SANGEETA SRIVASTAVA

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EDUCATION

The Ohio State University, Columbus, Ohio **May 2022 (expected)**
  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, Few-shot learning, Self-supervised learning

RESEARCH EXPERIENCE

Research Student, Sounds of the New York City (SONYC) **Jan 2018-present**
Dr. Juan P. Bello (NYU), Dr. Anish Arora (OSU), Dr. Mark Cartwright (NYU)

- 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 net 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
- Evaluating the robustness of L^3 embeddings against spatiotemporal and acoustic frontend variations
- Researching few-shot learning methodologies for training an acoustic detector that is invariant to acoustic properties

Graduate Research Assistant, Ohio State University **Jan 2021-present**
Dr. Anish Arora (OSU)

- Developing deep learning models for physics-guided machine learning (PGML) in Quantum Spin Mechanics
- Exploring use of physics guided supervision signals in reducing the computation overhead of the PGML models

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 upper-level complex classifier only when the lower-level 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

INTERNSHIP EXPERIENCE

Research Intern, Facebook, Menlo Park **May 2021-present**
- Developing a wav2vec version for acoustic event detection

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 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

Deep Learning System Intern, MediaTek, San Jose **May-June 2018**
- Worked on multimodal models for motion detection with radar (CNN for spectrogram/RNN for time series) and image (CNN) data

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 gives them a much easier way of making the product
- Improved the existing data analytics platform by capturing events that gave more insight into trends, making future predictions more accurate

PUBLICATIONS

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 ICASSP IEEE, 2021.
Python package: https://pypi.org/project/edgel3/

Sangeeta Kumari (co-primary), Dhrubojyoti Roy (co-primary), 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. IEEE, 2019. [paper] [edgel3 open-source]

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]

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

ACADEMIC PROJECTS
GPU Programing: CuCCD–Implementation of CCD in Cuda   **April 2018**
- Observed the GPU bottlenecks in Cyclic Coordinate Descent (CCD) algorithm for matrix factorization
- Used coalesced memory access, data re-use, and load imbalance reduction to optimize CCD for a single GPU

Speech | Deep Learning: Speech Enhancement with Deep Learning   **April 2018**
- Used DNN to remove additive noise from speech by estimating Ideal Ratio Mask (IRM); later used for generating a clean speech signal

NLP | Deep Learning: WSDM Music Recommendation Challenge 2018   **Dec 2017**
- Performed EDA, pre-processing and feature engineering to make the data more meaningful for prediction
- Neural Collaborative Filtering with engineered features gave a test score AUC of 0.6620
- Handled cold-start problem by using an ensemble of models trained to handle different categories of cold-start

Computer Vision | Deep Learning: Visual Question Answering   **Sep 2017**
- Improved the multimodal implementation for Visual Question Answering (VQA) proposed by Anton et al. (LSTM for Questions + CNN for Image) to get an accuracy of 58.2% on the open-ended dataset
- Explored Tucker Fusion model proposed by Hedi Ben-younes et al. in MUTAN paper which worked better at gluing the information obtained from image embeddings and question embeddings

Computer Vision | Deep Learning: Prevention of Poaching - Cattle Recognition and Counting   **May 2017**
- Experimented with different algorithms of image de-noising, feature extraction, object detection and tracking to build a robust classifier for target detection
- Improved recall from 38.8% to 66.5% by capturing temporal information post-detection by Faster *R-CNN* pre-trained Caffe model (VGG16)