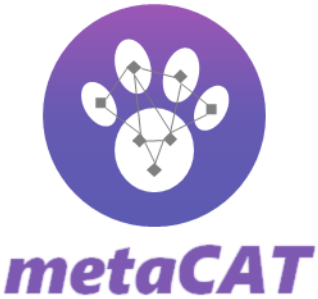
metaCAT Annotator Operation Guide



metaCAT is an open-source web-based annotation tool designed specifically for developing task-oriented dialogue data. metaCAT is an annotation tool that provides comprehensive metadata annotation coverage to the domain, intent, and span information. The data annotation quality is enhanced by a real-time annotation constraint-checking mechanism. The annotation process is further streamlined to create more diversified and robust annotated utterances by providing an ASR-inclusive paraphrasing function.

1 Annotation Task Description

This annotation tool currently provides two types of annotation tasks: dialogue annotating and dialogue paraphrasing.

- **Dialogue annotating**

The dialogue annotating function is used to annotate dialogue intents and slots based on the dialogue data which has been manually collected through crowd-sourcing.

- ✓ General: This type of domain contains only some intent without actual slots, such as "Thank" and "Bye", etc.
- ✓ Service domain: These type of domain contains some specific intents with slots, e.g. "Hotel" and "Restaurant". Generally, a dialogue involves one service domain. However, in a few cases, it may involve two service domains, e.g. "Hotel" and "Taxi".
- ✓ Intent: It represents the intent expressed in each utterance. It is possible that one utterance contains multiple intents.
- ✓ Slot: It indicates the key information carried by the intent. Non-enumerated slots are usually one word or short segment of text taken from the original utterance text. Enumerated slots only have some specific slot-values and may not appear in the utterance text of the dialogue.

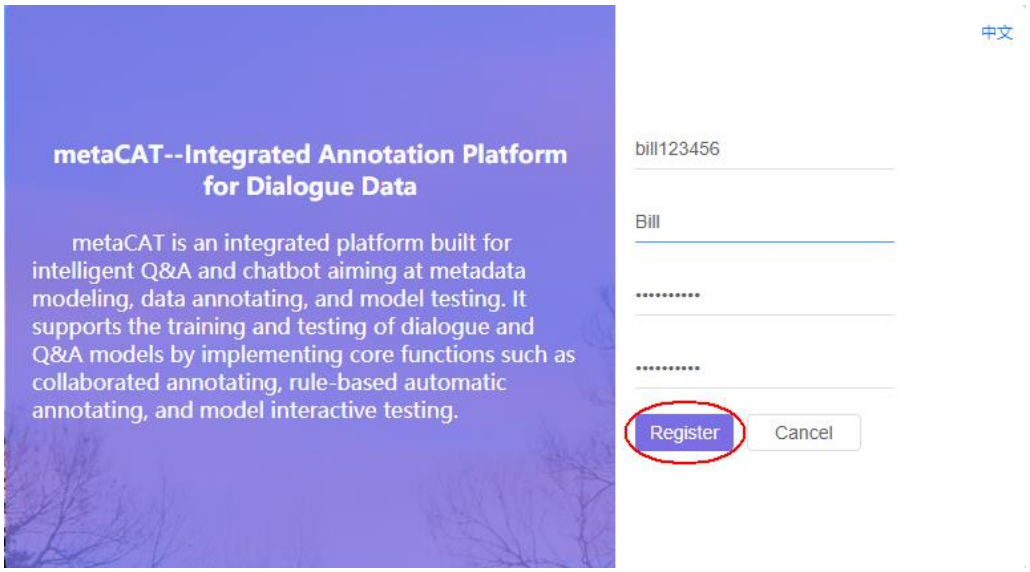
Generally, a dialogue can involve only one service domain, but a sentence can involve two service domains. A sentence may contain multiple intents and slots.

