

Discourse in Customer Care Dialogues

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Discourse analysis of texts as provided by Rhetorical Structure Theory (RST) and Penn Discourse Treebank (PDTB) describe relations within and across sentences. RST theory describes text as a rooted tree structure where all discourse units are connected by discourse relations (Marcu, 1997). In contrast, PDTB analyzes texts using a more shallow structure of discourse without the requirement of a rooted discourse tree (Miltsakaki et al. 2004).

While text discourse has received significant attention, dialogue utterances between two or more conversants also induce relations that are worth structuring in a discourse structure. Typically, two types of structural analysis are used for dialogues. The first kind of analysis involves shallow structures, such as dialogue acts (Core and Allen 1997, Petukhov and Bunt, 2009) that describe the role of an utterance segment, including its function, towards previous and/or consecutive utterance. The second type of dialogue analysis uses topic structures (Rotaru and Litman, 2006, Bangalore et. al. 2008). Dialogues are analyzed as a structure of topic shifts with relations between higher-level topics (get address) and subtopics (get zip code). This kind of analysis has been applied to task-oriented dialogues, such as tutoring and customer care interactions.

In (Stoyanchev and Piwek, 2010), the authors attempted to bridge dialogue act theory and RST theory by converting expository dialogues into texts and annotating discourse relations between text segments. Expository dialogues are used in commercials and on news channels to present information in a more exciting manner. However, the attempts to perform the same analysis on an argumentative dialogue were not as successful. RST structure presumes that the analyzed discourse is coherent and all parts are related to each other adding to the main informational point. However, unlike written text, which is planned by a single author, dialogue is produced dynamically over time. In other words, the outcome of the dialogue is not known until the end of the interaction. Hence, deep RST tree structure may not be directly applicable to a dialogue. PDTB, which does not presume a tree structure, has been successfully applied to annotate dialogues (Tonelli et al. 2010). In our current work we aim at identifying shallow PDTB-style discourse relations in dialogues and linking them to the topic structure.

We focus on task-oriented customer care dialogues, which contain both information seeking and problem solving conversations. In task-oriented dialogues, each conversation partner aims to achieve a goal using dialogue moves as building blocks. The resulting dialogue can be

viewed as a sequence of topic/subtask shifts, dialogue acts, and discourse relations. We hypothesize that each information carrying dialogue move plays a discourse role linking to a topic and helping fulfill the pragmatic goal of the conversant. For example, a customer's utterance in a dialogue "I think I'm going to go for the first option" is an INFORM dialogue act that plays a role of CONTINGENCY-RESULT for a topic of "Configuration selection".

In (Bangalore et. al. 2008), the authors created structures that identified task and subtask relations in such dialogues through supervised training methods. We extend this work by combining multiple levels of structure, including task/subtask, dialogue act, and discourse relation, presenting a more complete pragmatic and semantic representation of a dialogue. We annotate English human-human customer service typed chat dialogues with the domain-specific topic structure, dialogue acts enhanced with PDTB discourse roles and corresponding links. We present an analysis resulting from combining the multiple annotations levels. We anticipate that the combined structure would be helpful in visualizing dialogues for analytics and for bootstrapping human-machine dialogue systems.

With the availability of large number of customer service recordings at call centers, we investigate a combination of unsupervised methods for clustering, segmentation, and structure induction in addition to dialog acts and RST/PDTB defined clausal relations.

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