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**Outline of Help Generation**

Help is generated by estimating the gap between user's mental model and the system. 

1. Extract concepts that a user knows (does not know) from the user's utterances or help messages provided by the system.
2. Update known degrees of the nodes of a domain concept tree according to the concepts.
3. Search an appropriate help message from the tree.

**Domain Concept Tree**

A tree representing the hierarchical layers of concepts in the domain.
- Composed of four layers; the more abstract concepts are placed on the upper layer.
- Each node represents the concept of the system.
- Each node has a value (known degree), which represents the degree of how much user understands the concept.

**Maintenance of known degrees**

Rewards and penalties are given to known degrees.

- **Rewards**
  - if a user knows the corresponding concept
  - the user uses functions and concrete words correctly
  - the user gets the help message about the concept

- **Penalties**
  - if AND node is not satisfied by a user's single utterance.

**Search for a help message**

Search for a help message by saying "summary", "address", "telephone number", as a name of items.

**Integration**

SQL search engine is used to get information about temples, for example, by saying "summary", "address", "telephone number", as a name of items.

**Implementation**

Kyoto sightseeing guide system

- Speech recognizer: Julian (grammar-based)
- Vocabulary size: 673
- 279 entries \(\times 16\) keys (address, etc.) database
- User initiative

The system generates different help messages for the same ASR results based on our model.

**Experimental Evaluation**

- **Conditions**
  - Subjects - 12 novice users
  - gave no instruction about the system's usage.

- **Task**
  - Two tasks, A and B

- **Groups**
  - Group1: System w/ Help (A) \(\rightarrow\) w/o Help (B)
  - Group2: System w/o Help (A) \(\rightarrow\) w/ Help (B)

- **Results**
  - Successfully completed tasks: 673
  - In the latter half of the experiment (B), subjects of both groups were accustomed to the system enough.

**Future works**

- Setting optimal parameters for updating known degrees
- Extending our framework to mixed-initiated systems.
- Adapting expressions of help messages to known degrees.