- **Dialogue paraphrasing**

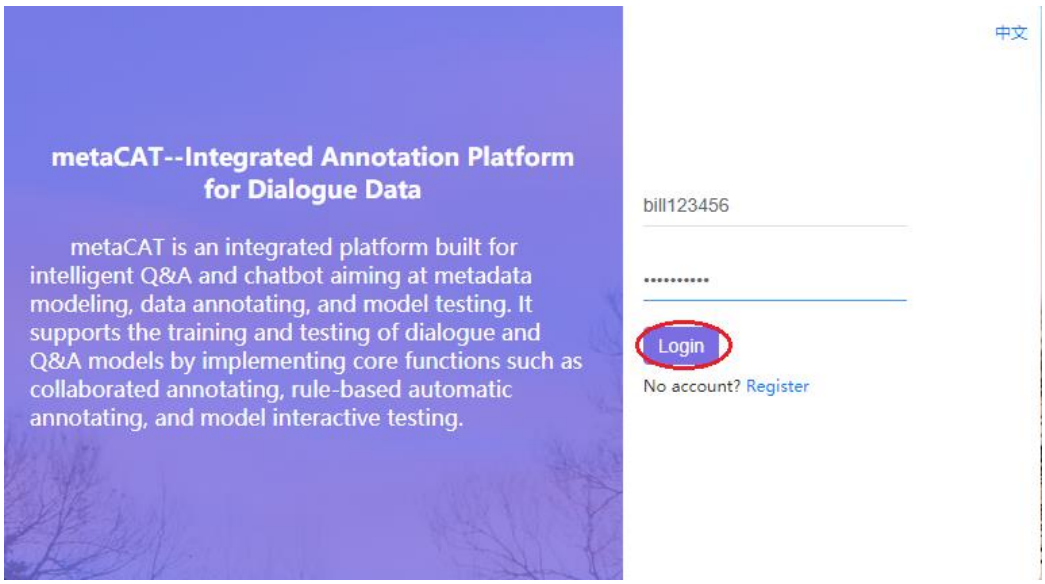
The paraphrasing function is based on the standard dialogues which are automatically generated using rule-based algorithm. The dialogue content on the user side and on the system side is paraphrased via keyboard typing or ASR inputting. In addition, some slots attached to the standard dialogues are re-annotated. The main purpose of this task is to enhance the diversity of the spoken language of goal-oriented dialogues. Providing such diversity is regarded as the key to increasing the robustness of dialogue models trained with these data.

2 Basic Functions of the Tool

2.1 Login and registration:



Annotator account is usually registered using an employee ID from his enterprise. Real name could be used as “User Name” and there is no special limitation for passwords.



After the annotator account is registered, he need to contact the administrator to assign tasks to him (or the administrator pre-registers and assigns tasks for the annotator in advance, and the annotator may need to change the password after login). After the login, the annotator can begin to perform the dialogue annotating or paraphrasing tasks.

2.2 Main Menu Bar

Currently, two types of tasks are supported: dialogue annotating and dialogue paraphrasing. Annotators can click to switch between different tasks.

中文: click to switch to Chinese interface.

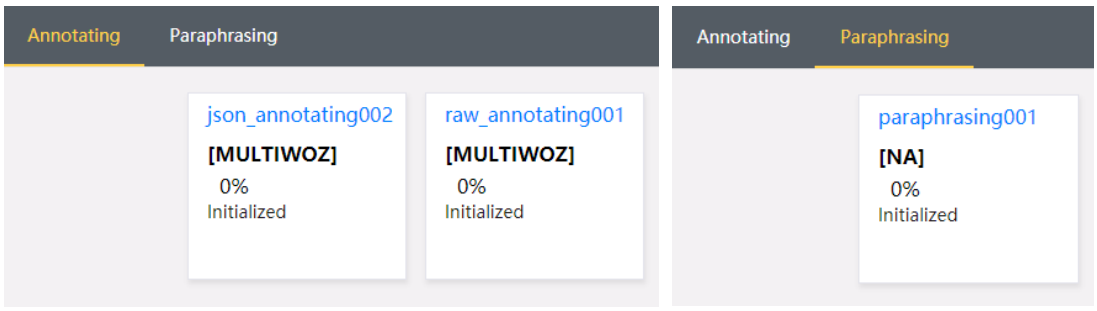
Help: click to display the operation guide in PDF format.

Logout: click to log out of the system and return to the login page.

