**SANGEETA SRIVASTAVA**

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# EDUCATION

The Ohio State University, Columbus, Ohio **May 2022**

**PhD, Computer Science and Engineering GPA: 3.87**

The Ohio State University, Columbus, Ohio **May 2017**

**Masters, Computer Science and Engineering GPA: 3.79**

**RESEARCH AREAS**

Acoustic event detection, Energy-efficient deep learning for on-device applications, Multimodal learning, Self-supervised learning

# RESEARCH EXPERIENCE

**Research Student, Sounds of the New York City (SONYC) Jan 2018-May 2022**

Dr. Juan P. Bello (NYU), Dr. Anish Arora (OSU)

* Produced a deep learning model that can run on-device and classify different types of noise pollution sources in New York City
* Reduced the size of Look Listen Learn (L3) audio model by 95% (EdgeL3) with negligible loss in performance in both audio-visual correspondence and downstream audio classification tasks. EdgeL3 was one of the baselines for [DCASE 2020 task](http://dcase.community/challenge2020/task-acoustic-scene-classification#subtask-b)
* Introduced a specialized embedding approximation (SEA) to learn a student network which preserves only part of teacher’s embedding manifold relevant to the target domain and requires >1.2 orders of magnitude lesser activation memory than L3 audio
* Designed a methodology for quantifying robustness of audio embeddings against variations both in the acoustic propagation from the source to the recording device and in the recording device itself

**Graduate Research Assistant, Ohio State University Jan 2021-May 2022**

Dr. Anish Arora (OSU)

* Developed data-efficient generalizable deep learning model for solving high-dimensional eigenvalue problems
* Leveraged physics signals to decompose a complex task into multiple simpler tasks and trained a mixture-of-experts architecture, which reduced the model size by 150x when compared to the complex version of the task
* Introduced a loss term based on constraints from physical models to improve extrapolation generalization by 11%

**Visiting Research Student, Microsoft Research on Constrained Devices, India June 2018**

Dr. Anish Arora (OSU), Dr. Manik Varma (Microsoft Research India)

* Proposed MSC-RNN, a two-tier architecture based on lightweight and faster RNN variants (Fast Gated RNNs), for N+1-class classification problem where +1-class corresponds to environmental noise
* Achieved 3x improvement in runtime efficiency by invoking the second-tier complex classifier only when the first-tier displacement detector signals an event and using raw time-series as input instead of spectrogram
* Improved both classification accuracy and recall as compared to SVM, LSTM, and CNN

# WORK EXPERIENCE

**Research Scientist, Meta (AI Speech), Seattle June 2022-Present**

* Implemented multitask framework for tasks with very different input/inference requirements, enabling the development of 900kB shared encoder for resource constrained devices
* Submitted 2 patent applications, 1) multitask learning for keyword spotting and acoustic event detection and 2) low-power system for acoustic event detection

# INTERNSHIP EXPERIENCE

**Research Intern, Facebook AI, Menlo Park May-Aug 2021**

* Investigated the contrastive framework of wav2vec 2.0 with conformer architecture to learn audio representations for non-speech tasks using only logmel features as input
* Achieved a new state-of-the-art result in self-supervised learning with only-audio for AudioSet with a mean average precision of 0.415
* Fine-tuned audio representations closed the gap between supervised and self-supervised performance on diverse audio tasks like music tagging, human actions, scene classification

**PhD Machine Learning SWE Intern, Facebook, Menlo Park May-Aug 2020**

* Explored various clustering approaches (centroid-based, density-based, connectivity-based) for scaled and prioritized human review of potential violating contents, and helped the team interpret the results while listing the points to consider for moving to a new clustering technique
* Broadened the integrity problem spaces by switching from unimodal (text) to multimodal embeddings, adding a variety of media signals like text, audio, image, comments, etc.
* Quantified the downstream performance comparison of unimodal and multimodal embeddings on dimensions like cluster quality, cluster similarity, latency, and model interpretability
* Developed a way to narrow down the silhouette threshold values for finding coherent clusters for different integrity problems, eliminating the need for expensive manual review for the same

**Machine Learning Architect Intern, Micron Technology, Seattle June-Aug 2018**

* Evaluated the impact of dynamic and static memory requirements for different compression techniques for neural network architectures for an informed hardware design
* Implemented extreme quantized CNN using binary and XNOR operations and studied the impact of eliminating Multiply-Accumulate (MAC) operations on performance metrics and memory requirement

