

XUE Boyang

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Research Interests: Natural Language Processing, Machine Learning, Speech Recognition.

Education

The Chinese University of Hong Kong, Hong Kong SAR, China. Aug.2021 - Present

Ph.D. Student Dept. of System Engineering and Engineering Management.

Huazhong University of Science and Technology, Wuhan, China. Sep.2016 - Jun.2020

B.Eng. School of Artificial Intelligence and Automation, Excellent Class.

Main Publications

Published as First Author:

- [Bayesian Neural Network Language Models for Speech Recognition](#). *IEEE/ACM Transactions on Audio, Speech, Language Processing (TASLP)*, vol. 30, page. 2900-2917, 2022.
- [Bayesian Transformer Language Models for Speech Recognition](#). in *IEEE International Conference of Acoustics, Speech Signal Processing (ICASSP)*, 2021, page. 7378-7382.
- [Deep Learning based Patient-Specific FHR Detection System on FECCG](#). *Chinese Patent Granted*, 2020, CN112826513B.

Research Experiences & Responsibilities

Research Assistant and Ph.D. Student in HCCL Lab, CUHK. Sep.2020 - Present

Research Topic: Neural Language Models. **Advisor:** *Dr. Jianwei YU* and *Prof. Xunying LIU*.

Project1: Domain Adaptation of Language Models for Elderly Speech Recognition.

➤ Applying variational Bayesian neural networks on Transformer language models (LMs) to improve the model generalization for domain adaptation tasks. SOTA performances of the CUHK Elderly Speech Recognition System were obtained on a cross-domain LM adaptation task on the conversational corpus transferred to a low-resource Alzheimer's speech corpus. Papers have been accepted in the speech-leading conference *ICASSP 2021*.

Project2: Uncertainty Modeling in Neural Network Language Models.

➤ Systematically investigating the variational inference Bayesian framework including Bayesian Neural Networks, Gaussian Process, and Variational Neural Networks for uncertainty modeling in both conventional LSTM-RNN and Transformer LMs to address the overfitting issue and improve model generalization given limited training set across a range of speech recognition scenarios. NAS techniques that efficiently select the optimal network internal components to be Bayesian learned and a minimal number of Monte Carlo parameter samples were used to reduce computation cost incurred by Bayesian inference. A signal-to-noise ratio computed over the parametric variational Gaussian distributions was also measured for uncertainty analysis in terms of both training data quantity and model complexity. One transaction has been accepted in the speech top journal *IEEE/ACM TASLP*.

Project3: Cross-Utterance Language Model for N-best List Rescoring in Speech Recognition.

➤ Applying advanced LSTM-Transformer combined neural language models by incorporating robust long-term cross-utterance representations of N-best list rescoring in speech recognition. Performance

improvements were obtained on both hybrid and end-to-end systems' generated hypotheses. Contributed to several papers accepted in the speech conference *Interspeech 2022*.

Research Intern in IMDS Lab, HUST.

Sep.2019 - June.2020

Project: Fetal Heart Rate Detection on FECG. Advisor: Dr. Cheng CHENG and Prof. Ye YUAN.

➤ Principal manager of a Fetal Heartbeat Detection Project on FECGs (co-operated with Tongji Hospital). Proposed a deep learning based framework including a CNN-LSTM model to detect fetal QRS wave and a patient-specific model to alleviate intra-differences on FECGs from different patients, with important clinical values for prenatal diagnosis to reduce fetal mortality. A *Chinese Patent* has been granted.

Team Leader in Intelligent Robotics Team, HUST.

Dec.2017 - Aug.2019

Project: Robotics and Intelligent Cars Development.

Advisor: Prof. Dingxin HE.

➤ Designing Balanced cars, tracking cars for beacons, energy-efficient cars, and programming on the NXP Cortex-M Series Chips for algorithm design including PID-based motion control, image processing, wireless charging, etc. Participated in the *NXP Cup National University Intelligent Car Race* twice [[Video](#)] and obtained the supreme National Grand Prize.

Awards & Honors

- ◆ Excellent Bachelor Thesis (Top 10%, HUST), Excellent Student Cadre.
- ◆ Grand Prize in the *14th NXP Cup National University Intelligent Car Race* (Top 3/600+).
- ◆ First Prize in the *14th NXP Cup National University Intelligent Car Race*.
- ◆ Second Prize in the *19th Asia and Pacific Mathematical Contest in Modeling* (APMCM).
- ◆ Second Prize in the *13th NXP Cup National University Intelligent Car Race*.
- ◆ University Scholarship of Academy and Sciences (HUST, 2019),
- ◆ Excellent Student Cadre (HUST, 2018).

Skills & Extracurricular Activities

- ◆ Adept in C, Python, MATLAB, Linux Shell, Latex, PyTorch, etc.
- ◆ Well-trained in pattern recognition, deep learning, algorithms, game theory, control theory, etc.
- ◆ Excellent communication, leadership, team spirit, and English writing skills (IELTS W: 7.0).
- ◆ Served as the class commissary in general affairs (Sep.2016 - Jun.2020, HUST).
- ◆ Served as a part-time author in [Zhihu](#) and PaperWeely.
- ◆ Served as the manager for a [PRML open-source project](#) with Datawhale.
- ◆ Always joined voluntary activities, skilled in piano, tennis, hiking, etc.