

A heuristic strategy for persuasion dialogues

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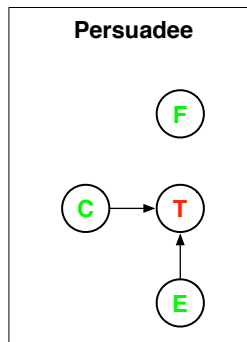
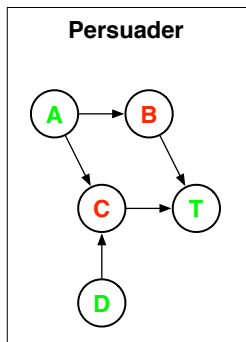
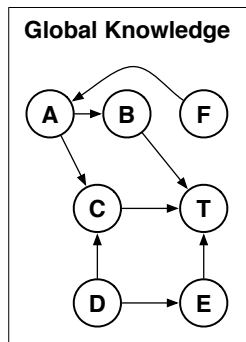
Overview

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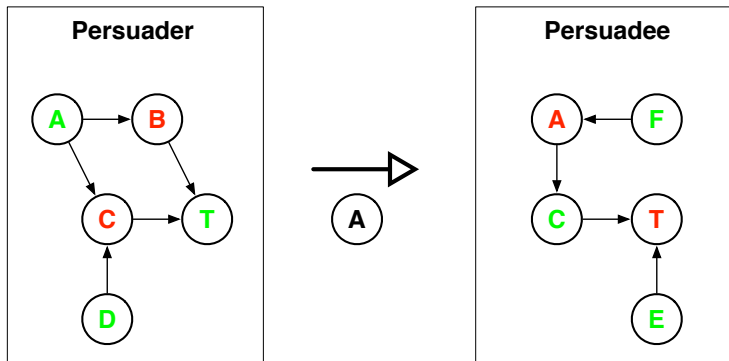
Argument-based persuasion dialogues

- Initial condition: Agents have conflicting views on a topic.
- Individual goals: At least one agent aims to persuade the other that the topic is acceptable/unacceptable.
- Goals of the dialogue: Attempt to resolve a conflicting view on the topic.

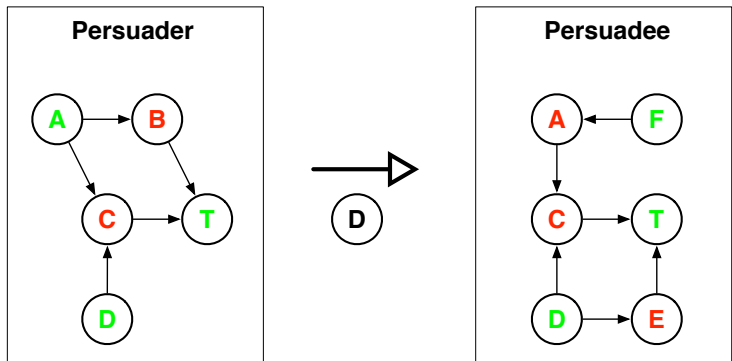
Example dialogue



Example dialogue



Example dialogue



Current methods for computing a dialogue strategy

- AI planning [Black et al., 2014].
- Mixed observability Markov decision problems [Hadoux et al., 2015]
- Minimax algorithm [Rienstra et al., 2013]

However, none of these approaches have been shown to scale to domains with more than 10 arguments.

Heuristic strategy

- We want a strategy that can be computed in domains with many arguments, even if the strategy is not optimal.
- To find a time-efficient strategy we consider the local *topological* properties of arguments graphs to determine some estimate of how beneficial an argument would be if asserted.

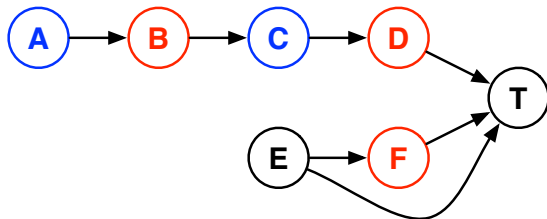
Estimating the influence of arguments

To obtain an accurate estimate of how beneficial asserting an argument will be we want to take into account:

- Does the argument support or defend the topic?
- What is the estimated of influence the argument has over the topic?

