Bo-Ru (Roy) Lu

☎ (+1) 510-424-1911 | ✉ roy.brlu@gmail.com | ⌂ nlp.borulu.com | ⌥ boru-roylu | in boru-roylu

Research Interests

My recent research is centered on improving language models for dialogue systems, with a particular focus on structure learning, model efficiency, and data synthesis. I have a wide-ranging interest in creating conversational AI systems for real-world conversational AI applications using large language models (LLMs) deep learning techniques.

Education

- University of Washington — Seattle, WA
  Ph.D. in Electrical & Computer Engineering. Overall GPA: 3.9/4.0. — July 2024 (expected)
  Advisor: Mari Ostendorf.

- National Taiwan University — Taiwan
  M.S. in Communication Engineering. Overall GPA: 4.0/4.0. — 2018
  Advisors: Lin-Shan Lee and Hung-Yi Lee.

- National Taiwan University — Taiwan
  B.S. in Electrical Engineering. Overall GPA: 3.7/4.0 & CS-relevant GPA: 4.0/4.0. — 2016

Research Experiences

- **UW Research Assistant** — Fall 2018 - present

  - Advisor: Mari Ostendorf.

  - Developed a new configuration for encoder-decoder transformer models to boost task performance and increase **training and inference efficiency** on three decomposable tasks (e.g. dialogue state tracking, medical summarization, medical question answering).

  - Built a **collaborative human-LLM framework** to synthesize data, enhancing the performance of fine-tuned T5 models for realistic call center applications.

  - Developed an **unsupervised learning algorithm** that automatically extracts **dialogue structure** to improve transformer performance and summarize call center calls.

  - Built a multi-task model of **knowledge identification in document-grounded conversations** and achieved state-of-the-art results in two recent datasets.

- **Amazon Applied Scientist Intern** — Spring & Summer 2022

  - Mentors: Yang Liu and Dilek Hakkani-Tür.

  - Worked on **knowledge-grounded response generation for information-seeking dialogues**. Integrated reranking loss function into a response generation model to improve the inference efficiency.

- **Google Research Intern** — Summer 2021

  - Mentors: Joshua Ainslie and Santiago Ontañón.

  - Worked on **multimodal representation learning** via a joint vision-language transformer that integrates 2-D image positional encoding to account for the relatively spatial relationships between pixel patches in images.

- Microsoft Research Intern   Summer 2020
    - Mentors: Xiaofeng Zhu and Pengchuan Zhang.
    - Worked on weakly supervised user question discovery on private customer service data via multiple instance learning.
- Apple Machine Learning Intern   Spring 2018
    - Mentors: Longkai Zhang and Xin Wang.
    - Designed and implemented a neural network model for keyboard input (Chinese, English, French) integrated in iOS 13.
- NTU Research Assistant   Spring 2015 - Summer 2018
    - Advisors: Lin-Shan Lee and Hung-Yi Lee.
    - LSTM with connectionist temporal classification (CTC) for text and spoken document summarization.

Publications & Preprints   * Equal Contribution

- Encode Once and Decode in Parallel: Efficient Transformer Decoding
  Bo-Ru Lu, Nikita Haduong, Chien-Yu Lin, Hao Cheng, Noah A. Smith, Mari Ostendorf. Preprint, arXiv:2403.13112, 2024.

- Does Collaborative Human-LM Dialogue Generation Help Information Extraction from Human Dialogues?
  Bo-Ru Lu*, Nikita Haduong*, Chia-Hsuan Lee, Zeqiu Wu, Hao Cheng, Paul Koester, Jean Utke, Tao Yu, Noah A. Smith, Mari Ostendor. Preprint, arXiv:2307.07047, 2023.

- Unsupervised Learning of Hierarchical Conversation Structure
  Bo-Ru Lu, Yushi Hu, Hao Cheng, Noah A. Smith, Mari Ostendorf. EMNLP Findings, 2022.

- DIALKI: Knowledge Identification in Conversational Systems through Dialogue-Document Contextualization.
  Zeqiu Wu*, Bo-Ru Lu*, Hannaneh Hajishirzi, Mari Ostendorf. EMNLP 2021.

- A Multi-Passage Knowledge Selector for Information-Seeking Dialogues
  Zeqiu Wu*, Bo-Ru Lu*, Hannaneh Hajishirzi, Mari Ostendorf.DialDoc@ACL, 2021.

- Order-Preserving Abstractive Summarization for Spoken Content Based on Connectionist Temporal Classification
  Bo-Ru Lu, Frank Shyu, Yun-Nung Chen, Hung-Yi Lee, Lin-Shan Lee. Interspeech, 2017.

Awards and Honors

- Ranked the 1st place out of 23 teams in the shared task 1 at 1st DialDoc workshop, ACL-IJCNLP 2021.   2021
- 2018 Foxconn Techonology Award, Foxconn Education Foundation.   2019
- Government Scholarship for Studying Abroad, Ministry of Education, Taiwan.   2018
- Long-Term Fellowship for Cultivating Elite Students, Hsing Tian Kong, Taiwan.   2017 - 2022
    - Fellowship to support elite students in Taiwan with the acceptance rate of 0.1%.
- Advanced Speech Technologies Scholarship, National Taiwan University, Taiwan.   2017
    - Recognizes students with excellent academic performance in speech processing (3 recipients in the year).
- International Speech and Communication Association Student Travel Grants, ISCA.   2017

- NTU Electrical Engineering 1960 Alumni Scholarship, National Taiwan University, Taiwan. 2015
    - Recognizes undergraduates in EECS with excellent academic performance (2 recipients a year).
- Dean's list. 2013

Teaching Experiences

- CSIE 5440, Intelligent Conversational Bot, NTU CSIE. Instructor: Yun-Nung (Vivian) Chen. Spring 2017
- EE 5177, Machine Learning, NTU EE. Instructor: Hung-Yi Lee. Fall 2016
    - Lead TA: led the team of 13 TAs and tutored 278 students in the course.
- CSIE 5431, Applied Deep Learning, NTU CSIE. Instructor: Yun-Nung (Vivian) Chen. Fall 2016

Services & Invited Talks

- Academic Conference Reviewer
  Reviewer: ACL ARR 2023-present, ICASSP 2023-2024, AAAI 2023-2024.
  Secondary reviewer: Interspeech 2017, ICASSP 2017, ICJNLP 2017, EMNLP 2017.
- USC CSCI 535 (Multimodal Probabilistic Learning of Human Communication) April 2022
- 1st DialDoc Workshop at ACL 2021 July 2021

Skills

- **Languages:** Mandarin (native), Taiwanese (native), English (fluent).
- **Programming Languages:** Python, Shell Script, Javascript, HTML/CSS, C++.
- **Libraries:** PyTorch, TensorFlow, Hugging Face, Scikit-learn, Numpy, Pandas.
- **Tools:** Git, Vim, Slurm, HTCondor, LaTeX, Google Clould, Azure, AWS.