Atsumoto Ohashi

Nagoya University
Nagoya, Aichi
Japan
ohashi.atsumoto.c0
@s.mail.nagoya-u.ac.jp
https://ohashi56225.github.io/

1 Research interests

My research interests concern the field of task-oriented dialogue (TOD) systems, which aim to help users accomplish specific dialogue goals (for example, customer service and booking services) while responding to user requests. To realize a practical TOD system deployable in a wide variety of applications, I particularly focus on **optimizing the task completion ability** using reinforcement learning (RL) and **developing language resources and exploring multilinguality**.

1.1 Optimizing task completion ability

TOD systems process a single input utterance from the user through a pipeline of multiple modules, such as natural language understanding, dialogue state tracking (DST), dialogue policy, and natural language generation (NLG), before generating the final response.

TOD systems have evolved rapidly in recent years, and benchmark scores for measuring the accuracy of each module have improved significantly with the introduction of deep learning-based methods. However, it is known that when these modules are combined to form a pipeline for generating responses and introduced in actual multi-turn interactions, the task completion performance is generally unsatisfactory (Takanobu et al., 2020). One of the main reasons is that several models are trained solely on static data and lack robustness to domain shifts and irregularities that occur in real-world interactions. Even dialogue systems comprising recent large language model (LLM)-based modules lack sufficient task completion performance (Hudeček and Dusek, 2023).

To optimize the real-world task completion ability, RL-based approaches that learn from successes and failures in actual explorations are considered suitable. Several studies have used RL to fine-tune some modules in a dialogue system during simulated interactions and improve their task-completion ability. To achieve a more general optimization method, I proposed an approach that optimizes post-processing networks (PPNs) through RL to modify the output of each module post-hoc, rather than fine-tuning the modules (Ohashi and Higashinaka, 2022, 2023). The PPN-based approach does not require training each module, making it possible to optimize the task completion ability even for systems that include modules that are impossible or difficult to train, such as API-based, rule-based, and LLM-based. See (Ohashi and Higashinaka, 2022, 2023) for details on PPNs.

1.2 Language resources and multilinguality

Large-scale TOD datasets are essential for the research and development of deep learning-based TOD systems. For English, several large-scale TOD datasets, such as MultiWOZ (Budzianowski et al., 2018), have been constructed and have driven the development of English dialogue systems. Recently, some large-scale datasets have also been constructed in Chinese (Zhu et al., 2020). However, compared to English, TOD datasets in other languages are limited. Therefore, the capabilities of multilingual TOD systems are not on par with those in English. I believe that it is important to build corpora in other languages and use them to study fundamental technologies such as DST and NLG.

With this background, I focused on the lack of Japanese datasets and constructed JMultiWOZ, the first large-scale Japanese TOD dataset (Ohashi et al., 2024). The dialogue topics and databases used in JMultiWOZ are designed to be culturally natural for Japan, and the dialogues are collected using real-time interactions of Japanese speakers. We expect that this collection can avoid naturalness issues such as "translationese" and lack of cultural adaptation (Ding et al., 2022), which are common in corpora created by translating MultiWOZ.

In the future, I would like to first investigate how the system based on JMultiWOZ differs in performance compared to that built by translation-based corpora. Moreover, I aim to advance research on linguistically general dialogue models and cross-lingual transfer learning for TOD systems.

2 Spoken dialogue system (SDS) research

Dialogue research in 5 to 10 years In the next 5 to 10 years, I expect the development of dialogue systems capable of more human-like spoken interaction. Specifically, models with incremental processing for real-time input and response are anticipated. Rather than the current approach where the system waits for complete utter-

The 20th Annual Meeting of the Young Researchers' Roundtable on Spoken Dialogue Systems, pages 35–36

ances from the user, more human-like turn-taking with overlapping speech and interruptions will be possible. Furthermore, the development of dialogue systems capable of human-like grounding based on non-linguistic modalities such as gestures, facial expressions, and environmental context is anticipated. With the acquisition of such human-like dialogue capabilities, dialogue systems will be more readily introduced into human society, and I would like to work on a dialogue system that can evolve similarly to humans by utilizing the rich experience in human society through RL.