2.3 Batch List and Dialogue List

After the annotator logins, a list of assigned tasks is shown. There are two task categories: dialogue annotating and dialogue paraphrasing. Every task in the list represents a batch, which is assigned by the administrator to the annotator. The batch number, name of related dataset, current progress, and status are displayed from top to bottom for each batch.

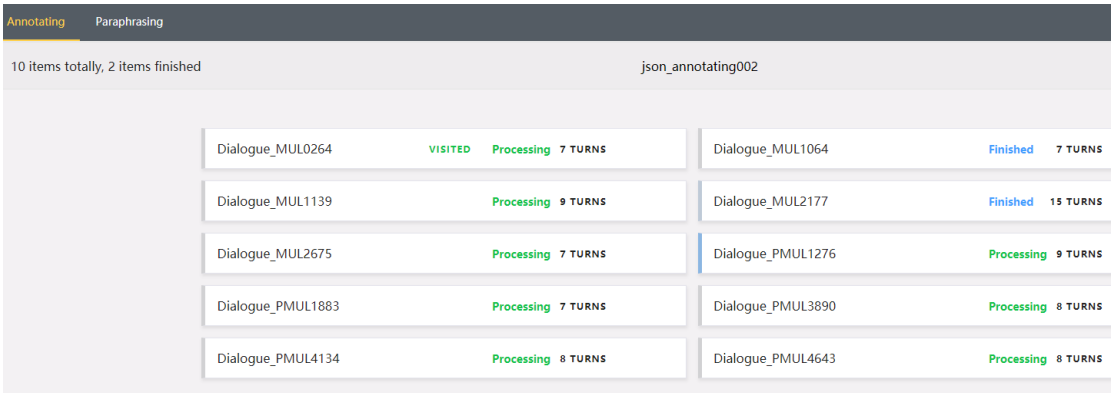
When the progress is 0%, the status will be shown “Initialized”, while when the progress is 100%, the status will be shown “Finished”. In other cases, the status is shown “Processing”.



When the annotator select one task and click, a list of the dialogues inside the batch will be shown. Note that the dialogue list of the annotating task is slightly different from that of the paraphrasing task.

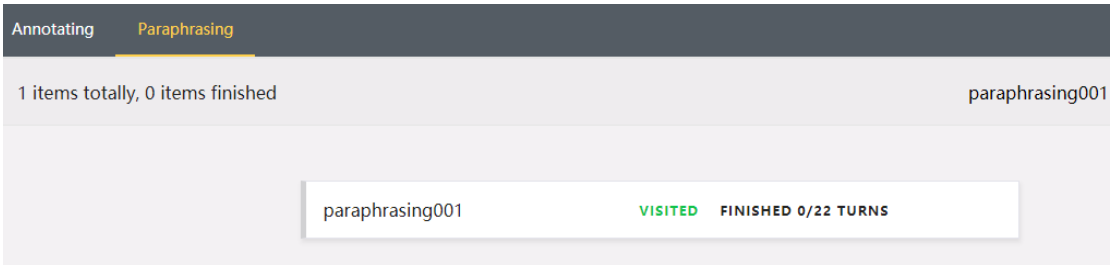
- **The dialogue list of annotating task:**

For each dialogue, the dialogue ID, current status and number of dialogue turns are displayed from left to right. After annotating a dialogue, the annotator needs to manually click the status to change the status from “Processing” to “Finished”. In addition, Accessed is a temporary status returned after the user accesses the dialog list page. After the user exits the dialog list page, Accessed is not displayed again.



