AURORA CRAMER-EVERGREEN

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RESEARCH INTERESTS

Machine listening, music information retrieval, machine learning, digital signal processing

EDUCATION

New York University - New York, NY, USA August 2017 - September 2023
Doctor of Philosophy (Electrical Engineering) GPA: 3.964
Department of Electrical and Computer Engineering
Advisor: Juan Pablo Bello

University of California, Berkeley - Berkeley, CA, USA August 2011 - May 2015
Bachelor of Science (Honors) GPA: 3.798
Department of Electrical Engineering and Computer Sciences
EECS Honors Program - Music/Audio
Advisor: David Wessel, Edmund Campion

PROFESSIONAL EXPERIENCE

Zoox - Foster City, CA August 2023 - Present
Advanced Hardware Engineering - Machine Learning & Signal Processing Engineer
Investigating and developing machine listening models for self-driving vehicles.

Mitsubishi Electric Research Laboratory - Cambridge, MA August 2020 - January 2021
Speech & Audio Team - Audio Analysis and Source Separation Research Intern
Investigated source separation models trained with hierarchical targets to improve separation performance.

NVIDIA - Santa Clara, CA May 2018 - August 2018
Applied Deep Learning Research - Research Intern
Investigated audio inpainting methods using text-to-speech inspired deep sequence-to-sequence models.

Gracenote - Emeryville, CA June 2015 - July 2017
Applied Research - Audio Research Engineer
Researched and developed audio classifiers to describe attributes of musical audio (e.g. genre classification, vocal detection, fingerprinting reliability); developed AWS applications for ingesting and processing audio content.

Blue Jeans Network - Mountain View, CA May 2014 - August 2014
Media Team - Media Software Engineering Intern
Refactored the WebRTC and Speex noise suppression modules used in teleconferencing software, and reconfigured modules to improve the system's perceptual speech quality.

Guidewire - Foster City, CA June 2013 - August 2013
Development Operations - Software Engineering Intern
Developing an optimization framework for managing virtual machines to balance cost and testing performance.

WhereLab - Berkeley, CA February 2013 - May 2013
Software Engineering Consultant
Creating an interactive, wide-area augmented reality applications for iOS.

Siemens Healthcare Diagnostics - Glasgow, DE June 2012 - August 2012
Informatics Research and Development - Student Intern
Creating a log parsing and statistical analysis application.

PEER-REVIEWED PUBLICATIONS

V. Lostanlen, A. **Cramer**, J. Salamon, A. Farnsworth, B. M. Van Doren, S. Kelling, and J. P. Bello, "BirdVoxDetect: Large-scale detection and classification of flight calls for bird migration monitoring," *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, pp. 1–12, 2024.

B. M. Van Doren, V. Lostanlen, A. **Cramer**, J. Salamon, A. Dokter, S. Kelling, J. P. Bello, and A. Farnsworth, "Automated acoustic monitoring captures timing and intensity of bird migration," *Journal of Applied Ecology*, 2022.

A. **Cramer**, M. Cartwright, F. Pishdadian, and J. P. Bello, "Weakly supervised source-specific sound level estimation in noisy soundscapes," in *2021 IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA)*, 2021.

M. Cartwright, A. **Cramer**, A. E. M. Mendez, Y. Wang, H.-H. Wu, V. Lostanlen, M. Fuentes, G. Dove, C. Mydlarz, J. Salamon, O. Nov, and J. P. Bello, "SONYC-UST-V2: an urban sound tagging dataset with spatiotemporal context," *Detection and Classification of Acoustic Scenes and Events 2020*, 2020.

A. **Cramer**, V. Lostanlen, A. Farnsworth, J. Salamon, and J. P. Bello, "Chirping up the right tree: incorporating biological taxonomies into deep bioacoustic classifiers," in *2020 IEEE International Conference on Acoustics, Speech and Signal Processing*, 2020.

M. Cartwright, A. E. M. Mendez, A. **Cramer**, V. Lostanlen, G. Dove, H.-H. Wu, J. Salamon, O. Nov, and J. P. Bello, "SONYC Urban Sound Tagging (SONYC-UST): a multilabel dataset from an urban acoustic sensor network," *Detection and Classification of Acoustic Scenes and Events 2019*, 2019.

V. Lostanlen, K. Palmer, E. Knight, C. Clark, H. Klinck, A. Farnsworth, T. Wong, A. **Cramer**, and J. P. Bello, "Long-distance detection of bioacoustic events with per-channel energy normalization," *Detection and Classification of Acoustic Scenes and Events 2019*, 2019.

M. Cartwright, A. **Cramer**, J. Salamon, and J. P. Bello, "TriCycle: audio representation learning from sensor network data using self-supervision," in *2019 IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA)*, 2019.

A. **Cramer**, H.-H. Wu, J. Salamon, and J. P. Bello, "Look, listen and learn more: design choices for deep audio embeddings," in *2019 IEEE International Conference on Acoustics, Speech and Signal Processing*, 2019.

C. Summers, G. Tronel, A. **Cramer**, A. Vartakavi, and P. Popp, "GNMID14: A collection of 110 million global music identification matches," in *Proceedings of the 39th International ACM SIGIR Conference*, 2016.

O. Oreifej, A. **Cramer**, and A. Zakhor, "Automatic generation of 3D thermal maps of building interiors," in *ASHRAE*, 2014.

PATENTS

M. Cremer, A. **Cramer**, P. Popp, and C. Summers, "Responding to remote media classification queries using classifier models and context parameters," July 6 2017. US Patent App. 15/185,616.

