

Modeling Thematic Changes in a Collaborative Task-Oriented Dialogue

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Abstract

When people talk, they focus their attention to the theme of their conversation. As a dialogue progresses, they change their focus of attention and the dialogue theme accordingly. In this work, we investigate the mechanism behind the changes of dialogue themes (i.e. thematic changes) in a collaborative task-oriented dialogue. We introduce an approach to building a thematic structure which can describe these changes and predict the next dialogue theme. A thematic structure of this kind can be useful for various tasks such as for improving speech recognition outputs or for helping to recognize the intention behind a user's utterance. We aim at building a thematic structure which can also model thematic changes in human-robot interactions.

Our approach uses a Markov Logic Network (MLN) as a probabilistic logic model. For this model, we specify logical rules to characterize the mechanisms of thematic changes. We train and test a number of MLN models using a human-human dialogue data set which is considered similar to human-computer dialogue data in USAR. The MLN models are compared to two kinds of baselines, namely a random and an informed baseline. The random baseline is a random choice over all possible dialogue theme, and the informed baseline is a basic focus prediction model which always continues the dialogue themes of the previous utterance. The experiment results show that the MLN models outperform both baselines. Furthermore, we argue that our approach can be used for structuring the dialogue themes in a human-robot collaborated dialogue in performing an urban search-and-rescue (USAR) task.