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Shared-Experience-Focused Utterance Generation in Dialogue Systems Using Prompt-Based LLM

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Extended Abstract

1. Objectives

This study aims to design prompts for generating “shared-experience-focused” utterances in LLM (Large Language Model)-based dialogue systems. While casual conversation systems have been introduced to the market in recent years, most of these interactions predominantly involve either 'questions' or 'reports (information provision)' regarding knowledge held by the system or its user. According to classifications based on dialogue analysis in Japanese linguistics [1], there exists a type of dialogue called “shared-experience-focused” conversations, in which speakers talk about mutually shared past experiences. This type of exchange helps reaffirm relationships between speakers and represents an essential aspect of relationship-building in casual conversations.

If dialogue systems could generate shared-experience-focused dialogues, they would help users feel a sense of connection to the system. In this research, we aim to design prompts to enable such dialogues using LLMs.

2. Scope

This study envisions a dialogue system that generates the shared-experience-focused conversations by retaining records of past interactions and using them as shared experiences with users. The proposed system is assumed to consist of a dialogue record database that stores the user’s experiences and opinions, a search function to retrieve records from the database similar to the current conversational context, a termination detection function to identify the end of a conversational segment based on the flow of the dialogue, and a shared-experience-focused utterance generation function that utilizes an LLM. This is a type of Retrieval-Augmented Generation (RAG), a widely studied approach in recent years that combines LLMs with external databases and retrieval functions [2].

This study focuses on designing prompts for generating shared-experience-focused utterances and verifies their feasibility. It is assumed that past conversational records are stored in the database.

3. Issues

Based on our previous experiments, two significant problems have been identified in dialogue systems that use prompts to guide the content and direction of conversations.

- As mentioned in the Objectives, dialogue systems are primarily limited to conversations involving "questions" or "reports (information provision)," which prevents them from engaging in shared-experience-focused dialogues.
- Even when past shared facts recorded in the database are incorporated into prompts and used to generate utterances via an LLM, our experiments have shown that the generated utterances may still deviate from the facts. Moreover, the system may produce utterances that incorrectly identify whether the agent of the shared experience is the user or the system itself.

4. Approach

This study considers using prompts that incorporate the following three elements:

1. Instruction statements: Guidance on roles and considerations during utterance generation.
2. Database information: Details about shared matters between the system and the user during previous dialogues.
3. Information on the definition of shared-experience-focused utterances.

The content of the utterances generated by the LLM based on the prompts is evaluated, and the prompts are iteratively improved to enable effective shared-experience-focused utterances. As a concrete method for improving prompts, the process involves repeating the following cycle: prompt refinement → dialogue experiments and evaluation → feedback-driven prompt refinement → dialogue experiments and evaluation. Typically, this iterative improvement requires the user to engage in multi-turn dialogues with the system for each evaluation. Consequently, improving prompts demands numerous trials and imposes a significant burden on the user.

To address this issue, this study conducts automated dialogue experiments with a pair of dialogue systems. This approach simplifies the collection of dialogue logs compared to user-based experiments. By evaluating these dialogue logs and feeding the results back into prompt refinement, the need for users to engage in dialogue experiments is eliminated, enabling more extensive feedback cycles for improving the prompts. Here, gpt-4o-mini [3] was used as the LLM.

5. Results

Through repeated evaluation experiments, the prompts were refined through an iterative process of improvement and testing. As a result, it was confirmed that by configuring the prompts as described below, the LLM could more accurately recognize roles and conversational content, enabling the generation of natural dialogues that include shared-experience-focused utterances.

- Incorporating Japanese linguistics insights: Definitions of shared-experience-focused dialogues were included in the prompts, and self-created examples were added to perform few-shot learning with the LLM. This resulted in the observation of sequences of shared-experience-focused utterances.
- Placing instruction statements at the beginning: Instruction statements were positioned at the start of the prompts, and role names and notes were added to the event database. This reduced incorrect utterances where the system misrecognized its role. The evaluations confirmed that the system could correctly reflect its roles and events in the utterances.
- Extracting key information from dialogue history: Important information was extracted from the dialogue history and stored in the database information part of the prompt in JSON format. This reduced the generation of utterances inconsistent with past facts. Additionally, smooth topic transitions were observed.

6. Acknowledgement

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