

Hari Prasanna Das

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EDUCATION

Ph.D. in Electrical Engineering and Computer Sciences

UNIVERSITY OF CALIFORNIA, BERKELEY

Berkeley, CA | Dec 2022

Bachelor of Technology (Honors) in Electrical Engineering

INDIAN INSTITUTE OF TECHNOLOGY (IIT), KHARAGPUR, INDIA

Kharagpur, India | May 2016

SKILLS

Languages: Python, SQL, C++, JAVA, MATLAB, R

Machine Learning (ML) Frameworks: PyTorch, TensorFlow, Scikit-Learn, Numpy, Pandas, Matplotlib

ML Research Experience: Deep Learning, Generative Modeling, Computer Vision, Transfer Learning, Time-Series Analysis

WORK EXPERIENCE

BYTEDANCE | INTERN- PRODUCT RD AND INFRASTRUCTURES- US APPLIED RESEARCH CENTER Mountain View, CA | May 2022 – Aug 2022

Highlights: Foundation Models, Distributed ML Training, Federated Learning, Online Learning

- Conducted an extensive survey on a new area of research- Foundation Models (FM) and its implementation.
- Proposed a research approach to using FMs in a federated learning setting, combining distributed training, aggregation, and online temporal updating of FMs.
- Designed a proof-of-concept implementation of above approach to introduce high performance and communication-efficient federated multi-task learning for ByteDance products.

AMAZON ALEXA AI | APPLIED SCIENTIST INTERN

Seattle, WA | May 2021 – Aug 2021

Highlights: NLP, Contextual Bandits, Reinforcement Learning, Prioritized Experience Replay

- Worked on the NLP engine of Alexa to enhance its contextual question-answer capability.
- Implemented Contextual Bandits and Experience Replay to improve follow-up question-answering by 17%.
- Introduced and implemented Online Learning pipeline for continual training and adaptation of the model.

UNIVERSITY OF CALIFORNIA, BERKELEY | RESEARCHER

Berkeley, CA | Aug 2017 - Ongoing

Highlights: Deep Learning, Computer Vision, Transfer Learning, Occupant Modeling, Smart Buildings

- Developed a deep learning based generative framework to extract conditional feature representation, and generate conditional synthetic data to tackle with data insufficiency challenges.
- Improved the generalizability of personal thermal comfort prediction algorithms by 16% via transfer learning.
- Developed deep learning algorithms for occupant activity detection in smart buildings using privacy preserving WiFi signals. Improved the performance by including camera signals wherever ethically possible via sensor fusion. The system achieved a 97.5% accuracy in occupant activity detection.
- Designed a graphical lasso based framework to intelligently segment the players in energy game-theoretic frameworks into energy usage groups, crucial in smart incentive design.

MENTOR GRAPHICS | RESEARCH AND DEVELOPMENT (R&D) ENGINEER Noida, India | Jun 2016 – Jul 2017

- Developed sink interface of Embedded Display Port (eDP) protocol for energy-efficient single stream transport using **System Verilog** and **C++**.

SELECTED PUBLICATIONS

A full-list of publications can be found in my [Google Scholar Profile](#)

- H.P. Das, R. Tran, J. Singh, X. Yue, G. Tison, A. Sangiovanni-Vincentelli, and C. J. Spanos. "Conditional Synthetic Data Generation for Robust Machine Learning Applications with Limited Pandemic Data". AAAI Conference on Artificial Intelligence (AAAI), 2022

