Junkai Wu

206-482-8933 | junkaiwu@uw.edu | linkedin.com/in/junkai-wu | github.com/wjk0925

EDUCATION

University of Washington — Seattle, WA
Ph.D. Student, Electrical & Computer Engineering Department — *Sep. 2023 – present*
- Advisor: Mari Ostendorf
- Robert E. Rushmer Endowed Fellowship

University of Illinois at Urbana Champaign — Champaign, IL
B.S. in Computer Engineering, Minor in Mathematics — *Aug. 2019 – May 2023*
- Advisors: Paris Smaragdis, Mark Hasegawa-Johnson

RESEARCH EXPERIENCE

Transformation, Interpretation and Analysis of Language (TIAL) Group — Oct 2023 – Present
Advisor: Mari Ostendorf — *Seattle, WA*
- Working on African American English Text-to-Speech (TTS) by utilizing prosody information.

Computational Audio Lab — May 2021 – May 2023
Advisor: Paris Smaragdis — *Champaign, IL*
- Proposed Higher-Order Meta-AF with improved performance and efficiency in double-talk acoustic echo cancellation.
- Built a pipeline for simulating challenging room acoustic scenes with pyroomacoustics and helping develop meta-optimizers trained with supervised loss.
- Implemented CSSL algorithm with MOCO and distillation loss for the project Continual Self-Supervised Learning (CSSL) of New Sound Classes.
- Worked on implementing vector-quantized audio autoencoder for unconditional and conditional audio generation.

Statistical Speech Technology Group — May 2022 – May 2023
Advisor: Mark Hasegawa-Johnson — *Champaign, IL*
- Worked on speech dataset augmentation for self-supervised training by generating synthetic speech with speech-unit language model and unit-WaveNet.
- Built evaluation pipeline for unit language models with Fairseq framework.

PUBLICATIONS

[1] [Conference Paper] Meta-Learning for Adaptive Filters with Higher-Order Frequency Dependencies. **Junkai Wu**, Jonah Casebeer, Nicholas J. Bryan, Paris Smaragdis. IWAENC 2022.

[2] [Journal Paper] Learning Representations for New Sound Classes With Continual Self-Supervised Learning. Zhepei Wang, Cem Subakan, Xilin Jiang, **Junkai Wu**, Efthymios Tzinis, Mirco Ravanelli, Paris Smaragdis. IEEE Signal Processing Letters.

[3] [Conference Paper] Unsupervised Improvement of Audio-Text Cross-Modal Representations. Zhepei Wang, Cem Subakan, Krishna Subramani, **Junkai Wu**, Tiago Tavares, Fabio Ayres, Paris Smaragdis. WASPAA 2023.

[4] [Preprint] Meta-AF Echo Cancellation for Improved Keyword Spotting. Jonah Casebeer, **Junkai Wu**, Paris Smaragdis. Submitted to ICASSP 2024.

PROJECTS

Speech Synthesis with Text to Unit Translation — Sep 2022 – Dec 2022
- Developed a speech synthesis system that consists of a HubERT + KMeans speech to discrete units (s2u) model, a transformer text to discrete units (t2u) model, a HiFiGAN discrete units to speech (u2s) model.
- Studied how KMeans size and t2u beam search size influence speech synthesis quality. Explored the potential advantage brought by the robustness to noise property of s2u.

Wav2vec 2.0 Pretraining from Scratch on Non-Western Languages — Feb 2022 – May 2022
- Pretrained Wav2vec 2.0 model on UN Proceedings Mandarin corpus and finetuned it for automatic speech recognition (ASR) on GlobalPhone Mandarin corpus with Fairseq toolkit.
- Fine-tunied pretrained English w2v2 and XLSR w2v2 models on the same Mandarin corpus for comparison.

Unsupervised Incremental Learning for Acoustic Scene Classification　　　　　Oct 2021 – Dec 2021
- Implemented an acoustic scene classification model with WAV2CLIP on UrbanSound8k.
- Developed a confusion based novelty detection mechanism and a dataloader for generating unlabeled training data exposures, trained the acoustic scene classifier incrementally without supervision.

Learning to Learn Implementation in JAX　　　　　May 2021 – June 2021
- Implemented the optimization algorithm from the paper Learning to Learn by Gradient Descent by Gradient Descent with JAX framework.
- Tested the algorithm's performance on quadratic problems and classification with multilayer perceptron for MNIST.

Skills & Courses

Languages: Python, Java, C, C++
Frameworks: PyTorch, JAX, deepmind-Haiku, SciPy, Git, Fairseq
Courses: Machine Learning, Deep Learning, Digital Signal Processing, Audio Computing, Speech Processing, Natural Language Processing, Linear Algebra, Optimization, Complex Variables, Random Process