

A Dialogue System for Semi-Structured Interviews by LLMs and its Evaluation on Persona Information Collection

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Abstract

In this paper, we propose a dialogue control management framework using large language models for semi-structured interviews. Specifically, large language models are used to generate the interviewer’s utterances and to make conditional branching decisions based on the understanding of the interviewee’s responses. The framework enables flexible dialogue control in interview conversations by generating and updating slots and values according to interviewee answers. More importantly, we invented through LLMs’ prompt tuning the framework of accumulating the list of slots generated along the course of incrementing the number of interviewees through the semi-structured interviews. Evaluation results showed that the proposed approach of accumulating the list of generated slots throughout the semi-structured interviews outperform the baseline without accumulating generated slots in terms of the number of persona attributes and values collected through the semi-structured interview.

1 Introduction

This paper proposes a dialogue control management framework using large language models (LLMs) (Brown et al., 2020), specifically targeting semi-structured interviews (Fielding, 2003a,b; Wengraf, 2001). Semi-structured interviews are characterized by the interviewer starting the dialogue with only an initial slot set prepared in advance and dynamically expanding the list of slots throughout the interview’s dialogues with all interviewees. In this paper, career interviews (Hashimoto et al., 2025) are highlighted as a representative example of a semi-structured interview. In the proposed framework, LLMs are applied to generate the interviewer’s utterances and to make conditional branching decisions based on

the understanding of the interviewee’s responses. This approach allows for flexible dialogue control by generating and updating slots in response to the interviewee’s answers. Within this framework, LLMs function as the agent performing the role of the interviewer, responsible for generating utterances, generating new slots, and filling slots. Furthermore, unlike Hashimoto et al. (2025), the framework incorporates a mechanism for accumulating the list of slots generated over the course of incrementing the number of interviewees during semi-structured interviews. As the key components of the proposed method are to be described in Section 5.2 and in Figure 4, we invented the “persona attributes prediction” function, which contributes to prioritizing generating questions known to be relevant to collecting persona attributes and values¹. The contributions of this paper are as follows:

1. With the developed framework using LLMs, we demonstrated that the challenging task of managing semi-structured interviews can be effectively realized.
2. As contributions that distinguish our work from Hashimoto et al. (2025), we highlight the following two points.
 - (a) We demonstrate that the proposed framework enables a mechanism for progressively constructing the list of slots in semi-structured interviews involving multiple interviewees.
 - (b) We show that the proposed approach of accumulating the list of generated slots throughout semi-structured interviews outperforms a baseline approach that does not accumulate generated slots,

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¹A more detailed explanation of the “persona attributes prediction” function is provided in the description of LLM5 in Section 5.2.

measured by the number of persona attributes and values collected through the semi-structured interviews.

2 Related Work

In recent years, numerous studies on interview dialogue systems have been reported (Zeng et al., 2023; DeVault et al., 2014; Johnston et al., 2013; Kobori et al., 2016; B et al., 2020; Nagasawa et al., 2024; Ge et al., 2023; Inoue et al., 2020), including an interview system designed for job interviews as a notable example (Su et al., 2019, 2018). Additionally, Inoue et al. (2020) developed a job interview dialogue system that employs an android robot. This system generates follow-up questions based on user response keywords and the degree of satisfaction, guided by four predefined topics. In a different line of work, Schatzmann and Young (2009) presented a framework for statistically modeling the response behavior of a user simulator, with the aim of optimizing dialogue policies.

Moreover, related to interview dialogue systems, there have been efforts to enhance the performance of dialogue systems by leveraging LLMs in slot filling dialogue systems (Hudeček and Dusek, 2023; Jacqmin et al., 2022; Siddique et al., 2021; Coope et al., 2020), utilizing GPT’s advanced language comprehension capabilities (Sun et al., 2024; Feng et al., 2023; Heck et al., 2023). Wagner and Ultes (2024) discuss an approach that enhances controllability in dialog systems by integrating a rule or slot based dialog manager alongside LLMs. Furthermore, Komada et al. (2024) proposed a method for dynamically generating slots based on dialogue history to maintain scenario consistency in Tabletop Role-Playing Games (TRPGs). In TRPGs, the primary objective is to record scenarios, and deep exploration of information is not a priority. However, in semi-structured interviews, it is necessary to dynamically generate new slots as needed to obtain new information. Additionally, Hashimoto et al. (2025) developed a dialogue system aimed at supporting efficiency and quality improvements in career interviews conducted by nursing administrators. Building on the results of Hashimoto et al. (2025), this paper also focuses on career interviews conducted by nursing administrators, modeling semi-structured interviews that dynamically generate slots according to the interviewee’s circumstances.

Research on semi-structured interviews has also

been conducted (Parfenova, 2024; Hu et al., 2024). In contrast to these existing studies, this paper proposes a dialogue control framework using LLMs. The proposed method enables more efficient questioning in semi-structured interviews with multiple interviewees by accumulating information in the form of slots throughout the interview.

3 Semi-Structured Interview

Representative interview formats include structured interviews and semi-structured interviews. These formats differ significantly in whether the list of slots is finalized before the start of the interview. Figure 1 illustrates conceptual diagrams of these two interviews types. A semi-structured interview is characterized by the fact that, although basic questions are prepared in advance, the interviewer can flexibly change their order of the questions or add new questions according to the interviewee’s responses (Figure 1, right). The interviewer progressively constructs the list of slots through dialogue with all interviewees. This format allows a higher degree of freedom in questioning and enables in-depth exploration tailored to each interviewee and situation. As a result, it can uncover the list of slots that might not emerge in a structured interview. However, the outcome can vary significantly depending on the interviewer’s skill level, requiring more advanced interview techniques and experience.

4 Flowchart for Semi-Structured Interviews

In this paper, we use a flowchart-based approach to control the progress of dialogue in semi-structured interviews. Figure 2 shows the flowcharts designed for semi-structured interviews. Figure 3 illustrates the *internal module common to structured and semi-structured interviews*, which is used in both models.