- **The dialogue list of paraphrasing task:**

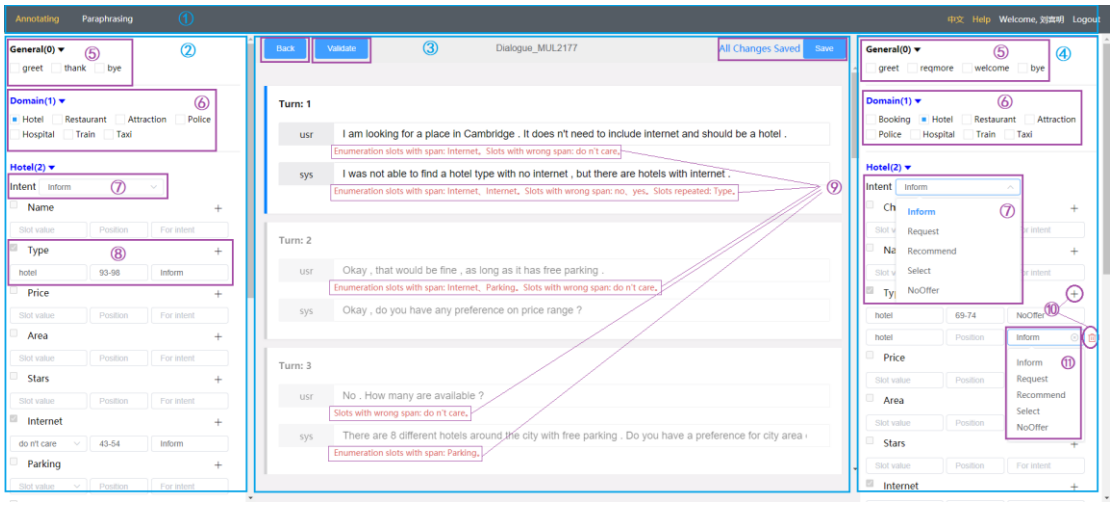
For each dialogue, the dialog ID and number of completed turns are displayed from left to right.



In addition, “Visited” is a temporary status displayed after a user visit the dialogue. After the user exits the dialogue list and then enters again, “Visited” status will disappeared.

3 Introduction to the Annotating Function

3.1 GUI of Annotating



The annotating interface consists of a left “Usr” annotating zone (②), a middle utterance

zone (④) and a right “Sys” annotating zone (④). During annotation, the annotator can perform operations on the “Usr” side and “Sys” side separately.

3.1.1 Dialogue Utterance Zone

Back: Click this button to return to the dialogue list of the current batch.

Validate: Click this button to check the validity of the annotating result of the current utterance. The detected errors will be shown beside each utterance to remind the annotator to modify annotating until no error is prompted.

Turn: ID of the current dialogue turn.

Detected Errors: The detected errors of automatically constraint-checking by validating. The errors on the user side is displayed under the user utterance, and the error information on the system side is displayed under the system utterance. For details, see *Appendix: Error Information List of Annotating*. When the detection is passed through, the errors will automatically disappears.

usr/sys: indicates the role of the speaker in the current dialogue. The edit box on the right is the text of the dialogue.

Save: Click this button to save all the annotations to all dialogue contents. Before the modification is saved, metaCAT will automatically performs global validating and displays the possible detected errors beside each dialogue utterance.

3.1.2 Annotating Zone

The structure of the annotation metadata on the user side is similar to that on the system side.

General(⑤): Intents in the general domain without any slots. You can select multiple or none of them.

Domain(⑥): Service domains. When one domain is selected, slots corresponding to the domain will be activated. While when one domain is un-selected, slots corresponding to the domain will be hidden (annotated operations for the domain are reserved).

Intent(⑦): This drop-down list box displays the currently default intent. After an intent in a domain is selected, then when a slot in the domain is annotated, the slot will automatically belongs to the newly selected intent. And a subsequent manual modification is allowed too.

Slot(⑧): The elements of one slot includes name, value, position, belonging intent, “Add” and “Delete” buttons.

- ✓ **Name**: Slot name, which cannot be changed.
- ✓ **Value**: Slot value, which can be dragged from the dialogue utterance (enumerated slots cannot be dragged). The annotator can also click the slot value to open the drop-down list box and choose a valid value.
- ✓ **Position**: The starting and ending position of a slot in the dialogue utterance which are automatically generated by dragging operation and cannot be modified manually.

- ✓ **Intent**: The intent to which a slot belongs. The default value is the selected one from the "intent" drop-down list box. You can also click it to open the drop-down list box and choose a different value.

- ✓ **Add**: Click this button to add a new data row, which represents a new instance value of the same slot (different slot values and positions).

- ✓ **Delete**: Click this button to delete the selected slot instance value.

3.2 Annotating Steps

3.2.1 Get Familiar with the Annotating Task

Before performing an annotating task, the annotator needs to attend a formal training to understand the purpose, procedure, and key points of the task. Additionally, the annotator can click "Help" button to acquire detail guidance of the operation.

