajan, P.T. Bremer, *Uncovering Interpretable Relationships in High-Dimensional Scientific Data Through Function Preserving Projections* in Machine Learning: Science and Technology (MLST) [paper], (2020).
31. B. Kustowski, J. A. Gaffney, B. K. Spears, G. J. Anderson, **R. Anirudh**, PT. Bremer, J. J. Thiagarajan, M. K. Kruse and R. C. Nora, *Suppressing simulation bias in multi-modal data using transfer learning*. Machine Learning: Science and Technology (MLST) [paper] (2022).
32. S. Liu, **R. Anirudh**, J. J. Thiagarajan, and PT. Bremer, *Uncovering interpretable relationships in high-dimensional scientific data through function preserving projections.* in Machine Learning: Science and Technology (MLST) [paper], (2020).
33. **R. Anirudh** and J. J. Thiagarajan, *Bootstrapping graph convolutional neural networks for autism spectrum disorder classification*, In ICASSP [paper] (2019).
34. A. Marathe, **R. Anirudh**, N. Jain, A. Bhatele, J. J. Thiagarajan, B. Kailkhura, J. S. Yeom, B. Rountree and T. Gamblin, *Performance modeling under resource constraints using deep transfer learning*, In Supercomputing (SC) [paper] (2017).
35. **R. Anirudh**, J. J. Thiagarajan, PT. Bremer,and H. Kim, *Lung nodule detection using 3D convolutional neural networks trained on weakly labeled data*, In SPIE Medical Imaging [paper] (2016).
36. **R. Anirudh** and P. Turaga, *Interactively Test Driving an Object Detector: Estimating Performance on Unlabeled Data*, IEEE WACV, [paper] (2014).

Activity Recognition & Riemannian Geometry

37. K. Koneripalli, S. Lohit, **R. Anirudh**, and P. Turaga, *Rate-invariant autoencoding of time-series.* In ICASSP [paper] (2020).
38. **R. Anirudh**, J. Su, A. Srivastava and P. Turaga,*Elastic Functional Coding of Riemannian Trajectories*, in IEEE PAMI [paper] (2017).
39. **R. Anirudh** and P. Turaga, *Geometry-based Adaptive Symbolic Approximation for Fast Sequence Matching*

on Manifolds., IJCV [paper] (2016).

40. **R. Anirudh**, V. Venkataraman, K. N. Ramamurthy, and P. Turaga, *A Riemannian framework for statistical analysis of topological persistence diagrams*, In CVPR Workshops [paper] (2016).
41. **R. Anirudh**, J. Su, A. Srivastava and P. Turaga, *Elastic Functional Coding of Human Actions: From Vector-Fields to Latent Variables*, in CVPR, [paper] (2015).
42. **R. Anirudh**, V. Venkataraman, and P. Turaga, *A generalized Lyapunov feature for dynamical systems on Riemannian manifolds* In BMVC Workshops [paper] (2015).
43. A. Sivakumar, **R. Anirudh**, P. Turaga, *Geometric Compression of Orientation Signals for Fast Gesture Analysis*, in Data Compression Conference [paper], (2015).

Skills

Programming	Python (most frequent), C++ and Java (less frequent) Matlab (used in grad school)
Packages	Deep learning (Pytorch, Tensorflow), OpenCV (computer vision), basic OpenGL, data analysis packages in Python (scikit learn, pandas)