

ZHIYUAN PENG

[Google Scholar](#), [Homepage](#), [Github](#), [Linkedin](#)
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EDUCATION

North Carolina State University

2023 - current

Post-Doc in Computer Science

Research interests: **Large language models (LLMs)**, **Tool-augmented LLMs**, **AI Safety**

The Chinese University of Hong Kong

2017 - 2023

Ph.D. in Electronic Engineering

Research interests: **Speech Processing/Recognition**, **Speaker Recognition**, **Bayes. Adaptation**

Coursework: DeepLearning | BigData | ProbabilisticModel | SpeechProcessing | DataMining

Harbin Institute of Technology, China

2013 - 2017

Bachelor of Electronic and Information Engineering, GPA: 90.91/100, Rank 1st

Coursework: C/C++ | FPGA/Verilog | Circuit | Networking | DigitalSignalProcessing | OS

SKILLS

Language: Python (8years) | Bash/Linux (7years) | C/C++ (4 years) | SQL|Perl|Java/Javascript

Tools: LangChain/OpenAI | HuggingFace | **PyTorch/Tensorflow(6years)**//Keras | Azure/AWS | Git | Docker/Hadoop | Fairseq/EspNet/Kaldi(5years)/PyKaldi/Wenet | scikit-learn

Others: MCU and Embedded System Development | FPGA/VerilogHDL/Vivado/SystemHDL

PROJECT EXPERIENCE

LLMs

Dec. 2022 - current

- Convenience: Open-sourced [Gentopia](#) for easy config. of LLM-powered agents
- Efficiency: QLoRA on *Llama2* LLM for network packet diagnosis | ReWOO to reduce high token use
- Interpretability: Auto-translate numerical features into semantic descript. for root cause analysis
- Scalability: Actively working on augmenting LLMs to master massive APIs (with knowledge graph)

Speech

2017 - current

- Efficiency: Sparsely-shared LoRA for ASR adaptation | Layer Pruning for ASR acceleration
- Extensibility: Prompt tuning for target-speaker ASR | wav2vec2 and RoBERTa for speech disorder assessment | Multi-task learning for language recognition
- Robustness: Bayes. regularize PLDA for adaptation | Model twining against adversarial attacks

Besides, I also had a touch in software defect prediction, using Longformer, and learned token pruning (LTP) for inference acceleration on long code sequences.

WORK EXPERIENCE

Meituan

Sept. 2021 - May 2022

Research Intern

- Accelerating wav2vec2 by fbank2vec for Transformer-based self-supervised pre-training of ASR
- Bayesian backend adaptation for speaker verification(Bayes PLDA, Coral)
- Large-scale knowledge distillation for light-weight speaker verifier

PUBLICATIONS

ReWOO: Decoupling Reasoning from Observations for Efficient Augmented Language Models, B. Xu, [Z. Peng](#), B. Lei, S. Mukherjee, Y. Liu, D. Xu, *submitted to ICLR 2024*, [demo](#), [code](#)

Sparsely Shared LoRA on Whisper for Child Speech Recognition, W. Liu, Y. Qin, [Z. Peng](#), T. Lee, *ICASSP 2024*

Extending Whisper with Prompt Tuning to Target-Speaker ASR, H. Mao, [Z. Peng](#), M. Shao, J. Li, J. Liu, *ICASSP 2024*

Co-evolving Data-driven and NLU-driven Synthesizers for Generating Code in Domain Growth and Data Scarcity, J. Gu, Z. Nan, [Z. Peng](#), X. Shen, D. Xu, *EMNLP 2023 Workshop*

CoMFLP: Correlation Measure based Fast Search on ASR Layer Pruning, W. Liu, [Z. Peng](#), T. Lee, *Interspeech 2023*

Covariance Regularization for Probabilistic Linear Discriminant Analysis, [Z. Peng](#), M. Shao, X. He, K. Ding, T. Lee, G. Wan, *ICASSP 2023*

Unifying Cosine and PLDA Back-ends for Speaker Verification, [Z. Peng](#), X. He, K. Ding, T. Lee, G. Wan, *Proc. Interspeech 2022*

Label-free Knowledge Distillation with Contrastive Loss for Light-weight Speaker Recognition, [Z. Peng](#), X. He, K. Ding, T. Lee, G. Wan, *ISCSLP 2022*

Pairing Weak with Strong: Twin Models for Defending against Adversarial Attack on Speaker Verification, [Z. Peng](#), X. LI, T. Lee, *Proc. Interspeech 2021*

Exploiting Pre-Trained ASR Models for Alzheimer’s Disease Recognition Through Spontaneous Speech, Y. QIN, W. LIU, [Z. Peng](#), SI Ng, J. LI, H. Hu, T. Lee, *NCMMSC 2021*

Mixture Factorized Auto-encoder for Unsupervised Hierarchical Deep Factorization of Speech Signal, [Z. Peng](#), S. Feng, and T. Lee, *in Proc. ICASSP 2020*

Adversarial Multi-task Deep Features and Unsupervised Back-end Adaptation for Language Recognition, [Z. Peng](#), S. Feng, and T. Lee, *in Proc. ICASSP 2019*

Combining Adversarial Training and Disentangled Speech Representation for Robust Zero-Resource Subword Modeling, S. Feng, T. Lee, and [Z. Peng](#), *in Interspeech 2019*

Child Speech Disorder Detection with Siamese Recurrent Network using Speech Attribute Features, J. Wang, Y. Qin, [Z. Peng](#) and T. LEE, *in Interspeech 2019*

SEMINAR TALKS

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|---|-------------------|
| Large-scale Pairwise Classification and its Application in Speaker Verification | <i>May 2019</i> |
| <ul style="list-style-type: none"> • The back-end for speaker verification is to perform similarity scoring of embeddings. Pairwise SVM is a potential alternative to the standard PLDA scoring back-end. • Developed both Cython and C++ implementations for PSVM. | |
| Introduction to Probabilistic Graphical Model: Variational Inference | <i>, May 2018</i> |
| <ul style="list-style-type: none"> • The standard training method of GMM-ivector extractor has two individual EM training phases that may result in sub-optimal solutions. Variational inference can be adopted to jointly train both GMM and ivector extractor. • Developed the C++ implementation for variational inference of GMM-ivector extractor. | |

HONORS

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| National Second Prize of Electronic Design (Frequency meter with Verilog) | <i>2015</i> |
| National scholarship | <i>2014, 2015</i> |
| Best Tutor Award | <i>2015</i> |