3.2.2 Dialogue Utterance Modification

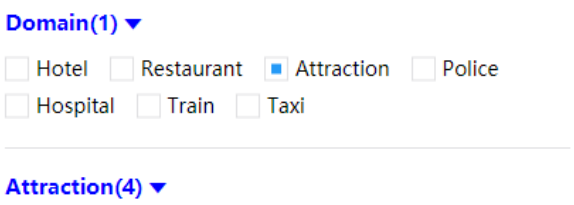
Generally, the dialogue utterance does not need to be manually modified. However, the dialogue content collected via crowd-sourcing may have some spelling errors or semantic errors. Therefore, you can modify the utterance by the way during annotation.

Since the slot annotating depends on the dialogue utterance, it must be modified before the slot annotating.

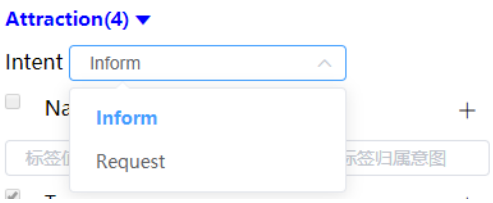
3.2.3 Dialogue Annotating

All slots are expected to be annotated by drag-and-drop operating or selecting from the drop-down list box. In some cases, slots could be manually inputted. The annotating steps are as below:

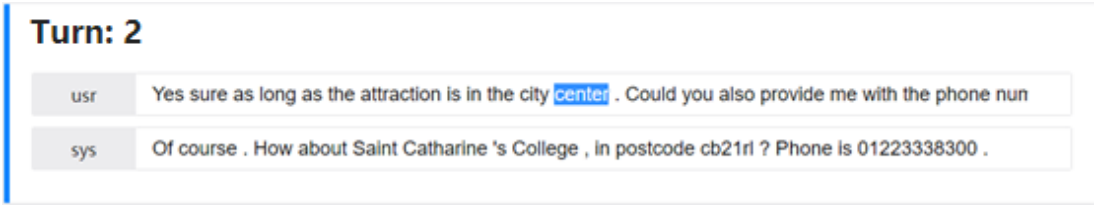
1) Determine the service domains involved in the current dialogue utterance, and then activate the slots corresponding to the service domains by selecting and un-selecting of the check boxes.



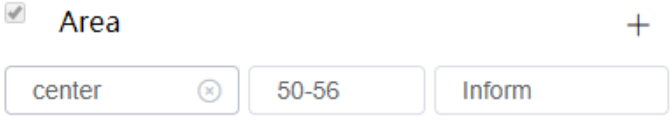
2) Determine which intent will the annotated slot belong to, and then select one intent from the drop-down list box.



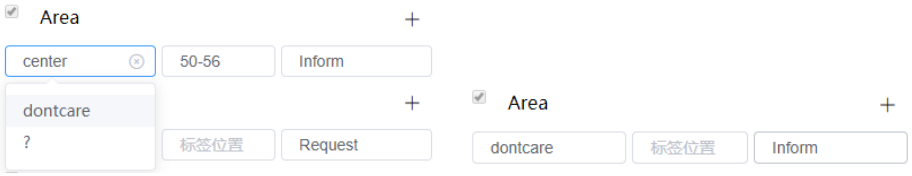
3) Select the text fragment inside the dialogue utterance, as shown below:



4) Use mouse to drag the selected text fragment to the slot value editing box, as shown below:

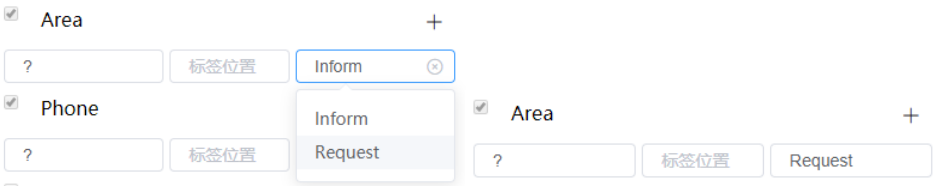


You can also click the slot value editing box to open a drop-down list box and select a valid value. After the selection, the original position information will be automatically cleared.

