Toward Consistent Agreement Approximation in Abstract Argumentation and Beyond

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Motivation

Often, it is not possible to achieve full agreement among different stakeholders. Partial agreements are more realistic and sufficient (example: *strategic* stakeholder alignment in software development organizations). Hence, formal foundations of agreement technologies (*i.e.* formal argumentation dialogues) should support approximating agreements.

Research Questions

1. How can a set of agents determine to what degree they are agreeing on a topic (set of arguments)?
2. How do an agent's subjective value preferences affect the degree of agreement on a topic?
3. How can an agent evaluate the reliability of another agent's inference process w.r.t. the maintenance of a previous approximated agreement?

Abstract Argumentation

Consider the concepts sketched out to the right. We have the following agreement scenario:

- Our argumentation framework AF_1 is the one displayed by Figure 1.
- Our *topic set* is $\{a, b, c\}$.
- We have three agents A_0 (stage semantics), A_1 (preferred), and A_3 (grounded)
- Stage/preferred/grounded extensions of AF_1: $\{\{a, b, c\}\}/\{\{b, c\}\}/\{\{\}\}$.
- Table 1 provides the degrees of satisfaction.
- The minimal/mean/median degrees of agreement are: $\frac{1}{3}$ / $\frac{2}{3}$ / $\frac{2}{3}$.

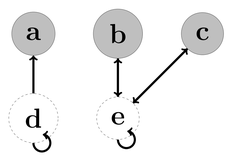

Figure 1:AF_1

Core Contribution

Degrees of Satisfaction and Agreement

- Agreement scenario: argumentation framework, 'topic' subset of arguments, several agents, each represented by an argumentation semantics
- Degree of satisfaction: how satisfied is one agent with the "most favorable" extension another agent infers?
- Minimal/median/mean degree of agreement: What is the minimal/mean/median degree of satisfaction of any two agents given a set of arguments that implies a maximal minimal/mean/median degree of satisfaction?

Extension to Value-based Argumentation

- Extension of abstract argumentation approach (see example).
- Addition: measure impact of a *value* on degrees of satisfaction/agreement

Theoretical Analysis. When normally expanding agreement scenarios, we prove suprema for changes in the degree of minimal agreement, given a semantics satisfies any *relaxed monotony* principle, and given some constraints to the change that is introduced by the normal expansion.

Implementation: `http://s.cs.umu.se/mhfrcp`

Table 1:Degrees of satisfaction.

	σ_{stage}	$\sigma_{preferred}$	$\sigma_{grounded}$
σ_{stage}	1	$\frac{2}{3}$	0
$\sigma_{preferred}$	$\frac{2}{3}$	1	$\frac{1}{3}$
$\sigma_{grounded}$	0	$\frac{1}{3}$	1

Value-Based Argumentation

Consider the concepts sketched out to the right. We have the following agreement scenario:

- Our argumentation framework AF_2 is the one displayed by Figure 2.
- Instead of different semantics we have different value preference: we have preferred semantics, the values a_v, b_v, c_v, d_v, and each argument arg is mapped to arg_v. The value preferences of our three agents are as follows. A_0: a_v is preferred over b_v; A_1: b_v is preferred over a_v; A_2: c_v is preferred over d_v.
- Our *topic set* is $\{a, b, c, d\}$.
- The agents' *subjective* extensions are as follows. A_0: $\{\{a, d\}\}$; $A_1 : \{\{b, d\}\}$; $A_2 : \{\{a, c, d\}\}$.
- The minimal/mean/median degrees of agreement are: $\frac{1}{2}$ / $\frac{3}{4}$ / $\frac{3}{4}$.
- The impact of value b_v on the minimal/mean/median degrees of agreement is: $\frac{1}{4}$ / $\frac{1}{6}$ / $\frac{1}{4}$.

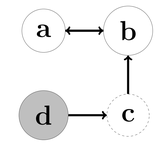

Figure 2:AF_2

Acknowledgements

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