

Yung-Sung Chuang

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Research Interests

- Self-supervised methods such as contrastive learning for sentence representation. [NAACL'22]
- Dense retrieval/Reranking/Reader models for open-domain question answering.
- Distilling knowledge from large language models to regular size BERT for downstream tasks.

Education

Massachusetts Institute of Technology (MIT)

Sep. 2021 - PRESENT

PH.D. STUDENT IN COMPUTER SCIENCE

- **GPA: 5.0/5.0** (up-to-date)
- Computer Science & Artificial Intelligence Laboratory (CSAIL), Advisor: Dr. James Glass

National Taiwan University (NTU)

Sep. 2016 - Jun. 2020

B.S. IN ELECTRICAL ENGINEERING

- **GPA:** overall: **4.18/4.30**, major: **4.22/4.30**, last 60: **4.27/4.30**, graduate ranking: **15/177 (8%)**
- **Honors:** Presidential Award * 4 (S '18, S '19, F '19, S '20), Irving T. Ho Memorial Scholarship (F '18, F '19)
- **Selected Courses:** Data Structure and Programming 2017 Fall (**A+**), Algorithms 2019 Spring (**A+**), Machine Learning 2018 Spring (**A+**), Digital Speech Processing 2018 Fall (**A+**), Deep Learning for Computer Vision 2019 Spring (**A+**), Computer Architecture 2019 Fall (**A+**)

Research Experiences

Spoken Language Systems Group, CSAIL, MIT, Advisor: Dr. James Glass

Sep. 2021 - PRESENT

RESEARCH ASSISTANT

- Researching on **Unsupervised Dense Retrieval** for open-domain question answering.
- Researching on **Equivariant Contrastive Learning** for sentence embedding for NLP tasks. [NAACL'22]

MIT-IBM Watson AI Lab, Cambridge, Advisor: Dr. Yang Zhang & Prof. Yoon Kim & Prof. Shiyu Chang

Jun. 2022 - Sep. 2022

RESEARCH INTERN

- Researching on **Cross-Lingual transfer** for low-resource languages with unseen scripts.

Speech Processing Lab, NTU, Advisor: Prof. Hung-yi Lee & Lin-shan Lee

Aug. 2018 - Aug. 2021

UNDERGRADUATE RESEARCHER

- Researched on **Non-autoregressive Speech-to-Text Translation**. [Findings@ACL'21]
- Researched on **Cross-Lingual Zero-shot Transfer** tasks. [arXiv Link]
- Researched on **Language Model Pre-training** for speech and text to solve **Spoken Question Answering** tasks. [Interspeech'20]
 - Receive **Travel Grant** in Interspeech 2020 with this paper.
- Researched on **Text Style Transfer** with CycleGAN architecture [Github Link] and delete-insert-based Transformer. [Github Link]

Machine Intelligence and Understanding Lab, NTU, Advisor: Prof. Yun-Nung (Vivian) Chen

Feb. 2019 - Aug. 2020

UNDERGRADUATE RESEARCHER

- Researched on **Knowledge Distillation** to improve **Lifelong Learning** for language tasks. [EMNLP'20]
 - Won **Appier Best Application Award** in **2020 NTU CSIE Undergrad Special Research Exhibition**.
- Researched on **Cycle Consistency and Duality of NLU and NLG** to improve both NLU/NLG tasks. [Findings@EMNLP'20]
- Researched on Generating Conclusions from Medical RCT Papers. [LOUHI 2019@EMNLP]
 - Won the **2nd place** and **Appier 1st prize** in **2019 NTU CSIE Undergrad Special Research Exhibition**.

Intelligent Agent Systems Lab, Academia Sinica, Advisor: Prof. Wen-Lian Hsu

Jul. 2018 - Feb. 2019

RESEARCH INTERN AND RESEARCH ASSISTANT

- Built a supervised **Accurate Collocation Parsing System** with state-of-the-art deep learning methods. [Github Link]
- Developed fully-unsupervised methods to find collocation pairs in a large corpus with Word2Vec technique. [Github Link]

Publications († indicates equal contribution.)

- [1] **Yung-Sung Chuang**, Rumen Dangovski, Hongyin Luo, Yang Zhang, Shiyu Chang, Marin Soljačić, Shang-Wen Li, Wen-tau Yih, Yoon Kim, James Glass “**DiffCSE: Difference-based Contrastive Learning for Sentence Embeddings**”. In *Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL)* 2022.
- [2] Guan-Ting Lin, **Yung-Sung Chuang**, Ho-Lam Chung, Shu-wen Yang, Hsuan-Jui Chen, Shang-Wen Li, Abdelrahman Mohamed, Hung-yi Lee, Lin-shan Lee “**DUAL: Textless Spoken Question Answering with Speech Discrete Unit Adaptive Learning**”.

Submitted to *Interspeech 2022*.