Differences between academia and industry in SDS The industry currently invests vast resources to develop NLP systems using scaling approaches and deploy them in applications. Dialogue systems are a prime example of such applications, and this trend is expected to continue. However, it is challenging for academia to secure such vast resources. Therefore, in my opinion, academia should focus on more fundamental research, such as theoretical exploration and novel algorithmic study, rather than ready-to-use practical applications and up-scaling. Collaboration between industry and academia leveraging their respective strengths will lead to breakthroughs in SDS.

3 Suggested topics for discussion

I would like to discuss the following topics:

- In current TODs, labels such as dialogue state can be defined in detail, but how should we deal with a more complex dialogue in which it is difficult to define labels?
- The optimization of dialogue systems through RL typically relies on user simulators, which are often costly to implement. Is there an effective approach to utilize RL without a user simulator?
- Is a domain-specific dataset for each language necessary to build multilingual TOD systems? Or can LLMs generalize dialogue abilities to other languages?
- How can we efficiently collect speech and multimodal TOD data?

Acknowledgments

This work was supported by JSPS KAKENHI Grant Number 19H05692 and JST Moonshot R&D Grant number JPMJMS2011.

References

Paweł Budzianowski, Tsung-Hsien Wen, Bo-Hsiang Tseng, Iñigo Casanueva, Stefan Ultes, Osman Ramadan, and Milica Gašić. 2018. MultiWOZ - A Large-Scale Multi-Domain Wizard-of-Oz Dataset for Task-Oriented Dialogue Modelling. In *Proc. EMNLP 2018*. pages 5016–5026.

Bosheng Ding, Junjie Hu, Lidong Bing, Mahani Aljunied, Shafiq Joty, Luo Si, and Chunyan Miao. 2022. GlobalWoZ: Globalizing MultiWoZ to develop multilingual task-oriented dialogue systems. In *Proc. ACL 2022*. pages 1639–1657.

Vojtěch Hudeček and Ondrej Dusek. 2023. Are large language models all you need for task-oriented dialogue? In *Proc. SIGDIAL 2023*. pages 216–228.

Atsumoto Ohashi and Ryuichiro Higashinaka. 2022. Post-processing Networks: Method for Optimizing Pipeline Task-oriented Dialogue Systems using Reinforcement Learning. In *Proc. SIGDIAL 2022*. pages 1–13.

Atsumoto Ohashi and Ryuichiro Higashinaka. 2023. Enhancing Task-oriented Dialogue Systems with Generative Post-processing Networks. In *Proc. EMNLP 2023*. pages 3815–3828.

Atsumoto Ohashi, Ryu Hirai, Shinya Iizuka, and Ryuichiro Higashinaka. 2024. JMultiWOZ: A large-scale Japanese multi-domain task-oriented dialogue dataset. In *Proc. LREC-COLILNG 2024*. pages 9554–9567.

Ryuichi Takanobu, Qi Zhu, Jinchao Li, Baolin Peng, Jianfeng Gao, and Minlie Huang. 2020. Is Your Goal-Oriented Dialog Model Performing Really Well? Empirical Analysis of System-wise Evaluation. In *Proc. SIGDIAL 2020*. pages 297–310.

Qi Zhu, Kaili Huang, Zheng Zhang, Xiaoyan Zhu, and Minlie Huang. 2020. CrossWOZ: A large-scale Chinese cross-domain task-oriented dialogue dataset. *TACL* pages 281–295.

Biographical sketch

Atsumoto Ohashi is a PhD student at the Graduate School of Informatics, Nagoya University. He is supervised by Prof. Ryuichiro Higashinaka. He is interested in task-oriented dialogue systems, reinforcement learning, and natural language processing using deep learning.