A. **Cramer**, M. Cremer, P. Popp, and C. Summers, "Model-based media classification service using sensed media noise characteristics," July 6 2017. US Patent App. 15/185,654.

A. Vartakavi, C. Y. R. Gil, A. Gopakumar, and A. **Cramer**, "Methods and apparatus to generate recommendations based on attribute vectors," May 27 2021. US Patent App. 16/695,169.

ACADEMIC RESEARCH EXPERIENCE

Music Audio Research Laboratory, NYU September 2017 - September 2023
Investigating using natural structure in audio data from class hierarchies, multi-task relationships, multi-modal dynamics, and embodied navigation to learn effective audio representations for machine listening tasks without large annotated datasets. Contributed to machine listening efforts of the SONYC and BirdVox projects.

Center for New Music & Audio Technology, UC Berkeley August 2014 - May 2015
Modeled musical sequences for the task of machine improvisation using an extension of author-topic modeling.

Video and Image Processing Lab, UC Berkeley September 2013 - May 2014
Developed visualizations of indoor point cloud models and their associated sensor data for energy auditing applications

HONORS AND AWARDS

ECE MS Student Award - New York University, Tandon School of Engineering 2018

Samuel Morse MS Fellowship - New York University, Tandon School of Engineering 2017

Music/Auto Challenge - Gracenote 5.0 Hackathon 2016

Auto Podcast Challenge - Gracenote 4.0 Hackathon 2015

3rd Place - CSUA Hackathon, UC Berkeley 2013

3rd Place - Code 4 Cal Hackathon, UC Berkeley 2013

Edward Frank Kraft Award - UC Berkeley 2011

Completed all A/B/C-Sides and Chapter 9 - Celeste (Nintendo Switch) 2022

SELECTED COURSE PROJECTS

Latent factor models for imputation of urban sound data Fall 2019
Using Kalman filters and deep learning variants to model the temporal dynamics of audio embeddings computed from a large dataset of urban audio in order to impute embeddings for missing/corrupted audio.

Ambisonic speech separation using recurrent neural networks using LSTMs Spring 2019
Implementing an ambisonic speech separation method and trained and evaluated on synthesized ambisonic audio.

Identifying and reducing gender bias in word-level language models Spring 2018
Reducing bias in embeddings learned by a language model by applying regularization that penalizes projection onto an embedding subspace capturing variations in gender.

Audio style transfer with cycle-consistent GANs Spring 2018
Using a combination of WaveGAN and CycleGAN models for audio style transfer from raw audio.

Online instrument source separation with source-filter models Fall 2014
Developing an online framework for performing source separation of instruments in audio using source-filter models.

Online instrument source separation with PLCA Fall 2014
Developing an online framework for performing source separation of instruments in audio using PLCA.

TEACHING EXPERIENCE

Teaching Assistant, ECE-GY 6143 Introduction to Machine Learning Fall 2018
New York University

Teaching Assistant, EE 126 Probability and Stochastic Processes Spring 2015
University of California, Berkeley

Teaching Assistant, EE 20N Structure and Interpretation of Signals and Systems Fall 2014
University of California, Berkeley

ACADEMIC SERVICE

Challenge Organization
Task Organizer, IEEE AASP Challenge on Detection and Classification of Acoustic Scenes and Events 2020

Workshop Organization
Student Volunteer, Workshop on Detection and Classification of Acoustic Scenes and Events 2019

Challenge Organization
Task Organizer, IEEE AASP Challenge on Detection and Classification of Acoustic Scenes and Events 2019

Journal Reviewer
IEEE Transactions on Audio, Speech and Language Processing 2019

Conference Reviewer
Workshop on Detection and Classification of Acoustic Scenes and Events 2019
IEEE International Conference on Acoustics, Speech, and Signal Processing 2019

ORGANIZATIONS

IEEE Student Member — 2019 - 2021

MIR @ Berkeley Cofounder — 2015
University of California, Berkeley

Computer Science Undergraduate Association Member — 2012 - 2015
University of California, Berkeley

Eta Kappa Nu Honor Society Member — 2012 - 2015
University of California, Berkeley

SELECTED OPEN SOURCE PROJECTS

BirdVoxClassify
Open-source Python library for performing classification of bird flight calls at different taxonomic ranks.

SONYC Urban Sound Tagging Dataset (SONYC-UST)
Urban sound classification dataset, released as part of *DCASE 2019 Challenge Task 5: Urban Sound Tagging* and *DCASE 2020 Challenge Task 5: Urban Sound Tagging with Spatiotemporal Context*.

openl3
Open-source Python library for extracting audio and image embeddings, using pre-trained models trained with self-supervised audio-visual correspondence.

SELECTED COURSEWORK TOPICS

Machine Learning & AI	Statistical Signal Processing	Music Perception and Cognition
Machine Listening & MIR	Linear Dynamical Systems	Computer Music
3D Audio	Time Series Analysis	Compilers and Languages
Digital Signal Processing	Statistical Learning Theory	Parallel Programming
Probability & Stochastic Processes	Data Structures & Algorithms	Scientific Writing

PROGRAMMING AND DEVELOPMENT SKILLS

Python	Web (HTML, CSS, JavaScript, Flask)
MATLAB	Data visualization (matplotlib, d3)
C/C++	UNIX scripting
Java	AWS (ElasticBeanstalk, S3, DynamoDB, CloudWatch)