Yen-Ju Lu

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RESEARCH INTERESTS

automatic speech recognition, speech processing, generative model, machine learning

EDUCATION

National Taiwan University (NTU), Taiwan   Sept. 2014 – Apr. 2017
M.S. Electrical Engineering and Computer Science
National Taiwan University (NTU), Taiwan   Sept. 2010 – June 2014
B.S. Electrical Engineering

WORK EXPERIENCE

Language Technology Institute, Carnegie Mellon University   May. 2021 – Present
Visiting Scholar
Biomedical Acoustic Signal Processing Lab, Academia Sinica   Mar. 2020 – Present
Research Assistant
MediaTek Inc., Taiwan   Feb.2018 – Feb.2020
Artificial Intelligence Software Engineer
NTU Garage, NTU Entrepreneurship Center, NTU   Mar. 2014 – Aug.2014
Group Leader of Peto

PUBLICATIONS

1. **Yen-Ju Lu**, Zhong-Qiu Wang, Alexander Richard, Yu Tsao, Shinji Watanabe *"Conditional Diffusion Probabilistic Model for Speech Enhancement,"* **Submitted to ICASSP 2022**
2. Jing Shi, Xuankai Chang, Tomoki Hayashi, **Yen-Ju Lu**, Shinji Watanabe, Bo Xu *"Discretization and Re-synthesis: An Alternative Method to Solve the Cocktail Party Problem,"* **Submitted to ICASSP 2022**
3. **Yen-Ju Lu**, Chia-Yu Chang, Jeih-Weih Hung, Shinji Watanabe, Yu Tsao *"Speech Enhancement Guided by Contextual Articulatory Information ,"* **Submitted to TASLP**
4. **Yen-Ju Lu**, Yu Tsao, Shinji Watanabe *"A Study on Speech Enhancement Based on Diffusion Probabilistic Model,"* **Accepted by APSIPA 2021**
5. Xuankai Chang, Takashi Maekaku, Pengcheng Guo, Jing Shi, **Yen-Ju Lu**, Aswin Shanmugam Subramanian, Tianzi Wang, Shu-wen Yang, Yu Tsao, Hung-yi Lee, Shinji Watanabe *"An Exploration of Self-Supervised Pretrained Representations for End-To-End Speech Recognition,"* **Accepted by ASRU 2021**
6. Gang-Xuan Lin, Shih-Wei Hu, **Yen-Ju Lu**, Yu Tsao, Chun-Shien Lu *"QISTA-Net-Audio: Audio Super-resolution via Non-Convex l_Q-Norm Minimization,"* **in Proc. InterSpeech 2021**
7. **Yen-Ju Lu**, Chien-Feng Liao, Xugang Lu, Jeih-Weih Hung, Yu Tsao *"Incorporating Broad Phonetic Information for Speech Enhancement,"* **in Proc. InterSpeech 2020**
8. Szu-Wei Fu, Chien-Feng Liao, Tsun-An Hsieh, Kuo-Hsuan Hung, Syu-Siang Wang, Cheng Yu, HengCheng Kuo, Ryandhimas E. Zezario, You-Jin Li, Shang-Yi Chuang, **Yen-Ju Lu**, Yu-Chen Lin ,Yu Tsao *"Boosting Objective Scores of a Speech Enhancement Model by MetricGAN Post-processing,"* **in Proc. APSIPA 2020**
9. **Yen-Ju, Lu,** advised by Lin-Shan, Lee, *"Enhancing Speech Recognition by Deep Unsupervised Learning."* Master's Thesis, National Taiwan University

RESEARCH EXPERIENCE

WAVLab, Language Technology Institute, Carnegie Mellon University
Visiting Scholar   Aug. 2020 – Present
Advisor: Associate Professor Shinji Watanabe
Project: Diffusion Probabilistic Model-based Speech Enhancement
- Proposed supportive reverse process for diffusion probabilistic model.
- Proposed conditional diffusion probabilistic model for speech enhancement, reaching state-of-the-art results in generative model, and keep good performance when discriminative model collapes.
- Collaborated with Facebook research scientist, Alexander Richard.