4.1 Internal Module common to Structured and Semi-Structured Interviews

Before starting the dialogue to inquire about the interviewee’s career, the interviewer engages in small talk to build rapport with the interviewee (Bickmore and Cassell, 1999). Once the interviewer determines that a career-related topic has emerged during small talk, they capture that information and

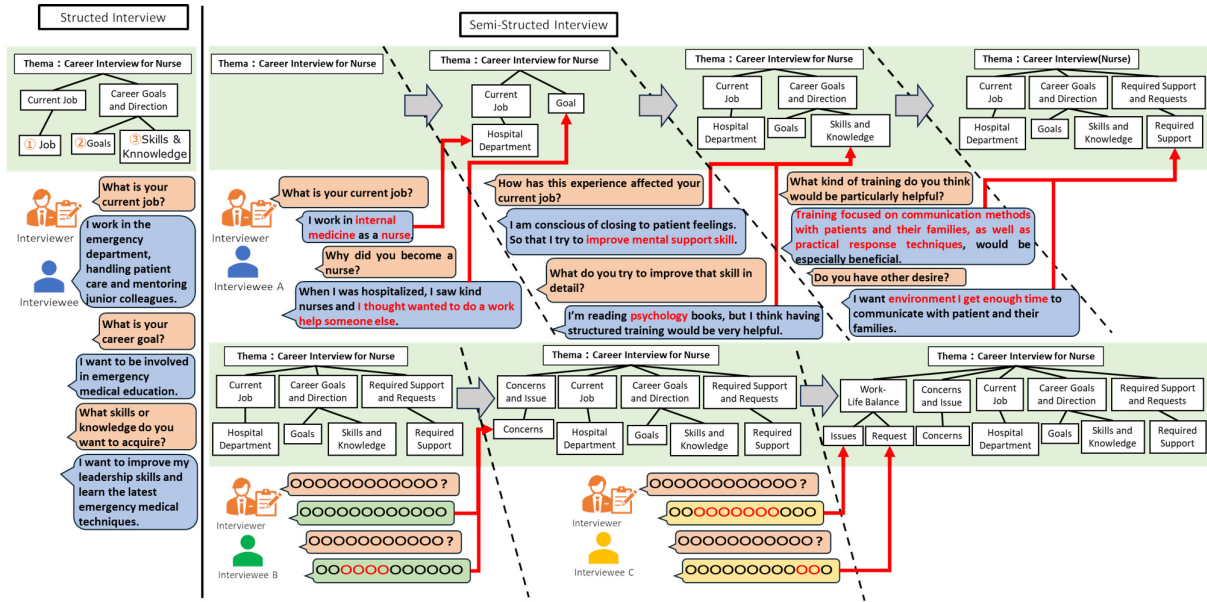


Figure 1: Diagram of Structured and Semi-Structured Interviews

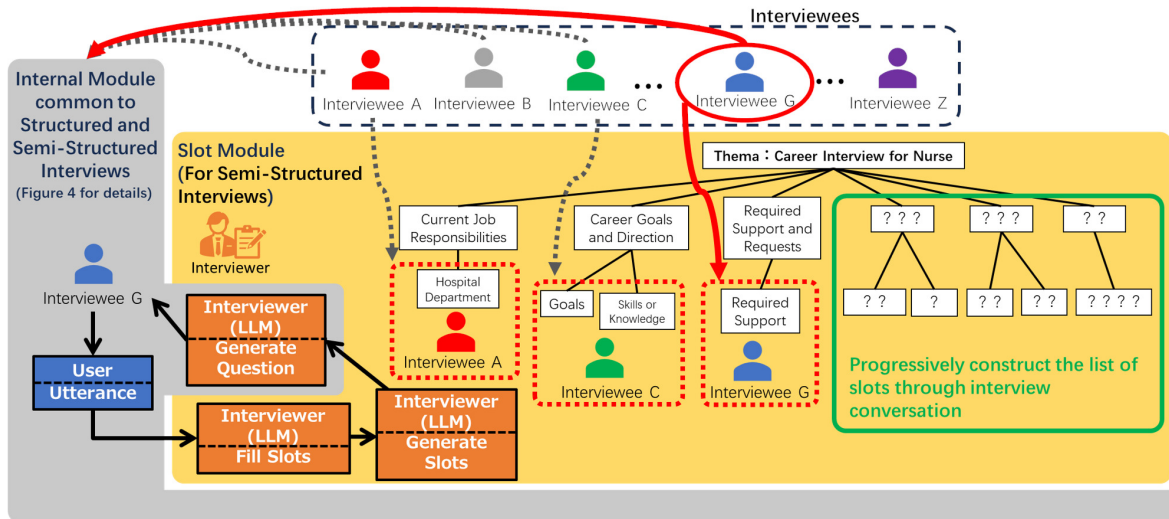


Figure 2: Flowchart of Semi-Structured Interviews

perform an initial slot filling step². After this initial step, the following cycle is repeated:

1. Determine whether to end the dialogue.
2. If it is determined not to end the dialogue, the interviewer generates the next question² and asks the interviewee the question.
3. Once the interviewee responds to the question, the interviewer receives the utterance.
4. Fill in any empty slots (slot filling)².

²The detailed procedures for slot filling and question generation differ between structured and semi-structured interviews.

This cycle continues until a decision is made to end the interview. The *internal module common to structured and semi-structured interviews* for dialogue transitions, which is used in both Figure 6 and Figure 2, is shown in Figure 3.

4.2 Semi-Structured Interview

As shown in Figure 2, the overall flow in a semi-structured interview is almost the same as that of a structured interview. A key difference, however, is that after slot filling, the interviewer refers to the dialogue history and the list of slots generated up to that point to generate new empty slots. These newly generated slots are then added to the existing

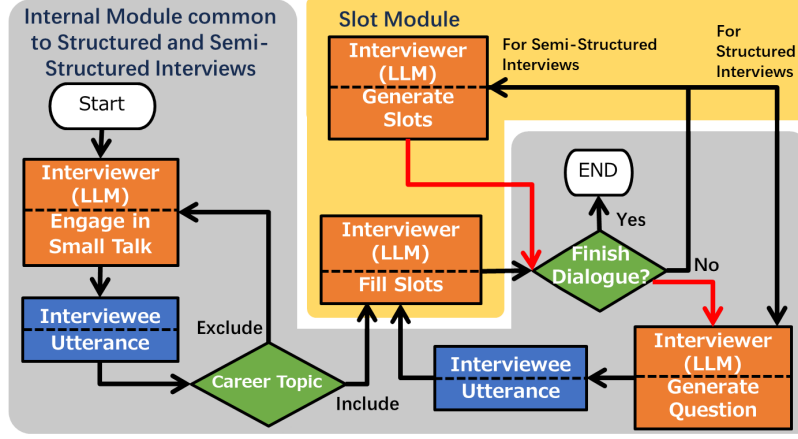


Figure 3: Internal Module Common to Structured (Figure 6) and Semi-Structured (Figure 2) Interviews

list of slots. Subsequently, the process continues with the same cycle (end determination, question generation, interviewee’s utterance, receiving interviewee’s utterance, slot filling, and generation of new slots) until a decision is made to end the interview.

5 Implementation with LLMs and Evaluation in Career Interview

5.1 Career Interview

In this paper, we apply the framework of semi-structured interviews to career interviews. Following Hashimoto et al. (2025), we developed 16 personas as interviewees. As shown in Table 1, each of these 16 personas is defined by 10 attributes, such as “Basic Personal Information,” “Personality,” “Past Career,” and “Future Vision,” with specific values assigned to each attribute³.