**Software Developer Intern, DeviceBits, Columbus May-Aug 2016**

* Designed a web application Device Delivery Platform (DDP) in Ruby on Rails, which reduced the product delivery time by 60%. It replaced the existing waterfall model of the product rollout with an agile method, removed manual work, enhanced communication between team members and the UI facilitated faster product rollout
* Improved the existing data analytics platform by capturing events that gave more insight into trends, making event predictions more accurate

**PUBLICATIONS**

**Sangeeta Srivastava,** Yun Wang, Andros Tjandra, Anurag Kumar, Chunxi Liu, Kritika Singh, and Yatharth Saraf. *“Conformer-Based Self-Supervised Learning for Non-Speech Audio Tasks.”* In IEEE International Conference on Acoustics, Speech, & Signal Processing (ICASSP), 2022. [[paper](https://arxiv.org/abs/2110.07313)]

**Sangeeta Srivastava**, Ho-Hsiang Wu, Joao Rulff, Magdalena Fuentes, Mark Cartwright, Claudio Silva, Anish Arora, Juan Pablo Bello. *“A Study on Robustness to Perturbations for Representations of Environmental Sound.”* In EUSIPCO, 2022. [[paper](https://eurasip.org/Proceedings/Eusipco/Eusipco2022/pdfs/0000125.pdf)]

Jihoon Yun**, Sangeeta Srivastava,** Dhrubojyoti Roy, Nathan Stohs, Charlie Mydlarz, Mahin Salman, Bea Steers, Juan Pablo Bello, and Anish Arora. *“Infrastructure-free, Deep Learned Urban Noise Monitoring at ~100mW.”* In IEEE/ACM ICCPS, 2022. [[paper](https://conferences.computer.org/cpsiot/pdfs/ICCPS2022-ifhdJu28kaMK8qGYbf7d0/096700a056/096700a056.pdf)]

**Sangeeta Srivastava**, Dhrubojyoti Roy, Mark Cartwright, Juan Pablo Bello, and Anish Arora. *“Specialized Embedding Approximation for Edge Intelligence: A Case Study in Urban Sound Classification*”. In IEEE ICASSP, 2021. [[paper](https://ieeexplore.ieee.org/document/9414287)]

Python package: <https://pypi.org/project/edgel3/>

**Sangeeta Kumari,** Dhrubojyoti Roy, Mark Cartwright, Juan Pablo Bello, and Anish Arora. *"EdgeL3: Compressing L3-Net for Mote Scale Urban Noise Monitoring.”* In IEEE International Parallel and Distributed Processing Symposium Workshops *(IPDPSW)*, pp. 877-884. 2019. [[paper](https://ieeexplore.ieee.org/document/8778418)]

Dhrubojyoti Roy (co-primary), **Sangeeta Srivastava** (co-primary), Aditya Kusupati, Pranshu Jain, Manik Varma, and Anish Arora.

*“One size does not fit all: Multi-scale, cascaded RNNs for radar classification.”*In ACM Transactions on Sensor Networks (TOSN) 17, no. 2 (2021): 1-27. **Best** **Paper Runner-Up in ACM BuildSys, 2019.** [[paper](https://github.com/ksangeeta2429/Publications/blob/master/TOSN_One_Size_Does_Not_Fit_All.pdf)]

Dhrubojyoti Roy (co-primary), **Sangeeta Srivastava** (co-primary), Aditya Kusupati, Pranshu Jain, Manik Varma, and Anish Arora. *“Lightweight, deep RNNs for radar classification (Demo)*.” In ACM BuildSys 2019. [[paper](https://github.com/ksangeeta2429/Publications/blob/master/Demo_for_MSCRNN.pdf)]

**Sangeeta Srivastava**, Sam Olin, Viktor Podolskiy, Anuj Karpatne, Wei-Cheng Lee, Anish Arora. Physics-Guided Problem *“Decomposition for Scaling Deep Learning of High-dimensional Eigen-Solvers: The Case of Schrödinger’s Equation*.” arXiv preprint arXiv:2202.05994, 2022. [[paper](https://arxiv.org/pdf/2202.05994.pdf)]

**Sangeeta Srivastava**. *“Towards Green AI: Cost-Efficient Deep Learning using Domain Knowledge.”* [[Dissertation](https://etd.ohiolink.edu/apexprod/rws_etd/send_file/send?accession=osu1650965193315291&disposition=inline)]

# TECHNICAL SKILLS

# Programming Languages: Python, C++, C

**Machine Learning:** PyTorch, TensorFlow, Keras, scikit-learn

**Parallel Computing:** Cuda, OpenMP