

## 1 Research interests

My research interests lie on the development of advanced **user support systems**, emphasizing the enhancement of user engagement and system effectiveness. The field of user support systems aims to help users accomplish complex tasks efficiently while ensuring a pleasant and intuitive interaction experience. I explore how to incorporate engaging and context-appropriate assistance into these systems to make the task completion process more effective and enjoyable for users.

A key area of my research is user support system personalization, which includes methods for adapting system behavior, interface elements, and assistance strategies based on user profiles, skill levels, and interaction histories. I am specifically interested in approaches that can achieve personalization without extensive manual configuration, allowing the support system to dynamically adjust to each user's evolving needs and preferences. To achieve this in a news commentary dialog system, I propose multiple question candidates with varying levels of difficulty to the user and, based on the selected questions, estimate and adapt the user's level of understanding of the news article.

### 1.1 Building a conversational question answering system

Conversational question generation involves producing multiturn questions related to a document, aiming to fulfill the user's information needs through conversation. Methods include generating questions based on dialog history, consisting of question–response pairs, and supporting sentences. Pan et al. (2019) developed a consistent question generation process using reinforcement learning. Do et al. (2023) proposed a two-stage framework for conversational question generation, determining what to ask and how to ask based on a semantic graph. These methods use datasets for conversational question answering, such as DoQA (Campos et al., 2020), QuAC (Choi et al., 2018), and CANARD (Elgohary et al., 2019), generating simple one-word-answer questions.

Qin et al. (2023) and Chernyavskiy et al. (2023) used large language models (LLMs) to generate fluent responses based on preselected knowledge. Following these methods, this study uses LLMs to generate ques-

tions that elicit explanatory answers in a free-form manner.

### 1.2 News chatbot

The media uses dialog content related to news articles for their clarity, but they are manually created by journalists. Manual creation is inefficient because it requires significant cost and time. To address this, Laban et al. (2020) proposed a method to automatically construct chatbots from news articles. This method presents question candidates to the user, but individual user characteristics are not considered in the creation of these candidates. Therefore, this study aims to provide desired question candidates by generating them based on the user's understanding.

### 1.3 Question generation considering user characteristics

If the user's social group characteristics differ, the questions are also expected to vary. Stewart and Mihalcea (2022) developed a method to generate questions reflecting user characteristics. This method trains a text generation model using social media data, considering social groups such as domain expertise. Additionally, An et al. (2021) designed a prototype conversation agent that generates speech based on what the user knows and does not know, verifying the effectiveness of incorporating the user's knowledge. Inspired by these methods, this research uses LLM to generate questions that consider the extent to which the user understands news articles. Specifically, the user is presented with questions with three levels of difficulty, and their understanding of the news article is assessed based on the difficulty level of the question they select.

### 1.4 Question generation with adjusted difficulty level

In educational contexts, the generation of questions with controlled difficulty is gaining momentum. Controlling the difficulty of questions in a question–answer learning system allows for learning to be tailored to individual users. Cheng et al. (2021) defined the difficulty of questions based on the number of inference steps required to answer them and proposed a method that gradually increases the difficulty through step-by-step rewrit-

ing. However, in this study, the difficulty of questions stems from factors such as the background knowledge required for comprehending news articles, rendering this definition unsuitable. Therefore, we generate questions with adjusted difficulty using an LLM through few-shot learning (Brown et al., 2020), following examples manually created in advance.

## 2 Spoken dialogue system (SDS) research

The advancement of LLMs has made it possible to build user support dialogue systems for a wide range of users. However, challenges remain in adapting these systems to individual users. Personalization in voice dialogue systems, which uses emotions and intentions derived from voice features, is particularly promising. By analyzing tone, speed, and accent, user profiling becomes more precise, potentially offering personalized support.

Using voice in user support dialogue systems also improves accessibility. Voice interfaces allow the system to be accessed by visually impaired users and those in situations where manual input is difficult, such as while driving. In my research on news article explanation interfaces, I reduced the user’s burden by automatically generating question candidates. Voice can further alleviate the user’s burden by eliminating the need to input long texts manually. Moreover, designing appropriate voice dialogues and endowing the system with a personality to strengthen emotional connections with users could enhance engagement.

However, several challenges need to be addressed to realize these benefits, including improving speech recognition accuracy, effectively utilizing audio features, and reducing hallucinations during task execution.

## 3 Suggested topics for discussion

I suggest discussing the following topics:

- What are the benefits and challenges of converting existing text-based user support dialog systems to voice-based systems?
- Can a multimodal LLM become an assistant spoken dialog system (SDS) that exceeds existing text-based LLM?
- Can the use of voice features in an SDS help personalize the system?

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## Biographical sketch



Tomoya Higuchi is a master's student at the Graduate School of Informatics and Engineering, University of Electro-Communications. He is interested in user support dialog systems and spoken task-oriented dialog systems. He has participated

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