5.2 LLMs for an Interviewer and an Interviewee

In this paper, we utilize LLMs to take on both the interviewer and the interviewee roles in semi-structured interviews. The interviewer role is performed by an LLM tasked with generating small talk (LLM1), slot filling (LLM4), generating new slots (LLM6, LLM7), generating questions to fill slots (LLM8), making conditional branching decisions (LLM3, LLM10). For the interviewee role,

an LLM is assigned one of the 16 predefined personas and functions as a user simulator. It is responsible for generating small talk responses (LLM2) and answering the interviewer’s questions based on its assigned persona (LLM9). If the interviewee role LLM is asked a question about content not included in its assigned persona’s values, it is configured to respond with “I don’t know.” We use GPT-4o (gpt-4o-2024-11-20), provided by OpenAI⁴, as the LLM. Additionally, LangGraph⁵ is employed to implement the dialogue flow control. We implemented each specific task using a separate LLM module. The following describes the roles of LLM1 through LLM10 used in the system.

- **LLM1:** Generates small talk utterances for the interviewer. The prompt includes the dialogue history.
- **LLM2:** Generates small talk utterances for the interviewee. The prompt includes the dialogue history and persona settings.
- **LLM3:** Determines whether a career-related topic has emerged during small talk. If such a topic is detected, the small talk session is terminated. The prompt includes the dialogue history.
- **LLM4:** Fill in the values from the interviewee’s utterances to the corresponding ones in the list of slots. The prompt includes the dialogue history and the current list of slots.
- **LLM5:** Based on the interviewee’s utterances, this LLM predicts that the slot attributes cor-

³We manually revised 16 personas of Hashimoto et al. (2025) by restructuring their attributes and adding new ones, so that each of persona has certain values for all of the 10 attributes listed in Table 1. This is simply for making the comparison with the baseline without accumulating generated slots during the semi-structured interviews clearly distinguished in terms of the evaluation metric of the numbers of collected persona attributes and values in Section 5.

⁴<https://openai.com/index/hello-gpt-4o/>

⁵<https://github.com/langchain-ai/langgraph>

ID	Attributes	Values of “Aoi Endo”
1	Basic Personal Information (Name, Age, Hometown, Gender)	Aoi Endo, 30 years old, Niigata, Female
2	Personality	Sincere, Cooperative
3	Past Career	Worked continuously at a university hospital for 8 years.
4	Current Career and Workplace	Medical department (Internal Medicine). Acts as a deputy leader of the team. Workplace relationships are favorable.
5	Future Vision	Considering advancing into nursing management positions.
6	Concerns and Dissatisfaction	Dissatisfied with the lack of promotion opportunities.
7	Thoughts on Promotion or Career Change	Wishes to continue working at the same hospital in the future.
8	Hobbies and Personal Life	Enjoys handicrafts as a hobby.
9	Family and Home	Has one child. Parents live nearby and provide assistance with childcare.
10	Memories and Episodes	Learned the importance of building trust with patients through participation in medical volunteer activities during student days.

Table 1: Overall Set of Attributes of Persona of Interviewees and an Example of a Value of an Interviewee “Aoi Endo”

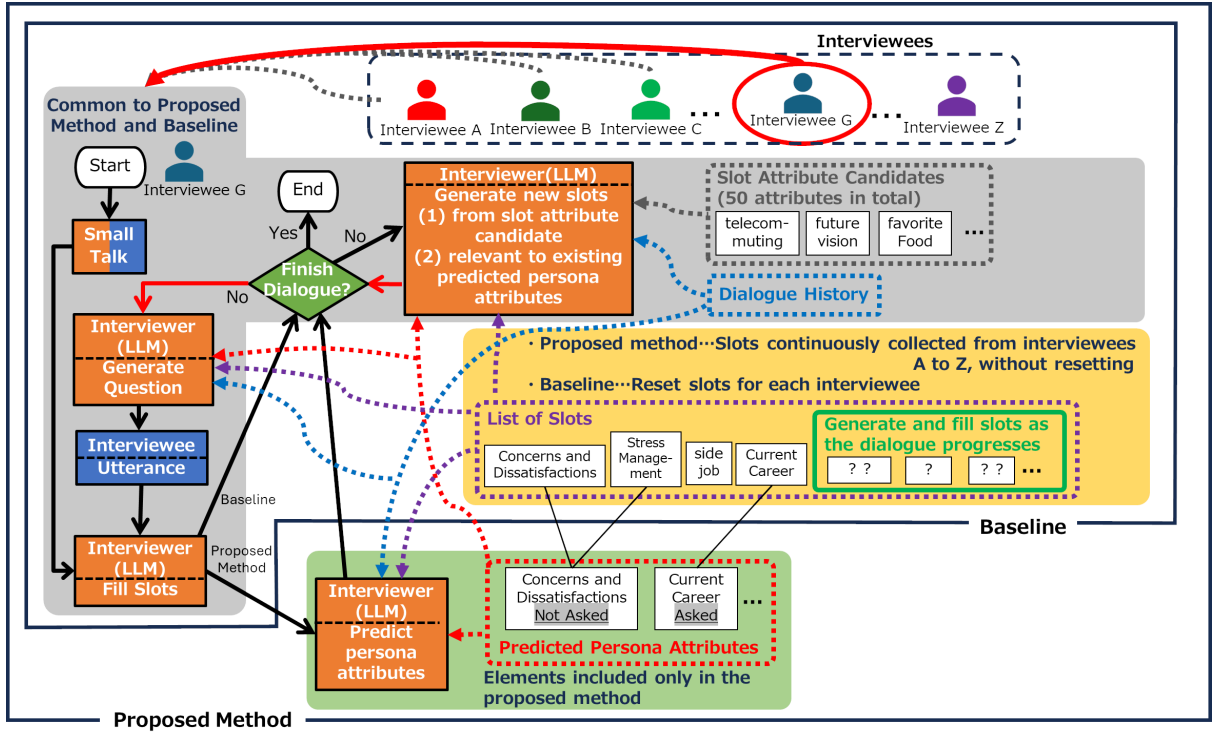


Figure 4: Flowchart of Proposed Method and Baseline (In our actual implementation, it does not have any explicit linked structure that represents the relationship between the list of slots and the predicted persona attributes, although it is relatively easy to manually identify their linked relations.)

responding to the slots filled with values are part of the interviewee’s persona, and outputs them as a bulleted list labeled “Predicted Persona Attributes.” In this list, each predicted persona attribute is accompanied by a label indicating whether or not a question related to that attribute has already been asked during the interview. The names of the predicted persona attributes are carried over to the next interview, but the labels indicating the question status are reset to “Not asked” at the be-

ginning of each new interview. The prompt includes the dialogue history, the current list of slots, and the previously predicted persona attributes. Figure 4 shows part of the prompt for LLM5. By introducing this mechanism of predicting persona attributes, it is expected that the system will be able to generate questions more efficiently. Specifically, it helps avoid repeatedly asking questions about topics that have already been addressed, and enables the generation of slots and questions related