Project: Self-supervised Pretrained Representations for E2E-ASR
- Survey general applications of seven pretrained speech representations, on end-to-end automatic speech recognition (E2E-ASR) models.
- Designed and run the self-supervised pretrained representation experiments for CHiME4 data set.

Biomedical Acoustic Signal Processing Lab, Academia Sinica
Research Assistant   Mar. 2020 – Present
Advisor: Research Fellow (Professor) Yu Tsao
Project: Robust Automatic Speech Recognition
- Joint training for end-to-end contextualized ASR system and SE model.
- Designed flexible end-to-end structure and cooperated with different tasks, including articulation ASR, audio-image pair training, voice conversion.

Project: Articulation Information in Enhancement
- Improved speech enhancement through broad phonetic articulation information.
- Extracted broad phonetic posterior-gram to improve speech enhancement.
- Joint training of broad phonetic end-to-end ASR and speech enhancement.

Speech Processing Laboratory, National Taiwan University
Graduate Student   Sept. 2014 – Apr. 2017
Advisor: Prof. Lin-Shan Lee
Project: Interactive Question Answering Project with INTEL
- Conducted research on using seq-to-seq, RNN model to generate robots able to learn from asking.
- Improved QA performance through training Question Generator by reinforcement learning.
- Coordinated a three-person team and presented to INTEL.

Speech Processing Laboratory, National Taiwan University
Special Project   Feb. 2013 – June 2014
Advisor: Prof. Lin-Shan Lee
Project: Neural Network implementation and application
- Implemented logistic regression, restricted Boltzmann machine (RBM), neural network, and deep neural network with back-propagation.
- Separated different complexity of 3-D color points data through different techniques.

INDUSTRY EXPERIENCE

MediaTek Inc., Taiwan
Artificial Intelligence Software Engineer   Feb.2018 – Feb.2020
Project: Automatic TF-Lite Model Generator
- Designed and developed TF-Lite model generator.

- Won vAward in 2018 and became 2020 Dept. AOP in CAI2 Technology Group.

Project: AI Digital Signal Processor

- Fabricatied new DSP – implemented and optimized Computer Vision/NN algorithms, and constructed the software architecture.
- Took a business trip to introduce the optimized skills on DSP at Arcsoft, China.

NTU Garage, NTU Entrepreneurship Center, National Taiwan University

Group Leader of Peto   Mar. 2014 – Aug.2014

Project: IoT Airbag for Cellphone

- Led a team of material, EE, CS major members, designing a protective device that can inflate a mini-airbag on a smartphone when it dropped.
- Selected by NTU Garage and regularly advised by Prof. Chung-Yang Huang and Vice President of Compal Communications, Inc.

TEACHING EXPERIENCE

Biomedical Acoustic Signal Processing Lab, Academia Sinica, Taiwan

Intern Mentor   July 2020 – May 2021

- Mentor of summer intern program for M.S. students.

Machine Learning Tutor   Mar. 2020 – June 2020

- Designed curriculum for Machine Learning and Programming for M.S. students.

Chen-Li Educational Group, Taiwan

Lecturer of Physics   Mar. 2013 – Feb. 2018

- Designed curriculum and taught more than **1000 physics classes with 150-300 students** in a class.
- Taught an individual student who won the **IPHO Gold Medal** in 2019.

HONORS & AWARDS

InterSpeech 2020 Young Scientist Granted   2020

- InterSpeech 2020 travel granted and 1-year ISCA membership.
- 3-min highlight and 15-min full paper online conference presentation.

MediaTek 2020 Dept. AOP   2019

- Project "TF-Lite model generator" was chosen as **one of the three Dept. AOPs** in 2020.

MediaTek vAward   2018

- Designed and implemented the TF-Lite model generator for verification.
- Proqmoted to other departments and projects, reaching beyond the original scope.

MediaTek vAward   2018

- Analyzed and optimized the operations on the DSP, improving its capability.

SKILLS

Programming: Python, C++, Shell Script, Matlab
Machine Learning: Pytorch, Tensorflow, Keras

LANGUAGES

English (Proficient), Chinese (Native), Japanese (Elementary)