

Categorisation of conversational games in free dialogue over spatial scenes

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Abstract

We describe an extension of a corpus of dialogues over perceptual scenes with the annotation of conversational games in which particular interactive strategies are adopted by conversational partners which result in regularities of dialogue features. We hope these will be useful for computational modelling of perceptual dialogue.

1 Introduction

An annotation and classification of dialogue in dialogue games is useful for building conversational agents as human free dialogue can be segmented into manageable units where certain features of conversation could be identified. The aim of this paper is to propose, annotate and evaluate a classification scheme for dialogue games for the *Cups corpus* of situated dialogue (Dobnik et al., 2015; Dobnik et al., 2016). The *Cups corpus* has been used in previous research to study the way conversational participants assign, align and negotiate spatial perspective or the origin of the FoR that is required for directionals. However, it could also be used to study other aspects of situated dialogue, for example resolution of reference to objects. The experimental design shows resemblance to the Map Task (Anderson et al., 1991), except that the roles of conversation leader versus follower change dynamically throughout the task. The corpus consists of both Swedish (985 turns) and English (598 turns) dialogues.

2 Conversational games in the cups dataset

The use of conversational games as a method for discourse analysis allows segmentation of conversation by its underlying non-linguistic goal or project (Grosz and Sidner, 1986; Kowtko et al., 1992; Bangerter and Clark, 2003). Games therefore consist of all utterances necessary to fulfil the intentions leading to a conversational goal (Kowtko et al., 1992). Our annotation of the Swedish part of the corpus is performed in two steps: (i) game segmentation (Section 2.1), and (ii) assigning the segmented games a *game type*.

2.1 Game segmentation

The first step of annotation of dialogue games is identifying their scope. Turns that share the same related goal that is fulfilled in conversation in the sense that a mutual agreement has been achieved or the goal has been abandoned are annotated with the same *game ID*. This is an integer starting at 1 for each dialogue. This allows us to identify easily threaded games and embedded games.

2.2 Game type coding scheme

In the second stage the previously segmented games were grouped by considering their conversational goals. The annotation categories are meant to be free of linguistic features. We identify two main categories: (i) games related to managing interaction (commonly found in conversations), and (ii) games related to the specific task the participants are performing which in this case is finding the missing objects.

2.2.1 Games related to interaction (Meta-games)

Clarify (Clar) games are intended to reduce uncertainty in the common ground and repair some type of miscommunication but not to request new information, e.g. with a starting utterance “So it’s three red cups?”. As such they are mostly used as nested games.

Task management (TaMa) The goal of these games is aligning and negotiating tactics how to approach solving a task.

Establishing Perspective (EsPe) These games are used to establish explicitly a common ground in respect to the spatial perspective or frame of reference for the following dialogue. Note that descriptions of spatial perspective may be present in several turns but are not identified as a part of this game because they are not part of an explicit negotiation.

Miscellaneous (Misc) include other games that relate to managing interaction such as social chatter, greetings or other conversational glue. They facilitate the task on a social level by establishing familiarity or provide motivation.

2.2.2 Games related to describing objects (Task-games)

Descriptive (Desc) In this game one conversational partner acts as a describer of the scene as they perceive it while the other acts as a follower who is looking for any inconsistencies between the description and the scene as they see it. In contrast to the next game this game involves a systematic investigation of objects in the scene, e.g. row by row.

Specification (Spec) In this game the participants establish a common focus on a specific object or a part of the scene. In the game the location or the identity of an object or a region is discussed.

Global (Glob) involves finding and describing objects on a global level (i.e. the table) without a focus on a specific part of the scene, e.g. counting the number of objects of a particular kind.

3 Evaluation

The game segmentation task was performed by a single coder and was evaluated by inter-test reliability. The same coder segmented the dialogue by game ids again after a month. The intra-coder agreement was 78% $N = 794$. In 85% of the games that were coded differently, the latter annotations were favourable upon review which shows that the accuracy of coding evolves with experience. The game identification task was evaluated by an inter-coder test where a novice coder with no background in linguistics or language technology annotated a part of the corpus which gave us an agreement $\kappa = 0.74(N = 67)$. The most common mismatches involve *Spec*- and *Desc*-games (4) and *Spec*- and *Clar*-games (4). This is expected as these games share some of their features.

4 Discussion and conclusions

Our work demonstrates that even in a free dialogue (as opposed to task-oriented dialogue) conversations are broken down into smaller units in which the conversational participants focus towards a particular goal: (i) thematically associated with the overarching task that the participants are performing, (ii) functionally related to interactional dynamics that facilitate linguistic and non-linguistic interaction. Our classification is not exhaustive but may be augmented as new domains and data are analysed, both in terms of the different types of games and their hierarchical organisation. From the linguistic perspective we demonstrate that what is communicated in dialogue is not only thematic information in the meanings of utterances and their relation to the world but also meta information how to functionally structure our interaction. In comparison to other coding schemes, e.g. HRC MapTask and DAMSL (Kowtko et al., 1992; Jurafsky et al., 1997) our coding scheme may appear simplistic but this is because our main goal is not discourse analysis but (shallow) segmentation of dialogue into units where features, linguistic reflections of these games, would become identifiable for machine learning approaches. Identifying different dialogue games is also useful for dialogue systems as these can be used as a basis for templates for dialogue rules, both domain specific and general.

In our forthcoming work we will further examine the generality of the coding scheme by testing it on the English part of the cups corpus, as well as different but related corpora involving spatial tasks such as those in the SCARE corpus (Stoia et al., 2008). Recording more information about participants such as their familiarity would allow us to make stronger conclusions about their conversational dynamics which may be relevant for *Meta*-games.

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