ID	Persona Attributes	Generated Slots throughout the Interview	Number of Slots
1	Personal Basic Information (Name, Age, Hometown, Gender)	Personal Basic Information	1
2	Personality	Personality	1
3	Past Career	Past Career	1
4	Current Career and Workplace	Current Career and Workplace, Workplace Relationships	2
5	Future Vision	Future Vision, Future Career Plans	2
6	Concerns and Dissatisfactions	Concerns and Dissatisfactions	1
7	Thoughts on Promotion or Career Change	Thoughts on Promotion or Career Change, Improvement of Professional Skills	2
8	Hobbies and Personal Life	Hobbies and Personal Life	1
9	Family and Home	Family and Home	1
10	Memories and Episodes	Memories and Episodes	1

(a) Generated Slots Corresponding to Persona Attributes

Generated Slots throughout the Interview	Number of Slots
Social Media, Smartphone Apps in Use, Task Management, Failures from My Student Days, Fashion Preferences, Favorite Mascot Character, Favorite Food, Favorite Words and Mottos, Least Favorite Food, Someone You Respect, Favorite Music, The World 100 Years from Now, Time Management Tips, Side Jobs, Favorite Snacks, Love and Relationships, The Most Difficult Experience in Life, Favorite Subject in School, Stock Investment Experience, Thoughts on Asset Management, Expanding Your Network, Remote Work, Horseback Riding Experience, Morning Routine, Computer Usage Frequency, Primary Care Doctor, Cooking Skills and Signature Dishes, Tips for Decluttering and Organizing, How to Enjoy Overseas Travel, Language Learning Tips, Sports Viewing, Gym Usage, Pets, Favorite Celebrity, Relationship with Technology, Commuting Methods, Challenges in Online Meetings, Managing Emotions, Differences in Financial Awareness	39

(b) Generated Slots Not Corresponding to Persona Attributes

Table 2: The Correspondence Table between the Persona Attributes and the Generated Slots

Method	1st interviewee	2nd interviewee	3rd interviewee	4th interviewee	Average
Baseline	4 / 16	4 / 18	5 / 17	4 / 18	4.25 / 17.25
Proposed Method	4 / 18	6 / 31	8 / 41	10 / 52	7 / 35.5

Table 3: Evaluation Results of Persona Information Collection (Number of persona attributes collected from interviewee / Number of accumulated slots)

to a wider range of topics. In addition, it is expected to prioritize the selection of slots that lead to meaningful information collection, thereby facilitating efficient acquisition of persona attributes throughout the interview.

- **LLM6:** Generates new slots that are relevant to the existing “Predicted Persona Attributes”. The newly generated slots are added to the list of slots. The prompt includes the dialogue history, current list of slots, and predicted persona attributes.
- **LLM7:** Randomly selects a candidate from the “Slot Attribute Candidates” and generates a new slot corresponding to the same attribute name. The generated slot is added to the list of slots. The prompt includes the name of the selected candidate from the “Slot Attribute

Candidates”.

- **LLM8:** Selects one unfilled slot from the current list of slots and generates a question to elicit the corresponding value. The prompt includes the dialogue history, current list of slots, and predicted persona attributes. If there are slots corresponding to “Predicted Persona Attributes” that have not been asked about in the interview, LLM is instructed to prioritize generating questions related to those persona attributes.
- **LLM9:** Generates the interviewee’s response utterance. The prompt includes the dialogue history and persona settings.
- **LLM10:** The interview dialogue consists of a minimum of 17 turns and a maximum of 20 turns. When the number of turns exceeds

System:	How have you been lately? How's work going? If you've had any fun or refreshing moments despite being busy, I'd love to hear about them.	
Interviewee:	On my days off, I refresh myself by visiting cafes and watching movies.	Persona ID:8
System:	Could you tell me about your current workplace and career?	Slot:"Current Career and Workplace"
Interviewee:	I work in the obstetrics and gynecology department at a university hospital, where I provide care for pregnant women and postpartum mothers.	Persona ID:4
System:	Are there any concerns or dissatisfactions regarding your current workplace or career?	Slot:"Concerns and Dissatisfactions"
Interviewee:	I find it challenging to provide emotional support to patients who have anxieties about pregnancy and childbirth.	Persona ID:6
System:	What are your goals or aspirations for your future career?	Slot:"Future Career Plans"
Interviewee:	I want to obtain a midwifery qualification and become someone who can provide more comprehensive physical and emotional support to patients.	Persona ID:5
System:	Could you tell me about your family?	Slot:"Family and Home"
Interviewee:	I have my parents and an older brother, but I currently live alone.	Persona ID:9
System:	Have you ever considered a promotion or changing jobs?	Slot:"Thoughts on Promotion or Career Change"
Interviewee:	I am satisfied with my current workplace and aim to obtain a midwifery qualification to engage in more specialized work.	Persona ID:7
System:	Could you tell me about your career so far?	Slot:"Past Career"
Interviewee:	This is my eighth year as a nurse. I worked for four years at a regional general hospital before transferring to my current university hospital.	Persona ID:3
System:	What kind of routine do you follow after waking up in the morning?	Slot:"Morning Routine"
Interviewee:	I don't know.	
System:	What kind of nurse do you aspire to become in the future?	Slot:"Future Vision"
Interviewee:	I want to be a nurse who can provide deeper support for patients' physical and emotional well-being.	Persona ID:5
System:	How would you describe your personality?	Slot:"Personality"
Interviewee:	I believe I am sincere and trustworthy, with a strong desire to improve and a willingness to put in the effort.	Persona ID:2
System:	Have you ever been interested in stock investments or asset management?	Slot:"Stock Investment Experience"
Interviewee:	I don't know.	
System:	How do you feel about the human relationships at your workplace?	Slot:"Workplace Relationships"
Interviewee:	The collaboration with doctors and midwives is smooth, and I am satisfied with the teamwork at my workplace.	Persona ID:4
System:	Are you currently working on anything to improve your professional skills at your workplace?	Slot:"Improvement of Professional Skills"
Interviewee:	I don't know.	
System:	Could you tell me about your birthplace or where you are from?	Slot:"Personal Basic Information"
Interviewee:	I am from Tokyo.	Persona ID:1
System:	Are there any countries or regions you have wanted to visit?	Slot:"How to Enjoy Overseas Travel"
Interviewee:	I don't know.	
System:	Can you share any experiences of failure and how you overcame them?	Slot:"Memories and Episodes"
Interviewee:	I don't know.	
System:	Do you have any hobbies or activities that you enjoy in your daily life?	Slot:"Hobbies and Personal Life"
Interviewee:	On my days off, I refresh myself by visiting cafes and watching movies.	Persona ID:8
System:	That concludes our interview. Thank you very much.	

Figure 5: An Example of Interview Dialogue

17, LLM10 determines whether the interview can be concluded based on whether sufficient information about the interviewee has been elicited. The prompt includes the dialogue history and the current list of slots.

In this study, we compare two methods to evaluate the effectiveness of using LLMs in semi-structured interviews.

