

Joseph Antognini

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Education

Ph.D., Astronomy, The Ohio State University, 2016

B.S. *cum laude*, Astrophysics, California Institute of Technology, 2010

Employment

June 2018 – Whisper AI, Member of the Technical Staff

- Employee № 6 at a startup developing a hearing aid (both hardware and software) that uses deep learning to perform on-device denoising in real time.
- Designed and trained convolutional neural networks to perform low latency denoising on a hearing aid. Collected and cleaned training and evaluation data. Developed the pipeline to convert the trained Tensorflow model into a quantized model that runs on embedded hardware. Built a CI test suite that compares the on-device model performance against the trained Tensorflow model.
- Designed and implemented an “escalation” system to determine when the hearing aid should run the denoising model. Coordinated the escalation system across 7 microcontrollers and two RF links.
- Implemented and tested a feedback cancellation system in C on bare metal hardware.
- Migrated the neural network training pipeline from GPUs to TPUs to achieve an 8x speedup in training.
- Migrated the company codebase (~100k SLOC) from Python 2 to Python 3.
- Mentored two new graduate hires.

July 2017 – June 2018 Google Inc., Google AI Resident

- Performed large-scale experiments to understand the relationship between minibatch size and training time in neural networks. Implemented Resnet-50-v2 in Tensorflow and performed $\sim 10^4$ Imagenet experiments on TPUs. Published results in JMLR.
- Demonstrated that neural network training trajectories projected onto PCA components resemble high dimensional random walks and proved that these trajectories are sinusoidal and dominated by the lowest components. Published results at NeurIPS 2018.
- Developed a technique to extend neural texture synthesis to audio data. Implemented Tensorflow code to take a “textural” audio clip and extend it arbitrarily. Published results at ICASSP 2019.

January 2016 – July 2017 Persyst, Lead Computational Scientist

- Developed a deep convolutional neural network that robustly detects QRS complexes (i.e., heartbeats) in noisy EKG data using Tensorflow. This project involved overseeing the assembly and labeling of the dataset and integrating the new QRS detector into the existing C++ codebase. The neural network achieved an error rate 9 times lower than the benchmark open source QRS detection software, EP Limited, which implements the standard Pan-Tompkins algorithm.
- Implemented backprop in C++ for a novel NN architecture called a “preferred NN”. (A preferred NN is similar to a Siamese NN but with symmetric connections between the two “twins”.) This project also involved implementing the training architecture, including the Adam optimizer.

Summary of publications

13 publications; 8 first-author publications; 512 total citations; 212 citations to first-author papers; h-index: 9

Please see my website for a complete list of my publications.