- [3] Cheng-I Jeff Lai, Erica Cooper, Yang Zhang, Shiyu Chang, Kaizhi Qian, Yi-Lun Liao, **Yung-Sung Chuang**, Alexander H Liu, Junichi Yamagishi, David Cox, James Glass “**On the Interplay between Sparsity, Naturalness, Intelligibility, and Prosody in Speech Synthesis**”. In *2022 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2022*.
- [4] Cheng-I Jeff Lai, Yang Zhang, Alexander H. Liu, Shiyu Chang, Yi-Lun Liao, **Yung-Sung Chuang**, Kaizhi Qian, Sameer Khurana, David Cox, James Glass. “**PARP: Prune, Adjust and Re-Prune for Self-Supervised Speech Recognition**”. In *Thirty-fifth Conference on Neural Information Processing Systems (NeurIPS) 2021*.
- [5] Shu-wen Yang, Po-Han Chi[†], **Yung-Sung Chuang**[†], Cheng-I Jeff Lai[†], Kushal Lakhotia[†], Yist Y. Lin[†], Andy T. Liu[†], Jiatong Shi[†], Xuankai Chang, Guan-Ting Lin, Tzu-Hsien Huang, Wei-Cheng Tseng, Ko-tik Lee, Da-Rong Liu, Zili Huang, Shuyan Dong, Shang-Wen Li, Shinji Watanabe, Abdelrahman Mohamed, Hung-Yi Lee. “**SUPERB: Speech processing Universal PERFORMANCE Benchmark**”. In *Interspeech 2021*.
- [6] Shun-Po Chuang[†], **Yung-Sung Chuang**[†], Chih-Chiang Chang[†], Hung-Yi Lee. “**Investigating the Reordering Capability in CTC-based Non-Autoregressive End-to-End Speech Translation**”. In *ACL-IJCNLP 2021: Findings*.
- [7] **Yung-Sung Chuang**, Mingye Gao, Hongyin Luo, James Glass, Hung-Yi Lee, Yun-Nung Chen, Shang-Wen Li. “**Mitigating Biases in Toxic Language Detection through Invariant Rationalization**”. In *The 5th Workshop on Online Abuse and Harms at The Joint Conference of the 59th Annual Meeting of the Association for Computational Linguistics and the 11th International Joint Conference on Natural Language Processing (WOAH@ ACL-IJCNLP) 2021*.
- [8] Cheng-I Lai, **Yung-Sung Chuang**, Hung-Yi Lee, Shang-Wen Li, James Glass. “**Semi-Supervised Spoken Language Understanding via Self-Supervised Speech and Language Model Pretraining**”. In *ICASSP 2021*.
- [9] **Yung-Sung Chuang**, Shang-Yu Su, Yun-Nung Chen. “**Lifelong Language Knowledge Distillation**”. In *EMNLP 2020*.
- [10] Shang-Yu Su[†], **Yung-Sung Chuang**[†], Yun-Nung Chen. “**Dual Inference for Improving Language Understanding and Generation**”. In *Findings of EMNLP 2020*.
- [11] **Yung-Sung Chuang**, Chi-Liang Liu, Hung-Yi Lee, Lin-shan Lee. “**SpeechBERT: An Audio-and-text Jointly Learned Language Model for End-to-end Spoken Question Answering**”. In *Proc. Interspeech 2020*.
- [12] Alexander Te-Wei Shieh[†], **Yung-Sung Chuang**[†], Shang-Yu Su, Yun-Nung Chen. “**Towards Understanding of Medical Randomized Controlled Trials by Conclusion Generation**”. In *Proceedings of the 10th International Workshop on Health Text Mining and Information Analysis at EMNLP 2019*
- [13] Chi-Liang Liu[†], Tsung-Yuan Hsu[†], **Yung-Sung Chuang**[†], Hung-yi Lee. “**A Study of Cross-Lingual Ability and Language-specific Information in Multilingual BERT**”. Preprint; arXiv:2004.09205.

Teachings

Tutorial Speaker at AACL-IJCNLP 2022

Nov. 2022

- Co-hosted a tutorial: **Recent Advances in Pre-trained Language Models: Why Do They Work and How to Use Them** with Prof. Hung-yi Lee and Cheng-Han Chiang at AACL-IJCNLP 2022. [\[Slide Link\]](#) [\[YouTube Link\]](#)
- Introduced the topic of **Contrastive Learning for Pre-trained Language Models**.

Teaching Assistant on Deep Learning for Human Language Processing 2020 Spring Course

Mar. 2020 - Jun. 2020

- Designed homework 1 on **End-to-end Speech Recognition** topic. [\[Slide Link\]](#) [\[YouTube Link\]](#)
- Introduced the topic of **Non-Autoregressive Sequence Generation**.

Honors & Awards

Reviewers, NeurIPS (2021, 2022), ICLR (2021, 2022, 2023), ICML (2022), AAAI (2023), EMNLP (2022), ICASSP (2021,2022), Interspeech (2021)

Apr. 2021 - PRESENT

Presidential Award - for top 5% students (4 times), Electrical Engineering Dept. at NTU

Spring '18, Spring '19, Fall '19, Spring '20

Irving T. Ho Memorial Scholarship (2 times), EECS at NTU

Fall '18, Fall '19

Travel Grant, INTERSPEECH 2020 conference

Sep. 2020

Appier Best Application Award, 2020 NTU CSIE Undergrad Special Research Exhibition

Jun. 2020

2nd Place & Appier 1st Award, 2019 NTU CSIE Undergrad Special Research Exhibition

Jun. 2019

2nd Place, 2019 NTUEE Undergraduate Innovation Award

Jun. 2019

1st Place, 2018 H. Spectrum Demo Day (out of 21 teams)

Jul. 2018

1st Place, NCTS Health Hackathon 2018 (out of 18 teams)

Jun. 2018

Top 8 Finalist, Microsoft Imagine Cup Taiwan National Final 2018

Apr. 2018

Best Tech Award & Microsoft Enterprise Award, MakeNTU 2018 (out of 50 teams)

Mar. 2018

1st Place of Dept. of Transportation, HackNTU 2017 (out of 100+ teams)

Jul. 2017