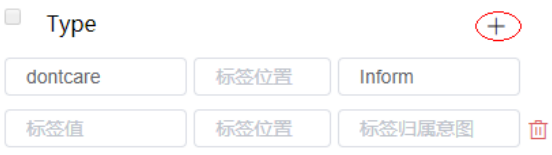


Note: enumerated slots can only selected from drop-down list box and cannot be dragged.

5) If the annotator needs to temporarily change the slot intent, he can click the drop-down list box and select one valid intent.



6) If a slot has multiple slot values, the annotator can click “Add ” button and perform subsequent operations.



The opposite operation is to click “delete” button, but at least one slot must be reserved for the slot.

3.2.4 Annotation Validating

In the following three cases, the system will automatically trigger the annotation validating and displays possible errors beside the dialogue utterance. For details, see *Appendix: Error Information List of Paraphrasing*.

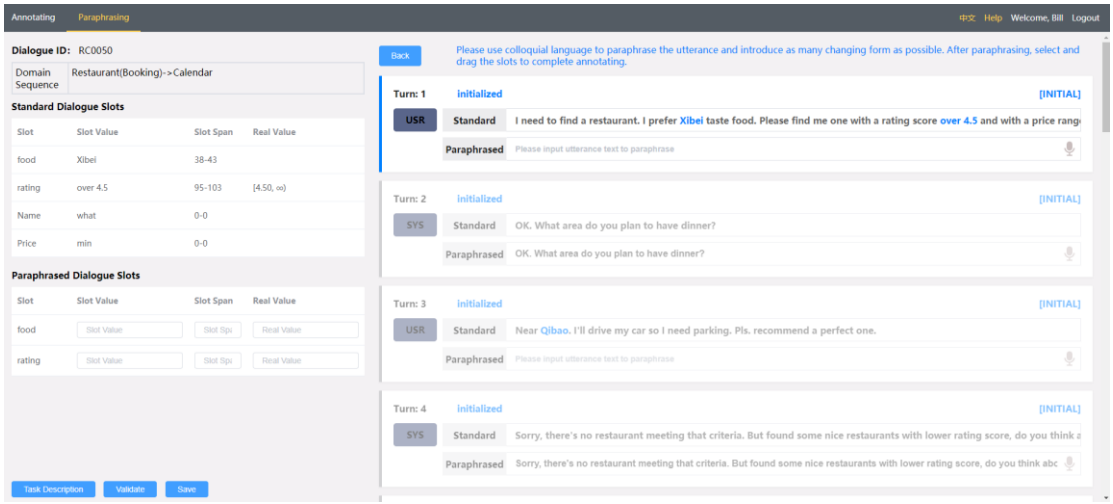
Dialogue turn switching: When an annotator finishes annotating a dialogue turn and switches to the next, metaCAT will automatically do validating of the annotation made in the previous turn.

Validating or Saving: When an annotator clicks the “Validate” or “Save” button, metaCAT will automatically do validating of the annotation of all turns of the entire dialogue.

4 Introduction to the Paraphrasing Function

4.1 GUI of Paraphrasing

The main interface for paraphrasing is divided into two zones: the dialogue utterance zone on the right and the annotating zone on the left.



4.1.1 Dialogue Utterance Zone

Paraphrasing Guidance: The general paraphrasing guidance is shown on the top: "Please use colloquial language to paraphrase the utterance, introducing as many diversity as possible. After the paraphrasing, some slots should be annotated by drag-and-drop operation to complete the annotation."

Back: Click this button to return to the dialogue list of the current batch.

Turn: ID of the current dialogue turn.

Detected Errors: The detected errors of automatically constraint-checking by validating. The errors are displayed beside the dialogue utterance with the check status of "INITIAL/FAILED/SUCCESS". INTIAL indicates no validating is triggered yet, and FAILED indicates failed validating (For details, see *Appendix: Error Information List of Paraphrasing*.). SUCCESS indicates successful validating.

USR/SYS: The role of the speaker in the current dialogue.

Standard dialogue: The dialog utterances automatically generated using rule-based algorithm. The text in blue indicates the specific slots

Paraphrased dialogue: The dialogue utterances paraphrased by the annotator.

