Kowshik Thopalli

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EDUCATION

PhD Electrical Engineering, Signal Processing (CGPA: 4.0/4.0) **01/2018 -09/2022 (Expected)**
Ira A. Fulton School of Engineering, Arizona State University, Tempe, AZ

M.S., Electrical Engineering, **Signal Processing (CGPA: 3.97/4.0)** **01/2016 - 12/2017**
Ira A. Fulton School of Engineering, Arizona State University, Tempe, AZ
Thesis- Perturbation Robust Representations of Topological Persistence Diagrams

Bachelors in Technology, Electrical Engineering (CGPA: 9.09/10) **08/2009 - 05/2013**
Gandhi Institute Of Technology and Management, Visakhapatnam, India

PROFESSIONAL EXPERIENCE

Graduate Research Assistant, Geometric Media Lab, ASU, Tempe |Matlab, Python, R **08/2017 – present**

- I am an ML researcher with a strong focus on computer vision. I have worked and published in areas of computer vision such as Unsupervised Domain Adaptation, Domain Generalization, Visual Navigation using Reinforcement Learning, Counter-factual learning for explainable AI, and 3D reconstruction from sparse views. I have also collaborated with a large inter-university team to innovate and build systems that enable home-based stroke rehabilitation.
- My current research interests are innovating and proposing algorithms to improve the robustness of machine learning models under different distribution/domain/task shifts and knowledge-integrated data learning.

Lawrence Livermore National Laboratories, Research Intern, Livermore, California | PyTorch **06/2021 – 08/2021**

- Proposed a principled algorithm to improve the generalization of computer vision models to unseen domains using meta-learning and deep ensembling techniques. The proposed solution improved upon state-of-the-art by more than 3% points across multiple benchmarks.
- This resulted in two NeurIPS workshop papers and one journal submission.

Microsoft Research, Research Intern, Seattle, WA | PyTorch| MultiModal Learning| Geo-Spatial **05/2020-08/2020**

- Developed AsyncFusion a novel patent-pending solution to multimodal problems with systemic asynchronicity between spatial and temporal modalities.
- AsyncFusion applications include - Geospatial applications such as precision agriculture, interpolation of soil moisture across a farm given sparse sensor deployment, and predicting wildfire boundary maps.

SRI International, Center for vision technologies, Research Intern, Princeton, NJ | PyTorch| Habitat| **05/2019 - 08/2019**

- Constructed efficient algorithms for visual navigation via Deep Reinforcement Learning (PPO)
- Proposed novel attention schema for utilizing scene semantics using Transformers.
- Achieved 38% relative improvement on navigation metrics (Success weighted by Path Length) on MP3d dataset against prior art given the same amount of agent's experience.
- Work published in International Conference on Robotics Applications, ICRA'2021

Lawrence Livermore National Laboratories, Research Intern, Livermore, California | PyTorch **06/2018 – 08/2018**

- Proposed a novel approach to the problem of unsupervised domain adaptation via Grassmannian analysis (resulted in a paper in ICASSP'19).
- Constructed Optimal Transport based generative models and GAN's that can generate manifold-valued samples.

Larsen & Toubro Inc, Sr Engineer (Electrical), Odisha, India **07/2013 – 08/2015**

- Worked as a Senior Engineer in the supply chain management department through collecting and managing the data of vendors and co-ordination with the on-site planning department.

