Multi-context argumentation system

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Roadmap

- Motivation and goals
- Argumentation systems
- Rationality postulates
- Some of the existing works
- Our ideas and problems

Motivation and goals

- MCS provides a framework for reasoning with the highly dynamic, heterogeneous and imperfect contexts.
- Argumentation system are naturaly applied for developing applications in legal systems, negotiation among agents, decision making
- Our goal is to provide intuitive principle-based argumentation semantics, that will be fitted into MCS, s.t. will be able to tackle various Ambient Intelligence scenarios.

Argumentation system

- logical language
- argument
- conflict (attack)
- defeat
- status of the argument

Argumentation system

- logical language: e.g. language of some class of logic programs. Usually distinguish two kinds of rules: strict $\rightarrow$ and defeasible $\Rightarrow$
- argument
- conflict (attack)
- defeat
- status of the argument

Argumentation system

- logical language
- argument: corresponds to a proof in the underlying logic (tree of inferences, sequences of inferences, pair of premises and conclusion)
- conflict (attack)
- defeat
- status of the argument

Argumentation system

- logical language
- argument
- conflict (attack): detection of inconsistencies. Two types of conflicts are usually considered (rebutting, undercutting)
- defeat
- status of the argument

Example of rebutting

Rebutting occurs when arguments have opposite conclusions.

$$[\Rightarrow a]$$

$$[\Rightarrow \neg a]$$

$$[\Rightarrow a]$$

$$[[\Rightarrow \neg a] \Rightarrow b]$$

Example of undercutting

Undercutting occurs when conclusion of one argument contradicts default assumption of another argument.

$$[\Rightarrow a]$$

$$[not\ a \Rightarrow b]$$

Argumentation system

- logical language
- argument
- conflict (attack)
- defeat: states whether the attack was successful (now preferences also come to play)
- status of the argument

Argumentation system

- logical language
- argument
- conflict (attack)
- defeat
- status of the argument: determines whether argument 'win', 'loose' the dispute or left it 'undecided'

Rationality postulates

stated by Caminada and Amgoud [2]:

- direct consistency: the output of system (the set of justified arguments) must be consistent
- closure under strict rules
- indirect consistency

Rationality postulates

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- direct consistency
- closure under strict rules: the output of system (the set of justified arguments) must be closed under strict rules
- indirect consistency

Rationality postulates

stated by Caminada and Amgoud [2]:

- direct consistency
- closure under strict rules
- indirect consistency: the closure of output of system (the set of justified arguments) under strict rules must be consistent

Example

$$C : [\rightarrow c]$$

$$C^{\neg} : [a, b \rightarrow \neg c]$$

$$A : [\Rightarrow a]$$

$$B : [\Rightarrow b]$$

According to Prakken, Nute semantics [5, 4] the set of justified arguments is $\{a, b, c\}$. But $\{a, b, c\}$ is not closed under strict rules and even worse, its closure is inconsistent.
Caminada also provides general solution for satisfying these postulates [2].

Existing works

Majority of the existing works (we are familiar with) in defeasible argumentation are example-driven and lack enough intuitions behind their design decision.
Caminada and Amgoud postulates [2] provide a more solid basis for the evaluation of formal argumentation systems.

Our ideas and problems in argumentation

What we want:

- principle based approach: explicitly formulate all philosophical principles that motivates for design decisions
- provide alternative for satisfying rationality postulates [2]
- be general enough for comparing with different systems:
  arguments as trees, not necessarily minimal
  defeat between set of arguments and argument
  The generality will allow us to compare with other non-argumentative approaches as well (e.g. Dynamic logic program)

Our ideas and problems in argumentation

How will we tackle the indirect consistency issue?

$$C : [\rightarrow c]$$

$$C^{\neg} : [a, b \rightarrow \neg c]$$

$$A : [\Rightarrow a]$$

$$B : [\Rightarrow b]$$

The notion of defeat between the set of arguments and argument: The closure of an argument B under strict rules contains C. The closure of set of arguments $\{A, B\}$ contains $\neg c$.

Our ideas and problems in MCS

what we want:

- to minimize necessary communication complexity between contexts
- ideally, the defeat between arguments will be decided within the one context
- contexts provide distributive computing, they should not change the output (the set of justified arguments)

References

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Thank you