4.1.2 Annotating Zone

Dialogue ID: Unique ID of the current dialogue.

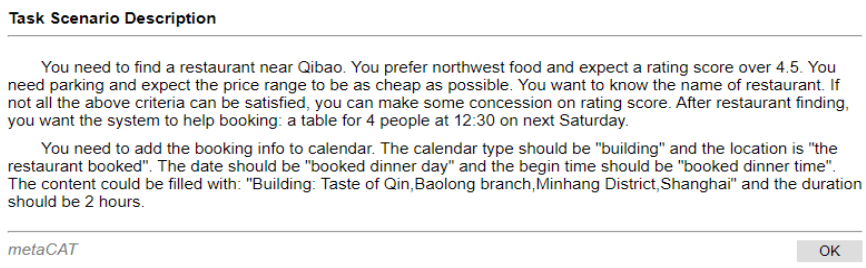
Domain Sequence: The specific service domains which the current dialogue walks through one by one.

Standard Dialogue Slots: All slots corresponding to standard dialogues which are automatically generated using rule-based algorithm. These slots also contain some special slots that do not appear in the dialogue utterance, such as "Question" slots or enumeration slots.

Paraphrased Dialogue Slots: The slots which need to be re-annotated after the paraphrasing.

Slot Fields:

- ✓ **Slot**: Slot name, which cannot be changed.
- ✓ **Value**: Slot values, including some special slot values. *(For details, refer to appendix: Special Slot Values.)*
- ✓ **Position**: The starting and ending positions of a slot in the dialogue utterance. The position of a special slot is "0-0".
- ✓ **Actual Value**: For some slots, the original or actual value of the slot needs to be annotated. For example, the actual value of "this restaurant" is the specific name of the restaurant, and the actual value of "Next Saturday" is the specific date of the next Saturday.



Task Description: Click this button to display the actual application scenario of the current dialogue. The actual dialogue scenario is described based on the specific business domain, including the requirements, the requesting information, and the suggestions for temporary situations which may occur during the interaction between the user and the system.

Validating: Click this button to do validating of the paraphrased and annotated data of the current dialogue. The validating result is displayed beside the dialogue utterance of each turn, reminding the annotator to make modification until the validating passes.

Save: Click this button to save the current paraphrased and annotated data. Before the data is saved, the system will also perform validating.

4.2 Paraphrasing Steps

4.2.1 Get Familiar with the Paraphrasing Task

Before performing the task, the annotator need to attend a formal training to understand the purpose, procedure, and key points of the task. He can also click “Help” and “Task Description” buttons to acquire detail guidance of the operation.

4.2.2 Paraphrasing Dialogue Utterance

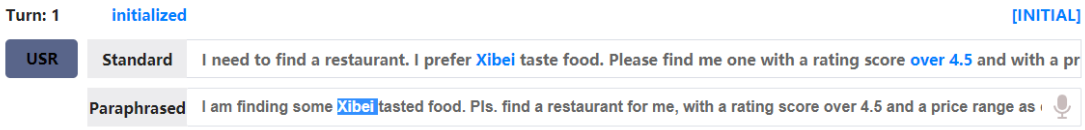
For each turn of a dialogue, the primary task of the annotator is to paraphrase the dialogue utterance in the natural language. He can do this via keyboard typing or ASR inputting. It is suggested to pay attention to the following key points during paraphrasing:

- ✓ **Language Diversity**: The dialogue utterance paraphrased should be as colloquial as possible. In addition, sufficient difference from the standard dialog must be introduced. Direct copying from the standard dialogue content is prohibited.
- ✓ **Semantic Consistency**: The semantics expressed in the paraphrased utterance must be basically consistent with the standard dialogue utterance.
- ✓ **Slot Consistency**: The paraphrased utterance should contain and only contain the slots corresponding to the standard dialogue utterance. The values of some slots can be changed flexibly, but cannot lead to big meaning gap. Additionally, new slot values should be consistent with the context.