- A. Chhenapragada, D. Periyakoil, H.P. Das, and C. J. Spanos. "Time Series-based Deep Learning model for Personal Thermal Comfort Prediction", International Conference on Future Energy Systems (**e-Energy**), 2022
- H.P. Das, S. Schiavon, and C. J. Spanos. "Unsupervised Personal Thermal Comfort Prediction via Adversarial Domain Adaptation". ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (**BuildSys**), 2021 (**Best Poster/Demo Award**)
- H.P. Das, R. Tran, J. Singh, Y. Lin, and C. J. Spanos. "CDCGen: Cross-Domain Conditional Generation via Normalizing Flows and Adversarial Training". Workshop on Machine Learning for Data: Automated Creation, Privacy, Bias, International Conference on Machine Learning (**ICML**) and the Workshop on Data-Efficient Machine Learning, Conference on Knowledge Discovery and Data Mining (**KDD**), 2021
- X. Yue, Z. Zheng, C. Reed, **H. P. Das**, K. Keutzer, A. Sangiovanni-Vincentelli, "Multi-source Few-shot Domain Adaptation", arXiv preprint arXiv:2109.12391, 2021
- H.P. Das et al. "Do Occupants in a Building exhibit patterns in Energy Consumption? Analyzing Clusters in Energy Social Games". Workshop on Tackling Climate Change with Machine Learning, Advances in Neural and Information Processing Systems (**NeurIPS**), 2020
- H. Zou, J. Yang, H.P. Das, H. Liu, Y. Zhou, and C. J. Spanos. "WiFi and Vision Multimodal Learning for Accurate and Robust Device-Free Human Activity Recognition". IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**), 2019
- H. Zou, Y. Zhou, J. Yang, H. Liu, H.P. Das, and C. J. Spanos. "Consensus Adversarial Domain Adaptation". AAAI Conference on Artificial Intelligence (**AAAI**), 2019
- H.P. Das et al. "Design, Benchmarking and Graphical Lasso based Explainability Analysis of an Energy Game-Theoretic Framework". Workshop on Tackling Climate Change with Machine Learning, Conference on Neural and Information Processing Systems (**NeurIPS**), 2019
- H. Zou, H.P. Das, J. Yang, Y. Zhou, and C. J. Spanos. Machine Learning empowered Occupancy Sensing for Smart Buildings. Workshop on Climate Change: How Can AI Help?, **ICML** 2019
- H.P. Das et al. "A Novel Graphical Lasso based approach towards Segmentation Analysis in Energy Game-Theoretic Frameworks. IEEE International Conference On ML And Applications (**ICMLA**), 2019

HIGHLIGHTED PROJECTS

DEEP LEARNING-BASED CONDITIONAL SYNTHETIC GENERATION OF PANDEMIC DATA

PYTHON, PYTORCH, COMPUTER VISION, PROBABILISTIC MODELING, SEMI-SUPERVISED LEARNING

Designed a convolutional neural network based framework consisting of a feature extractor and a conditional generative flow working in tandem to learn the probabilistic distribution of input data, and generate conditional synthetic samples. A classifier trained on our generated synthetic data achieved at par accuracy (96.3%) with that trained on real data (96.46%).

TRANSFER LEARNING FOR SMART BUILDING APPLICATIONS PYTHON, PYTORCH, MYSQL, GANS, ADVERSARIAL DOMAIN ADAPTATION

Developed transfer learning techniques using adversarial domain adaptation for cross-domain tasks in smart buildings. Applications include enabling transfer learning of personal thermal comfort prediction model from one occupant to another, and occupant gesture recognition model transfer across spatial environments.

MACHINE LEARNING EMPOWERED OCCUPANCY SENSING AND ACTIVITY DETECTION

PYTHON, PYTORCH, COMPUTER VISION, TRANSFER LEARNING

Formulated computer vision based algorithms to detect human activity and occupancy in a building using channel state information data from WiFi modules. Proposed a sensor fusion approach to combine data from WiFi and camera modules for robust human activity detection.

PROFESSIONAL SERVICE

Lead Organizer: Tackling Climate Change with Machine Learning at **ICML 2021**, **NeurIPS 2021**, and International Workshop on Applied Machine Learning for Intelligent Energy Systems at **ACM e-Energy Conference 2019-22**

Publicity Chair: 9th ACM International Conference on Systems for Energy-Efficient Built Environments (BuildSys 2022)

Reviewer: **AAAI 2023, 2022**, Tackling Climate Change with ML workshops at **NeurIPS 2019**, **ICLR 2020**, **NeurIPS 2020**, **ICML 2021**, **NeurIPS 2021**, MULA workshop at **CVPR 2021,22**, European AI4Cities Grant, Journal of Building Engineering