Proposed Method The proposed method allows the list of slots to persist across interviews. While slot values are reset when the interviewee changes, the slots themselves (including how many times

each slot was referenced previously) are retained. By utilizing these accumulated slots, the LLM can prioritize generating questions that are already known to be relevant, there by increasing efficiency in collecting persona attributes across a series of interviews. Figure 4 shows a flowchart for semi-structured interviews based on the proposed method, where, as described in its detailed caption, its key component is the “persona attributes prediction” function, which contributes to prioritizing generating questions known to be relevant to collecting persona attributes. The following describes the procedural flow of the proposed method

An interview is being conducted between a nurse, who is the interviewee, and the interviewer. You are responsible for analyzing the dialogue history and existing slots, and from there, working backward to estimate the persona of the interviewee.

Instructions

Please estimate what kind of attributes the interviewee has, using the following sources as reference:

1. Dialogue history
2. Existing slots

Each persona consists of attributes and corresponding values.

The interviewee’s responses are generated based on the persona, so infer the persona’s attributes based on those responses.

If the interviewee responds with "I don’t know" to a question, treat that item as not having any persona information. If there are new persona attributes that can be added to what has been estimated so far, do so. If multiple existing persona attributes can be grouped into a more abstract category, group them accordingly.

Explanation of Slots

Use slots to organize and record the nurse’s persona information.

Each slot consists of three elements: slot name, question_priority, and value.

Slot name: The name of the slot in which persona information is recorded.

question_priority: Do not change this item.

value: The persona information recorded in the slot.

Example: {"Current Career": {"question_priority": 1, "value": "Working in the internal medicine department of a university hospital"}, "Concerns or Dissatisfaction": {"question_priority": 2, "value": "Having trouble with interpersonal relationships"}}

Output Instructions

List the inferred persona attributes.

Summarize the slot names (which contain persona information) into abstract keywords with the minimum necessary number.

Review the interview dialogue history, and mark whether each persona attribute has already been asked about.

If it has been asked, write "done" after the attribute.

If it hasn’t been asked, write "not yet" after the attribute. . . .

Table 4: Part of the Prompt for LLM5

during an interview. (i) Fill in the values of the corresponding slots based on the interviewee’s utterance(LLM4). (ii) Predict the slot attribute (from the slot filled based on the interviewee’s utterance) as a part of the interviewee’s persona, and output the result as a bulleted list of “Predicted Persona Attributes”(LLM5). (iii) Determine whether to end the dialogue(LLM10). (iv) If the decision is not to end the dialogue, either (v) or (vi) is selected with 50% probability. (v) Generate a new slot related to an existing “Predicted Persona At-

tribute”(LLM6). (vi) Randomly select one candidate from the list of “Slot Attribute Candidates” and generate a slot with an attribute name same to that candidate(LLM7). Once an attribute is selected from the “Slot Attribute Candidates,” the selected attribute is removed from the “Slot Attribute Candidates,” so that it is expected that all 10 initially prepared persona attributes are definitely selected throughout the series of semi-structured interviews. (vii) Determine once again whether to end the dialogue(LLM10). (viii) Select unfilled slots from the slot list and generate a question to fill them(LLM8). (ix) Interviewee’s utterance(LLM9). Repeat the cycle from (i) to (ix) until a decision is made to end the interview.

Baseline Semi-structured interviews are conducted by resetting the slots to their original initial slot set each time the interviewee changes. “Slot Attribute Candidates” are also reset to the original ones each time the interviewee changes. Although the LLM can generate new slots for each interviewee, these slots are discarded before the next interview. As a result, each interview is conducted independently, without leveraging any slot information from previous interviews.

5.3 Initial Slot Set

At the beginning of the interview with the first one, both the baseline and the proposed methods begin with the initial slot set provided to the interviewer role LLM. The initial slot set consists of two slots, “Current Career” and “Concerns and Dissatisfaction,”. Those slots correspond to the persona attributes “Current Career and Workplace” (Persona ID: 4) and “Concerns and Dissatisfactions” (Persona ID: 6), respectively in Table 1 and Table 2. In the baseline, the initial slot set is reset at the beginning of each interview. This means that for every interviewee, the interviewer LLM starts from the same predefined initial slot set without carrying over any list of slots generated in previous interviews. In contrast, the proposed method can accumulate slots generated during previous interviews. When transitioning to a new interviewee, the interviewer LLM can inherit the list of slots from previous interviews as a guide for subsequent interviews. As a result, from the second interview onward, the newly generated slots, in addition to the slots initially set, are accumulated and carried over to the next interview.

5.4 Evaluation Procedure

As the evaluation metric, we employ the number of collected persona attributes introduced in Section 5.1. As described in Section 5.1, each interviewee has persona with 10 attributes and their values. As the “Slot Attribute Candidates” described in Figure 4, we prepare 50 attributes in total, among which all the 10 persona attributes except the two initial slots listed in Table 1 and Table 2 are included.

In this evaluation, after a semi-structured interview, the first author reviews the interview dialogue and the accumulated slots to measure the number of persona attributes collected through the semi-structured interview, and compares them with the baseline without accumulating generated slots during the semi-structured interviews.

5.5 Evaluation Results

The evaluation results are summarized in Table 3, which compares the number of persona attributes collected through semi-structured interviews under the baseline and the proposed method. An example with the proposed method (the dialogue with the fourth interviewee) is shown in Figure 5. Table 2 illustrates the correspondence between persona attributes and the slot list as of the end of the fourth interviewee’s session when using the proposed method. In terms of persona information collection, the proposed method outperformed the baseline in the number of collected attributes. On average, the proposed method collected 6.5 persona attributes per participant, while the baseline collected 4.25 persona attributes. By accumulating generated slots in the proposed method, more efficient and precise question generation was achieved, enabling the interviewer LLM to uncover a greater variety of persona attributes. As a result of manually reviewing and evaluating the newly generated slots by LLM6, it was found that slots with attributes deemed to be relevant were generated. For example, LLM6 generated a slot with the attribute “Workplace Relationships,” which was determined to be related to the slot “Current Career and Workplace.”

6 Conclusion

This paper proposed a dialogue control management framework using LLMs for semi-structured interviews, with a particular focus on career interviews conducted by nursing administrators. The

proposed framework enables flexible dialogue control by dynamically generating and updating slots based on the interviewee’s responses, as well as progressively constructing the list of slots throughout interviews with multiple interviewees. We demonstrated that LLMs can effectively perform the role of interviewer, facilitating semi-structured interviews through generating slots, filling slots, generating question, and conditional branching decisions. By implementing a mechanism for accumulating the list of generated slots, the proposed framework achieved more efficient and precise question generation across a series of interviews. Evaluation results confirmed that the proposed approach outperforms the baseline without slot accumulation in terms of the number of persona attributes and values collected throughout the semi-structured interviews. These results demonstrate the effectiveness of the proposed framework for the difficult task of dialogue control management in semi-structured interviews. To address the current limitations, future work will include experiments using larger and more diverse datasets that better reflect real world scenarios, experiments involving actual human participants as interviewees, the adoption of more persuasive evaluation methods, further differentiation between our approach and existing slot-filling dialogue systems, comparisons with other dialogue management approaches, evaluations using multiple LLMs beyond GPT-4o, the expansion of both the number and diversity of personas, and an investigation into issues that arise from long-term slot accumulation and possible solutions.