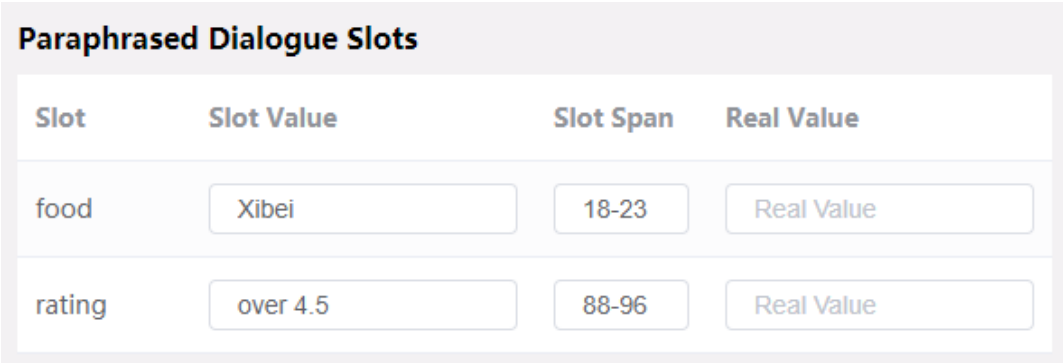
4.2.3 Slot Annotating

The re-annotated slots should be corresponding to the standard dialogue slots. The procedure is as followings:

1) Select the text fragment inside the paraphrased dialogue utterance, as shown below:



2) Use mouse to drag the selected text fragment to the slot value editing box, as shown below:



3) For some slots that have actual values, the annotator need to manually enter the actual values of the slots. For example, if the slot value is "This restaurant", you need to search for the actual restaurant name specified by "This restaurant". Copy or manually enter the actual value in the text box. (Note that the actual value cannot be dragged and dropped.) The annotator can determine whether to enter the actual value based on the actual value of the slot in the standard dialogue. However, it is not excluded that the actual value does not exist in the standard dialogue but needs to be added to the paraphrased dialogue. This depends on the actual situation.

4) Special slots do not need to be annotated in the paraphrased utterance. However, the implication of the special slots should be reserved in the paraphrased utterance. For example, if the value of a special slot "Parking" is "yes" in the utterance, the implication of "parking service provided by the XX" should be included inside.

If a slot has multiple slot values, for example, "nearby attractions", you need to annotate each slot value.

5 Appendix

5.1 Error Information List of Annotating

Error Type	Error Description	Remarks
Useless Domain	Domains without slot	
Enumerated Slot with Span	Enumeration slots with span	
Wrong Intent	Slots with wrong intent	
Wrong Span	Slots with wrong span	

Overlapped Span	Slots with overlapped span	
Repeated Slot	Slots repeated (only for enumerated slots)	
Repeated Slot Value	Slot values repeated (same slot, slot value, and position) exist	

5.2 Error Information List of Paraphrasing

Error Type	**Error Description**	**Remarks**
No Paraphrasing	Utterance not paraphrased	The value is calculated based on the text length and editing distance.
Incomplete Paraphrasing	Incomplete paraphrasing	
Lack of Difference	Lack of utterance difference	
Missing slots	Slots not annotated	
Lack of Slot Value	Lack of slot value	
Lack of Actual Value	Lack of actual slot value	This parameter is valid only for the slots having actual value.
Wrong Span	Slots with wrong span	
Overlapped Span	Slots with overlapped span	
Redundant Slots	Redundant slots	Avoided by front end.
Redundant Slot Values	Redundant slot values (same slot, slot value, and position)	Avoided by front end.

5.3 Special Slot Values

Slot	**Slot Value**	**Application Scenario**
Text or numeric type	any/dontcare	Indicates that the user accept any option for the slot.
Text or numeric type	unknown	This parameter is used on the system side to indicate that a target item has no value for the slot.
boolean	yes/no	Indicates the boolean value of a specific slot, for example, “whether have parking service”.
Almost all types of slots	what	Requests for the slot value.
Numeric, date or time types	max/min	Requests for the maximum or minimum value of the slot.
Numeric, date or time types	lower/upper	For an “Inform” intent, indicates choice of the lower or upper one. For a “Request” intent: requests for a lower or upper item.
option	more	Requests for more options from the system.
booking/navigating	none	Used for booking and navigation. The slot value is meaningless.

6 Revise History

Version No.	Revision Date	Revision Summary
1.0	2020/07/30	First draft.