SELECTED PUBLICATIONS

- **Thopalli, K*.**, Ahmed, T.*, Rikakis, T., Turaga, P., Kelliher, A., Huang, J. B., & Wolf, S. L. (2021). Automated movement assessment in stroke rehabilitation. **Frontiers in Neurology, 1396**. (* equal contribution)
- Thiagarajan, J. J., **Thopalli, K.**, Rajan, D., & Turaga, P. (2022). Training calibration-based counterfactual explainers for deep learning models in medical image analysis. **Nature Scientific Reports, 12(1), 1-15**.
- **Thopalli, K.**, Turaga, P. K., & Thiagarajan, J. J. (2021, October). Re-labeling Domains Improves Multi-Domain Generalization. In **NeurIPS 2021 Workshop on Distribution Shifts: Connecting Methods and Applications.**
- **Thopalli, K.**, Katoch, S., Thiagarajan, J. J., Turaga, P. K., & Spanias, A. (2021, October). Multi-Domain Ensembles for Domain Generalization. **In NeurIPS 2021 Workshop on Distribution Shifts: Connecting Methods and Applications.**
- **Thopalli, K.**, Katoch, S., Spanias, A., Turaga, P., & Thiagarajan, J. J. Improving Multi-Domain Generalization through

Domain Re-labeling. **Under Review IEEE TNNLS**

- Thopalli, K., Thiagarajan, J. J., Anirudh, R., & Turaga, P. K. (2022). Revisiting Deep Subspace Alignment for Unsupervised Domain Adaptation. **Under Review (IEEE TIP)**
- **Thopalli, K.**, Anirudh, R., Thiagarajan, J. J., & Turaga, P. (2019, May). Multiple subspace alignment improves domain adaptation. **In ICASSP 2019-2019 IEEE International Conference on Acoustics, Speech and Signal Processing *(ICASSP)* (pp. 3552-3556). IEEE**
- Seymour, Z., **Thopalli, K.**, Mithun, N., Chiu, H. P., Samarasekera, S., & Kumar, R. (2019). MaAST: Map Attention with Semantic Transformers for Efficient Visual Navigation, **2021 International Conference on Robotics and Automation (ICRA). IEEE, 2021**
- A. Som*, **Thopalli, K.***, K. N. Ramamurthy, V. Venkataraman, A. Shukla, P. Turaga, Perturbation Robust Representations of Topological Persistence Diagrams, **European Conference on Computer Vision (ECCV), September 2018. (* equal contribution)**
- **Thopalli, K.**, Thiagarajan, J. J., Anirudh, R., & Turaga, P. (2019). SALT: Subspace Alignment as an Auxiliary Learning Task for Domain Adaptation. *arXiv preprint arXiv:1906.04338*.
- Venkatesh, B., Thiagarajan, J. J., **Thopalli, K.**, & Sattigeri, P. (2020). Calibrate and Prune: Improving Reliability of Lottery Tickets Through Prediction Calibration. arXiv preprint arXiv:2002.03875.
- **Thopalli, K.***, Katoch, S.*, Thiagarajan, J. J., Turaga, P., & Spanias, A. (2019). Invenio: Discovering Hidden Relationships Between Tasks/Domains Using Structured Meta Learning (* equal contribution)

TECHNICAL SKILLS

- **Programming Languages**: *Python, MATLAB, R, Max*
- **Machine Learning tools**: *PyTorch, TensorFlow, Keras, Scikit-learn*.
- **Packages**: Topological Data Analysis (TDA-R, DIPHA, Ripser, TTK), Python Optimal Transport, pandas
- **Application software**: OpenCV, AWS, Git, VMWare, MeshLab, Blender
- **Relevant Coursework**: Deep Learning, Computer Vision Pattern Recognition, Convex Optimization, Random Processes, Image Processing, Computational Cameras, Machine Learning, Quantum Computing.

TEACHING EXPERIENCE

- Served as a T.A. and grader for EEE 202- Electrical Circuits-1 hands-on Lab with more than 100 students with a focus on understanding the practical applications along with maintaining tight safety precautions.
- Teaching assistant to the transdisciplinary graduate class AME 520- Understanding Activity that uses motion capture studios and real-time video processing.

AWARDS

- Received 4 awards at SRI International: Most Innovative | Most Impactful | Best Poster and People's Choice

LEADERSHIP

- Served as the president of SPICMACAY ASU (for 2.5 years) a student organization at ASU for promoting Indian classical music and arts
    - Organized multiple classical vocal concerts and dance performances with ASU students as the main performers
    - Invited renowned Indian classical artists for concerts and raised funds for the same.