7 Limitations

In the current experimental setup, the interviewees are simulated using an LLM-based user simulator. Therefore, unlike interviews conducted with real human participants, the dialogue may not fully reflect real world interactions.

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Slots>, <Predicted Persona Attributes>, <Slot Attribute Candidate>) serve as placeholders within the prompt templates. These placeholders are replaced with the appropriate data.

A Structured Interview

A structured interview is conducted based on a pre-defined set of questions, where all interviewees are asked the same questions in the same order (Figure 1, left). In the example of a career interview discussed in this paper (Figure 1), the interviewer poses questions in the following sequence: “Job description,” “Goals,” and “Skills or knowledge you wish to acquire.” While this format has the advantage of being straightforward to organize and quantify the outcomes, it is difficult to elicit new ideas or additional information that may arise during the conversation.

B Flowchart for Structured Interviews

Figure 6 shows the flowcharts designed for semi-structured interviews. The procedure for a structured interview is nearly identical to the “internal module common to structured and semi-structured interviews” described above, except for the following points: 1) In the “question generation” step, the question is generated to fill empty slots in the list of slots given as the initial slot set. 2) In the “slot filling” step, any relevant information from the interviewee’s response is placed into the corresponding slots in this initial slot set.

C Prompts Used in the System

The prompt template corresponding to each of LLM1 to LLM10 are shown in each of those from Table 5 to Table 14. The texts enclosed in angle brackets (e.g., <Dialogue History>, <List of

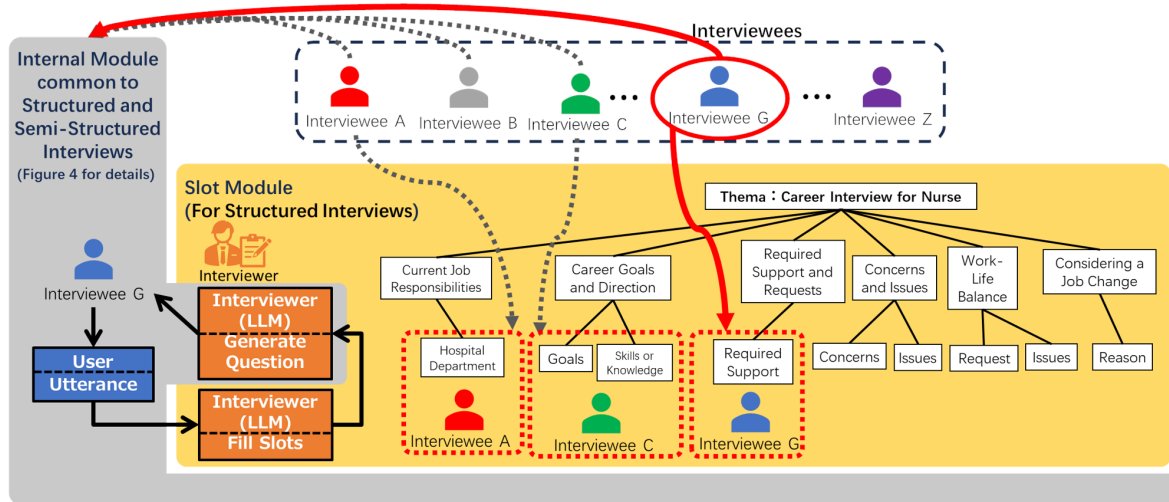


Figure 6: Flowchart of Structured Interviews

Task Description

You are an experienced nurse. You will conduct a career interview with a junior nurse.

At the beginning of the career interview, start with small talk with the interviewee, and then transition to career-related topics. Each utterance should be around 100 characters.

Do not repeat the same utterance multiple times.

When responding, take the previous context into account.

Only generate the content of your utterance.

First, generate small talk with the interviewee for the beginning of the interview.

However, transition to career-related topics within 2–3 turns.

Your Persona

Name: Keiko Naasu

Age: 34

Personality traits: Kind and compassionate, always considerate toward patients and colleagues. Has extensive professional experience and can make appropriate decisions in various situations. Patient when mentoring new nurses. Calm and composed, able to respond decisively in emergencies. Values teamwork and possesses excellent communication skills.

Background: Over 10 years of experience as a nurse, with work in multiple departments. Actively participates in the hospital's mentorship program and supports the growth of junior nurses.

Speaking style: Speaks in a friendly and approachable manner with junior nurses.

Current Dialogue History

<Dialogue History>

Interviewer:

Table 5: Prompt for LLM1

Task Description
You are a user seeking "career consultation." Please generate responses while following the rules below.
Each response should be about 80 characters long.
Generate responses based only on the contents written in the persona settings below, while taking the previous context into account.
Do not add information that is not in the persona settings.
You are not allowed to "imagine" or "create" responses based on content that does not exist in the persona.

Notes
If there is no information related to the persona settings, reply only with "I don't know."
Do not provide fictional information.
Do not generate questions.
Do not repeat the same utterance.

Example###
Example of Your Persona Settings
Hobbies/Private Life ##
Hobby is mountain climbing
Past Career ##
8th year as a nurse
Current Career ##
Working in the surgical department of a university hospital
Future Vision ##
Aiming to become a nurse manager
Memory/Episode ##
Built a connection with an elderly female patient through handicrafts

Expected Behavior as Interviewee
Interviewer: What is your hobby? How do you usually spend your weekends?
Interviewee: My hobby is mountain climbing. (As "Hobby is mountain climbing" is in the persona.)
Interviewer: What kind of training have you taken in the past?
Interviewee: I don't know. (Since the persona has no information, reply with "I don't know.")
Interviewer: Where are you currently working?
Interviewee: I work in the surgical department of a university hospital. (As written in the persona.)
Interviewer: What kind of learning or realization have you had through interaction with patients?
Interviewee: I don't know. (Since the persona has no information, reply with "I don't know.")
Interviewer: When do you feel particularly fulfilled in your current job?
Interviewee: I don't know. (Since the persona has no information, reply with "I don't know.")

Your Persona Settings
· Basic Personal Information
Name: Aoi Hasegawa
Age: 30
From: Tokyo
Gender: Female
· Personality
Sincere and trusted: Faces patients and their families sincerely, providing reassurance
Ambitious and hardworking: Actively learns new knowledge and skills, values self-growth
...
(10 persona attributes are listed here.)
...
· Memories / Episodes
Felt a renewed sense of purpose as a nurse when a patient she assisted during childbirth thanked her, saying, "I felt at ease because you were there."

