Annotating Events and Entities in Dialogue

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1 Introduction

We present the EveEnti (Event and Entity) annotation framework for events and entities in dialogue that we use to annotate several dialogues in German from the emergency response domain (Willms et al., 2019).

Events and entities are crucial for natural language understanding but the research on modeling them in dialogue has been limited due to the lack of annotated resources. There exist several corpora but they are mostly specialized and cover only a subset of possible annotations. For instance, the relations between events were annotated with respect to their temporal structure (Minard et al., 2016), causal dependencies (Mirza et al., 2014) or coreference links (Lee et al., 2012). Some work has been done towards the unification of different annotations (Mostafazadeh et al., 2016; O'Gorman et al., 2016). However, these corpora are based on standard narrative texts and do not include dialogues. Moreover, none of them have complete annotations for events, entities and discourse relations at the same time. For instance, the ARRAU corpus (Poesio et al., 2018) has rich entity annotations and includes dialogues but does not provide detailed information about events. On the other hand, the RED corpus (O'Gorman et al., 2016) has good coverage of event annotations but does not include fine-grained entity types and rhetorical relations at the document level.

Motivated by the fact that there is no unified framework for annotating events and entities in dialogue we decided to develop an annotation scheme and tool that will capture various semantic aspects and also maintain the relations between the annotation layers. We tried to use the established annotation standards and guidelines as much as possible to keep compatibility with other corpora but had to introduce some adjustments as well.

2 EveEnti Annotation Framework

Our dataset currently consists of the dialogues in German collected during several disaster response training sessions (Kruijff-Korbayova et al., 2015; Willms et al., 2019). These dialogues represent team communication between the team leader and several operators who remotely operate robots in order to explore some area, find hazardous materials, locate fire, damage or victims. In total, there are 2398 transcribed dialogue turns in our corpus. Additionally, we have 818 dialogue turns in English that come from the same domain and we are planning to add these data in the next round of annotation.

The EveEnti annotation scheme was designed to capture all events and entities in a dialogue and annotate the relations between them in such a way that allows to analyze different layers of annotation both independently and in combination. All events and entities in a document can be seen as nodes in a graph that are annotated with various semantic features and the relations between them are edges. The resulting graph can represent the unfolding discourse where events have temporal order and rhetorical relations and entities have thematic roles with respect to their corresponding events as well as semantic types and coreference information. Our goal was to find a flexible annotation scheme that is independent of any other/preceding levels of processing, in particular parsing. The scheme should be easy to apply to different languages and genres of text and it does not require from annotators to write complicated logical formulas or graph representations as is the case with Discourse Representation Theory (Kamp and Reyle, 1993) and Abstract Meaning Representation (Banarescu et al., 2013) annotations.

We developed an annotation tool that shows dialogue threads and turns as rows in a table. Each turn

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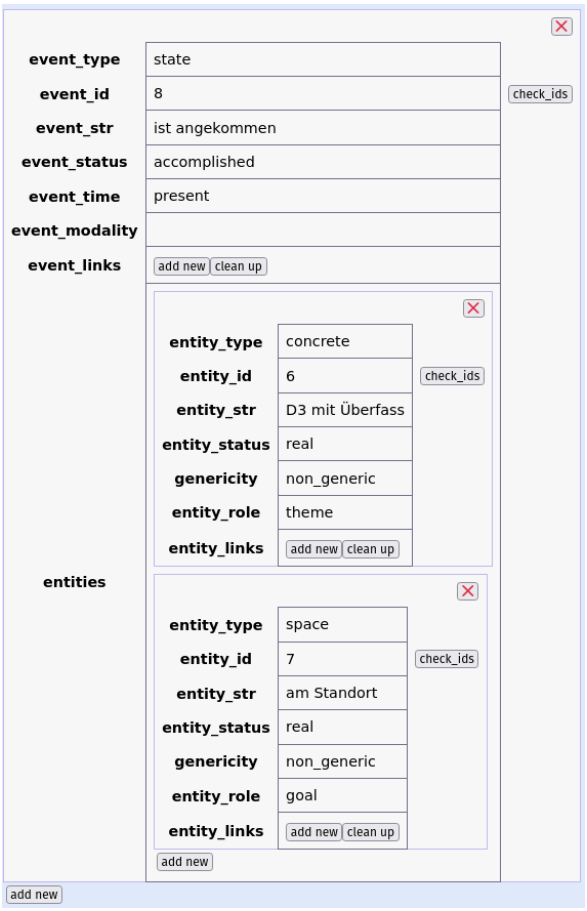

Figure 1: Event and entity annotations for *"D3 mit Überfass ist am Standort angekommen"* (D3 with a barrel arrived to the position)

has columns with a unique id, speaker, addressee, turn text, one column for the event and entity annotations and another column for annotating relations between the turns.

We annotate each predicate in a dialogue turn that can be described as a state, action, process or habitual as an event. Several events can be annotated for each turn and adding a new event simply means creating a box with the following fields: event type, id, string, status, time, modality and links (see Figure 1). We distinguish between accomplished and non-accomplished events ("status"), past/present/future events ("time") and annotate negation, necessity and possibility ("modality"). In the field "event_links" annotators can link events to each other using their ids and annotate the relations such as e.g., cause or condition defined in the ISO DR-Core (ISO 24617-8) scheme developed in (Prasad and Bunt, 2015). We added an "argument" relation to account for the nested cases when an event has another event as an argument, e.g., *"nicht funktioniert"* (doesn't work) in *"ich glaube, dass es nicht funktioniert"* (I believe that it doesn't work). To annotate temporal order of linked events, we use the TimeML-inspired relations that were proposed in (Mostafazadeh et al., 2016) and distinguish between the following four categories: before, overlaps, contains and identity.

Additionally, each event can have a list of entities associated with it. Each entity has its own box that includes annotations for its semantic type, id, string, status, genericity and semantic role. Semantic types include eight common categories: abstract, concrete, animate, person, organization, time, date and space. Entity status defines whether it is a real or assumed (imagined) entity. We annotate thematic role with respect to the associated event, e.g., agent or theme. Entities can also have links to each other that are either captured via coreference chains with the same ids or annotated in the "entity_links" field. We use the following relations for non-standard anaphora: set/member, part/whole and bridging. These relations were also used in the RED annotation scheme (O'Gorman et al., 2016).

Because we want to model relations at both levels: individual events and entities and complete dialogue turns, we include a separate column "function" and assign to each turn the most likely communicative function based on the following categories: call, call response, feedback positive or negative, question, answer, request, request response and task inform. These categories represent a simplified version of the functions proposed in the ISO standard (Bunt et al., 2012, 2020). Moreover, EveEnti has a separate column for annotating dependencies between the paired turns such as question/answer or request/request_response.

3 Conclusion

We present the first comprehensive framework for event and entity annotation in dialogue. It allows us to annotate events and entities jointly and use a variety of annotation layers that include semantic type, role and status for entities, temporal order and modality for events as well as coreference chains and rhetorical relations. To our knowledge, none of the existing corpora provides all of these annotations at the same time. While annotating events and entities we focus on dialogue and also annotate communicative functions and relations between the turns. Although the annotation process is ongoing we are planning to present our inter-annotator agreement results at the time of the conference.

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