

Multi-Domain Dialogue Model

- SDS are generally structured around task domains (“Multi-Domain Dialogue Model”, MDDM)
- Dialogue states are organized according to task domains (as in modular systems, see fig.)
- No immediate way of talking about objects or relations between them:

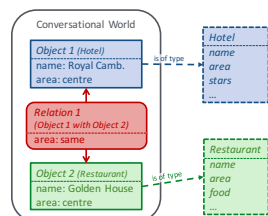
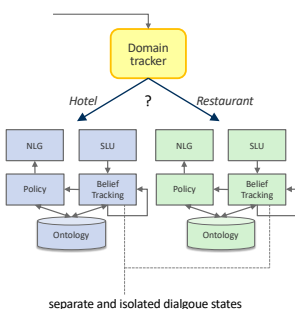
user *I am looking for a restaurant and a hotel in the same area*



Conversational Entity Dialogue Model

Ultes et al. (2018) (“CEDM”)

- A *conversational entity* is either
 - a conversational object: Typed entity with attributes, can correspond to real-world entity, or
 - a conversational relation: Relation between objects or their attributes.
- Object instances reside in a conversational world
- Each conversational entity maintains user goal belief and a context state
- CEDM > MDDM: Dialogues in a MDDM can be modeled with the CEDM: Domains can be conversational objects and slots the attributes of their types.



Challenges for the conversational entity dialogue model

Modelling semantic relations

- CEDM types are flat and semantic relations not accessible
- Conversational relations between types would allow the modelling of semantic relations

user *i am looking for a running outfit*
 sys *here is a suggestion for a jacket, shirt, pants, underwear, and shoes*
 user *i want only black **outerwear***

Count

- Count of objects can be essential in conversations
- It could be modelled as a conversational object linked to the count of the actual objects in the conversational world

user *i want to book the tour for tomorrow at 8am*
 sys *how many people will participate*
 user **four**
 sys *please tell me the name of the first person*
 user *did I say **four**, make that **three** persons.*

Additional Knowledge

- Some expressions that reference a subset of objects in conversation need a knowledge base for resolving (cf. “no pockets”)
- Others need even more sophisticated world knowledge
- All could be handled as described for the semantic relations above

user *i am looking for a running outfit*
 sys *here is a suggestion for a jacket, shirt, pants, underwear, and shoes*
 user *please **no pockets***
 user *i am looking for a running outfit*
 sys *here is a suggestion for a jacket, shirt, pants, underwear, and shoes*
 user **too boring above the waistline**, can you suggest something else

Relating multiple attributes

- CEDM relations are binary
- Some contexts would require *n*-ary relations (as for the color attribute in the example)

user *i am looking for a running outfit*
 sys *here is a suggestion for a jacket, shirt, pants, underwear, and shoes*
 user *can you suggest something with **identical colors**?*

More complex relations

- CEDM presents the *equals* relation
- Particular types could benefit from other relation types, e.g. temporal relations or spatial relations
- Other relations might need a knowledge base for their evaluation (cf. “matching”).

user *I need a taxi to the train station to catch the train to London*

user *Could you hand me the cup left of the bottle*

user *i am looking for a running outfit*
 sys *here is a suggestion for a jacket, shirt, pants, underwear, and shoes*
 user *can you suggest something with **matching colors**?*

Challenges for the conversational entity dialogue model

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