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 (L^3) audio model by 95% (EdgeL^3) with negligible loss in performance in both audio-visual correspondence and downstream audio classification tasks. EdgeL^3 was one of the baselines for DCASE 2020 task
- 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 L^3 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, such as keyword spotting and acoustic event detection, with very different input/inference requirements, enabling the development of 900kB shared encoder for resource constrained devices
- 2 pending patent applications; 1) multitask learning for keyword spotting and acoustic event detection and 2) low-power system for acoustic event detection
- Researching on automatic audio separation based on user-defined inputs

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]

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]

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]

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] 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]

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]

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]

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]

Sangeeta Srivastava. *"Towards Green AI: Cost-Efficient Deep Learning using Domain Knowledge."* [Dissertation]

TECHNICAL SKILLS
Programming Languages: Python, C++, C
Machine Learning: PyTorch, TensorFlow, Keras, scikit-learn
Parallel Computing: Cuda, OpenMP