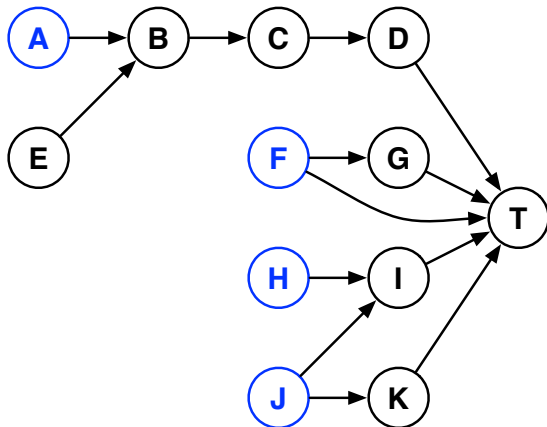
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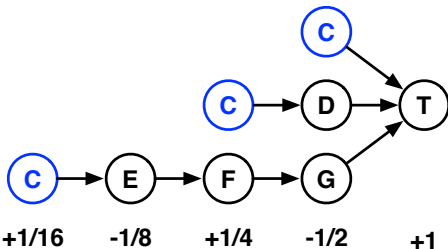
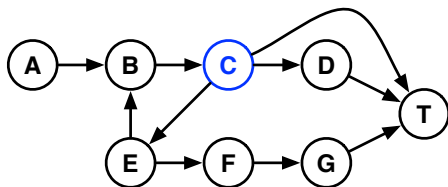


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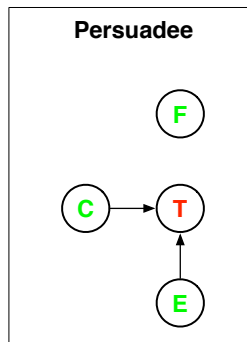
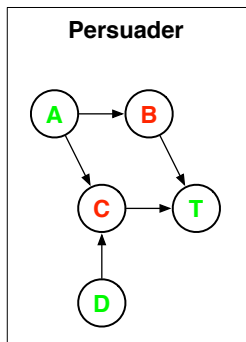
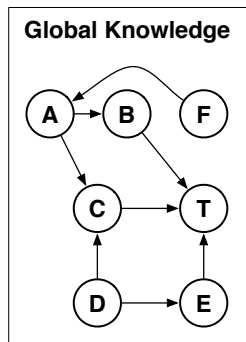
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Estimating the influence of arguments



Estimating the influence of arguments



Experimental evaluation

- Evaluation through simulation. Generate thousands of instances of dialogue scenarios.
 - ▶ Requires many argumentation frameworks to act as a domain
 - ▶ Ideally, from real-world sources — but, public databases not large enough for serious empirical evaluation.
 - ▶ So, generate random frameworks with “realistic” properties
- Measure if the persuader is successful when using the heuristic strategy, and how long computing the strategy takes.
- Use a random strategy as a lower bound on success.

Results

The heuristic strategy is fast to compute, and efficiently scales to domains with 50 arguments.

Args	10	20	30	40	50
Time	<0.1	0.21	0.37	0.56	0.77

Table: Time to compute heuristic strategy (seconds). *Args* is the number of arguments in the domain.

Results

The heuristic strategy has a high success rate.

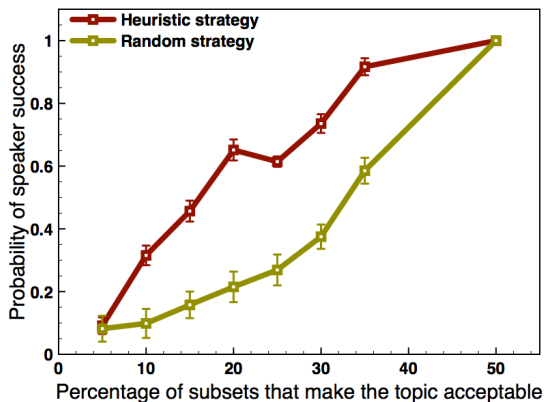


Figure: Percentage success rate of strategies. Error bars indicate standard error.

Future work

- Application of the strategy to more complex dialogue scenarios.
 - ▶ Particularly dialogues with more than two participants.
- The generation of argumentation frameworks for the use in simulation has a large effect on the resulting dialogue.
 - ▶ What structures of framework exist in real-world domains? Different argumentation schemes, argument mining of different sources, models of argument (extended frameworks)...
 - ▶ What impact do different structures have on other argument-based systems? Dialogues, argument solvers, dynamic argumentation...

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