

Towards Flexible Argumentation with Conversational Agents

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Abstract ([should be within 1st page](#))

Reasoning over conflicting information, i.e. to argue is at the core of many types of conversation such as persuasion, negotiation and deliberation. The multitude of setups that require this capacity makes it an interesting, yet challenging task for conversational agents. It is required in any scenario in which the corresponding system has to operate on conflicting information or positions, as for example contradicting online reviews or opposing points of view. However, current systems mostly focus on a specific application scenario and flexible approaches that can be applied in multiple systems are comparatively scarce. The present thesis addresses this issue in pursuit of the goal of enabling flexible argumentation with conversational agents. To account for the complexity of the topic, the work is divided into three sub-tasks: The development of challenging agent strategies, the acquisition of arguments and the adaptation to the interlocutor. All tasks are addressed one after the other with an emphasis on the flexibility of the proposed methods. First, an agent-agent setup is introduced to assess the suitability of the utilized formal frameworks, evaluate the proposed methods and identify pending issues. The sub-task of challenging agent strategies is then addressed through multi-agent reinforcement learning based on a general reformulation of dialogue games as markov games. In addition, a modification of the dialogue game for argumentation utilized in the experimental setup is introduced to enable a more complex and natural interaction. Subsequently, the sub-task of topic flexibility is addressed through a combination of argument search engines and dialogue systems. Finally, user-adaptive argumentation is investigated through the introduction of a user preference model and an implicit recognition of user opinions based on social signals. In the last part of the thesis, application systems that utilize the proposed methods are discussed.