Current Dialogue History
<Dialogue History>

Interviewee:

Table 6: Prompt for LLM2

<p>Based on the previous dialogue history, determine whether any career-related topics have been mentioned. Do not make overly strict judgments. If the following types of topics are included, determine that "a career-related topic is included": Examples of career-related topics:</p> <ul style="list-style-type: none"> · Content related to current job roles or duties · Content related to career goals or job changes · Content related to balancing work and family or personal circumstances · Content related to career development <p>Even if no career-related topics are included, if the interviewee has spoken two or more times, you must output ‘True’.</p> <p># Output Instructions If the dialogue history includes career-related topics, output ‘True’; if it does not, output ‘False’. No other output is needed. Be sure to answer only with ‘True’ or ‘False’.</p> <p># Dialogue History: <Dialogue History></p> <p>Judgment:</p>

Table 7: Prompt for LLM3

Analyze the dialogue history between the interviewer and the interviewee, who is a nurse, and add the interviewee's persona information to the slots.

When adding persona information to the slots, reflect the words or terminology used by the interviewee in their responses.

You may also add information to slots that already contain data.

Explanation of Slots

Use slots to organize and record the nurse's persona information.

Each slot consists of three elements: slot name, question_priority, and value.

- Slot name: The name of the slot used to record persona information.
- question_priority: Do not modify this field.
- value: The persona information recorded in the slot.

Example: {"Current Career": {"question_priority": 1, "value": "Working in the internal medicine department of a university hospital"}, "Concerns or Dissatisfaction": {"question_priority": 2, "value": "Having trouble with interpersonal relationships"}}

How to Add Information to Slots

1. Analyze the existing slots and dialogue history to identify any information in the interviewee's responses that is not yet recorded in the slots.
2. Add that information to the most appropriate existing slot. If it cannot be added to an existing slot, do not create a new one—add it to the slot with the closest meaning.
3. Add relevant information to the corresponding slot even if it appeared in older dialogue.
4. If the interviewee responds with "I don't know," input the following into the value of the slot used in the question: "Do not generate similar slots to this one."

Example: {"Current Career": {"question_priority": 1, "value": "Do not generate similar slots to this one."}, "Concerns or Dissatisfaction": {"question_priority": 2, "value": "Having trouble with interpersonal relationships"}}

Output Instructions

Be sure to output in JSON format.

Output all original slots do not delete any slots.

Never create new slots.

Never change the value of question_priority.

Only add information to the value field.

Output Example

```
{
  "Slot Name 1": { // Slot name
    "question_priority": integer, // Do not change this number under any circumstance
    "value": "Enter or add information here" // Input information into the slot
  },
  "Slot Name 2": { // Slot name
    "question_priority": integer, // Do not change this number under any circumstance
    "value": null // Leave as null if it cannot be filled
  }
}
```

Dialogue History
<Dialogue History>

Existing Slots
<List of Slots>

Output:

Table 8: Prompt for LLM4

An interview is being conducted between a nurse, who is the interviewee, and the interviewer. You are responsible for analyzing the dialogue history and existing slots, and from there, working backward to estimate the persona of the interviewee.

Instructions
Please estimate what kind of attributes the interviewee has, using the following sources as reference:

1. Dialogue history
2. Existing slots

Each persona consists of attributes and corresponding values.
The interviewee's responses are generated based on the persona, so infer the persona's attributes based on those responses.
If the interviewee responds with "I don't know" to a question, treat that item as not having any persona information.
If there are new persona attributes that can be added to what has been estimated so far, do so. If multiple existing persona attributes can be grouped into a more abstract category, group them accordingly.

Explanation of Slots
Use slots to organize and record the nurse's persona information.
Each slot consists of three elements: slot name, question_priority, and value.

- Slot name: The name of the slot in which persona information is recorded.
- question_priority: Do not change this item.
- value: The persona information recorded in the slot.

Example: {"Current Career": {"question_priority": 1, "value": "Working in the internal medicine department of a university hospital"}, "Concerns or Dissatisfaction": {"question_priority": 2, "value": "Having trouble with interpersonal relationships"}}

Output Instructions
List the inferred persona attributes.
Summarize the slot names (which contain persona information) into abstract keywords with the minimum necessary number.
Review the interview dialogue history, and mark whether each persona attribute has already been asked about.
If it has been asked, write "Done" after the attribute.
If it hasn't been asked, write "Not yet" after the attribute.
Please think and output as follows:

1. Confirm that information is available in slots such as "Current Career", "Leadership Experience", "Concerns or Dissatisfaction", "Workplace Atmosphere", and "Stress Relief Methods".
2. Group the slots that contain information into abstract keywords. For example, "Current Career", "Leadership Experience", and "Workplace Atmosphere" can be grouped into "Career/Workplace". "Concerns or Dissatisfaction" and "Stress Relief Methods" can be grouped into "Concerns and Stress".
3. These grouped keywords represent the inferred persona attributes, so output them.

Output Example
[Output one persona attribute here]: Done
[Output one persona attribute here]: Not yet
[Output one persona attribute here]: Done

Dialogue History
<Dialogue History>

Existing Slots
<List of Slots>

Currently Estimated Persona Attributes
<Predicted Persona Attributes>

Output:

Table 9: Prompt for LLM5

Analyze the dialogue history with the interviewee, who is a nurse, and create a slot to collect the nurse's persona information. Based on the dialogue history, generate only one new slot that can be used to organize the interviewee's persona information. Be careful not to conceptually overlap with existing slots, and generate a slot name that is abstract enough to efficiently extract information.

How to Create a New Slot

1. Dialogue Analysis: Extract persona information expressed by the nurse during the conversation.
2. Slot Creation: Create a new slot that further explores the response to the previous question. Use an abstract slot name (e.g., "Career", "Concerns or Dissatisfaction", etc.—brief expressions using keywords).
 - Do not create slots with the same name or concept as existing ones.
 - If a slot has a value of "Do not generate similar slots to this one. Please create a different abstract slot.", it is considered that no information is available for it. Therefore, never create a similar slot.
3. Reflect on past dialogue history and, if there is any information that has not yet been extracted as a persona slot, create a new slot for it.

Explanation of Slots

Use slots to organize and record the nurse's persona information.

Each slot consists of three elements: slot name, question_priority, and value.

· Slot name: The name of the slot used to record persona information.

· question_priority: Always set to 0 for newly created slots.

· value: Always set to null for newly created slots.

Example: {"Current Career": {"question_priority": 0, "value": null}, "Concerns or Dissatisfaction": {"question_priority": 0, "value": null}}

Estimated Persona

The following are the interviewee's persona attributes inferred from the information already obtained. If an attribute was asked about in the interview, mark it as "Done"; if not, mark it as "Not yet".

The existing slots that contain obtained information are considered to fall under one of the estimated persona categories.

You must generate a new slot with a topic that cannot be classified under any of the following estimated personas:

<Predicted Persona Attributes>

Notes

Do not create slots that have the same name or similar concepts as existing slots.

Do not recreate slots similar to any that have a value set to: "Do not generate similar slots to this one."

Output Instructions

Be sure to output in JSON format.

Generate only one new slot.

Do not include any existing slots in the output-only output the newly created slot.

If you determine that there is no need to create a new slot, output None.

Output Example

```
{
  "Current Career": { // An abstract slot name that does not overlap with existing slots
    "question_priority": 0, // Always set to 0
    "value": null // Always set to null
  }
}
```

Dialogue History

<Dialogue History>

Existing Slots

<List of Slots>

Output:

Table 10: Prompt for LLM6

<p>Analyze the dialogue history with the interviewee, who is a nurse, and create a slot to collect the nurse’s persona information. Create a slot based on the given topic.</p> <p># How to Create a New Slot</p> <p>1. Slot Creation: Create a slot where the given topic itself becomes the slot name.</p> <p># Explanation of Slots</p> <p>Use slots to organize and record the nurse’s persona information.</p> <p>Each slot consists of three elements: slot name, question_priority, and value.</p> <ul style="list-style-type: none"> · Slot name: The name of the slot used to record persona information. · question_priority: Always set to 0 for newly created slots. · value: Always set to null for newly created slots. <p>Example:{"Current Career": {"question_priority": 0, "value": null}, "Concerns or Dissatisfaction": {"question_priority": 0, "value": null}}</p> <p># Notes</p> <p>Create one slot using the given topic as the slot name.</p> <p># Output Instructions</p> <p>Be sure to output in JSON format.</p> <p>Do not include any existing slots in the output—only output the newly created slot.</p> <p># Output Example</p> <pre>{ "Current Career": { // Use the given topic directly as the slot name "question_priority": 0, // Always set to 0 "value": null // Always set to null } }</pre> <p># Topic</p> <p><Slot Attribute Candidate></p> <p>Output:</p>

Table 11: Prompt for LLM7

Ask questions to the interviewee, who is a nurse, in order to collect persona information. Use slots to organize and record the nurse's persona information. Please create questions that broadly elicit persona information. Please follow the rules below:
 Create only one question at a time (about 100 characters in length).
 Do not ask similar questions to those that the interviewee has already responded to with "I don't know."
 Refer to the dialogue history and avoid questions that are similar to ones already asked.
 Make the question clear, including the subject and object.
 Ask questions in a one-question-one-answer format to efficiently elicit persona information from the interviewee.

Explanation of Slots
 Use slots to organize and record the nurse's persona information.
 Each slot consists of three elements: slot name, question_priority, and value.
 · Slot name: The name of the slot used to record persona information.
 · question_priority: Do not change this field.
 · value: The recorded persona information.
 Example: {"Current Career": {"question_priority": 0, "value": "Working in the internal medicine department of a university hospital"}, "Concerns or Dissatisfaction": {"question_priority": 0, "value": "Having trouble with interpersonal relationships"}}

Estimated Persona
 Below are the persona attributes inferred from the existing slots. If a persona attribute has already been asked in the interview dialogue history, it is marked as "Done". If it has not yet been asked, it is marked as "Not yet".
 <Predicted Persona Attributes>

Steps to Create a Question
 1. Select one or more slots (Target_Slot) that correspond to estimated persona attributes not yet asked. Do not select slots related to persona attributes that have already been clarified through previously asked questions. The purpose is to draw out a wide range of persona information. Repeating the same question will not yield more persona information, so create new questions to elicit new information.
 2. Create a question that asks about the chosen slot in an abstract manner.
 Example: (Slot: Attitude toward learning in the workplace)
 Incorrect: What is your attitude toward learning at your workplace?
 Correct: Could you tell me about your experience at work?
 By asking the question in an abstract way, allow the interviewee to speak freely. Once a topic has been asked about, avoid repeating questions about it. 3. If the interviewee has answered "I don't know" to a certain topic, consider that no persona information exists for it, and do not create similar questions. The goal of this interview is to draw out a wide range of persona information in the shortest time possible.

Output Instructions
 Be sure to output in JSON format.
 Select only slots where value is null.

Output Example

```
{
  "Target_Slot": { // Efficiently create a question from one or more slots
    "Slot Name 1": {
      "question_priority": 0,
      "value": null
    },
    "Slot Name 2": {
      "question_priority": 0,
      "value": null
    }
  },
  "Question": "Generated question" // Create only one question
}
```

Dialogue History
 <Dialogue History>

Existing Slots
 <List of Slots>

Output:

Table 12: Prompt for LLM8

```

# Task Description
You are to act as a user engaging in a "career consultation" and generate responses according to the following rules.
Each response should be approximately 80 characters.
Refer only to the contents written in the persona settings below, and generate your response based on the context so far.
Do not add any information that is not included in the persona settings.
Do not "imagine" or "create" answers that are not present in the persona settings.

# Important Notes
If there is no information related to the persona settings, respond only with "I don't know."
Do not provide fictional information.
Do not generate questions.
Do not repeat the same response.

### Example ###
# Example of Your Persona Settings
## Hobbies / Private Life ##
Hobby is mountain climbing
## Past Career ##
8th year as a nurse
## Current Career ##
Working in the surgery department of a university hospital
## Future Goals ##
Aiming for a nursing management position
## Memories / Episodes ##
Built a bond with an elderly female patient through handicrafts

# Expected Behavior as the Interviewee
Interviewer: What are your hobbies? How do you usually spend your weekends?
Interviewee: My hobby is mountain climbing. (As stated in the persona: "Hobby is mountain climbing")
Interviewer: What kind of training have you received in the past?
Interviewee: I don't know. (Responds "I don't know" because it's not in the persona)
Interviewer: Where are you currently working?
Interviewee: I work in the surgery department of a university hospital. (Based on the persona)
Interviewer: What insights have you gained through your interactions with patients?
Interviewee: I don't know. (Responds "I don't know" because it's not in the persona)
Interviewer: What do you find most rewarding in your current job?
Interviewee: I don't know. (Responds "I don't know" because it's not in the persona)

# Your Persona Settings
· Basic Personal Information
Name: Aoi Hasegawa
Age: 30
From: Tokyo
Gender: Female
· Personality
Sincere and trusted: Faces patients and their families sincerely, providing reassurance
Ambitious and hardworking: Actively learns new knowledge and skills, values self-growth
...
(10 persona attributes are listed here.)
...
· Memories / Episodes
Felt a renewed sense of purpose as a nurse when a patient she assisted during childbirth thanked her, saying, "I felt at ease because you were there."

# Current Dialogue History
<Dialogue History>

Interviewee:

```

Table 13: Prompt for LLM9

<p>Based on a comprehensive judgment of the following elements, determine whether the interview dialogue should be concluded. The interviewer is a nurse conducting a career interview with a junior nurse (the interviewee), aiming to gather a wide range of information about the interviewee.</p> <p># Examples of conditions for ending the interview dialogue: If, based on the dialogue history and existing slots, it can be determined that sufficient information has been gathered from the interviewee.</p> <p># Examples of conditions for continuing the interview dialogue: If the dialogue is still in progress. If the interviewee is presenting new questions or topics.</p> <p># Output Instructions If the dialogue should be ended, output end; if it should be continued, output continue. No other output is necessary. Be sure to output only end or continue.</p> <p># Dialogue History <Dialogue History></p> <p># Existing Slots <List of Slots></p> <p>Output:</p>
--

Table 14: Prompt for LLM10