Distributed semantics for distributed argumentation

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Reminder (Dung)

Set of arguments $\mathcal{A}$ and an attack binary relation $\preceq$.
A set of arguments (extension) can be:

- **conflict-free** if none of its arguments attack another;
- **self-defended** if any argument attacking one of its arguments is attacked by one of its arguments;
- **admissible** if it is conflict-free and self-defended;
- **preferred** if it is an inclusion-maximal admissible set;
- **grounded** if it is an inclusion-minimal admissible set;
- **stable** if it is conflict free and any argument not in the set is attacked by an element in the set.

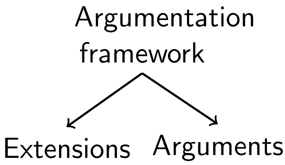
Many variations of these frameworks (preference-based, value-based, with "negative" arguments, etc.)

State of the playground

- Work on the semantics of argumentation for one argumentation framework;
- Work on argumentation protocols.

In addiction there are a few works on the merging of argumentation frameworks. They usually take merging as a representation problem.

The problem



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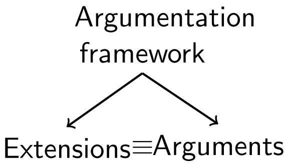

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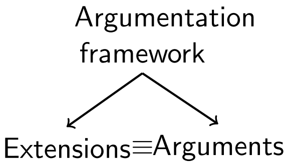
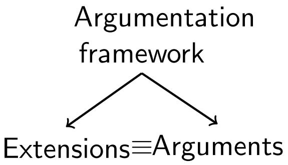


Argumentation framework
Extensions≡Arguments



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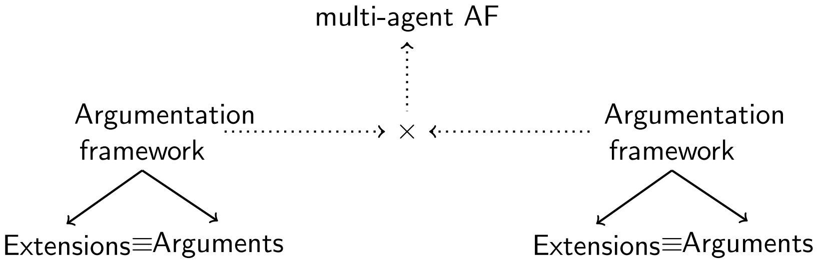
multi-agent AF
Argumentation framework
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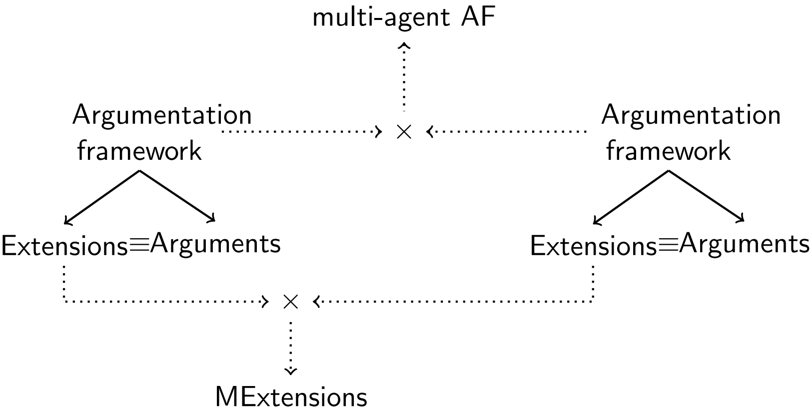
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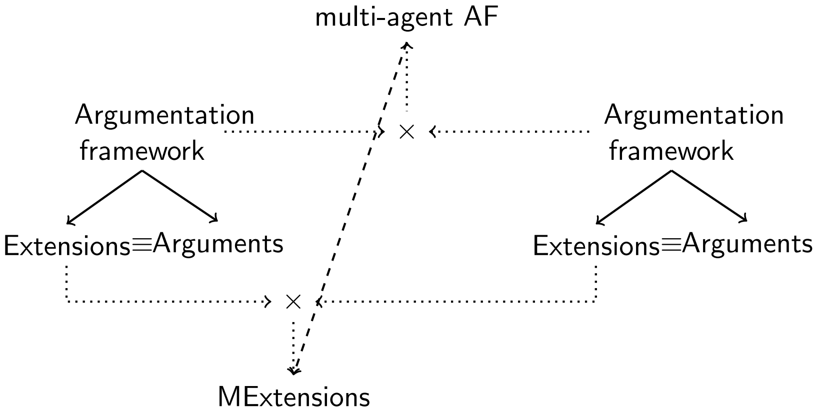

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MExtensions

Definition (Models of networks of ontologies)

Given a finite set of n ontologies Ω and a finite set of alignments Λ between pairs of ontologies in Ω, a model of the networks of ontologies $\langle \Omega, \Lambda \rangle$ is a n-uple of models $\langle m_1 \ldots m_n \rangle \in \mathcal{M}(o_1) \times \ldots \mathcal{M}(o_n)$, such that for each alignment $A \in \Lambda(o_i, o_j)$, $m_i, m_j \models A$.

Distributed systems semantics

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- a model of network of ontologies is a set of compatible local models;
- compatibility is expressed w.r.t. the constraints applied by the alignments.

A proposal

- an extension is a defendable position expressed for an agent;
- a model of the multi-agent argumentation framework is a set of compatible local extensions.

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$\downarrow$

$\mathcal{E}_1^1, \dots \mathcal{E}_1^n$

Argumentation framework

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$\mathcal{E}_p^1, \dots \mathcal{E}_p^m$

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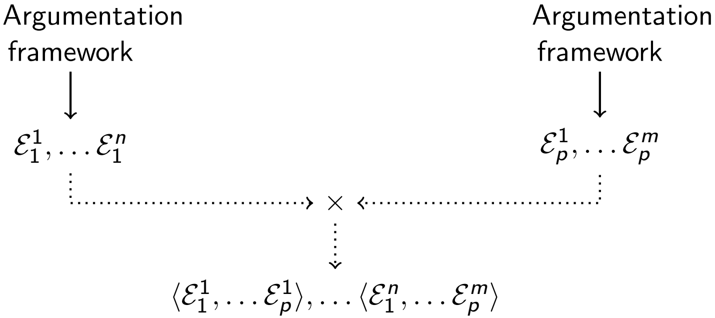

Compatibility

Obvious compatibility:

- Keep all tuples (hyper-credulous: acceptable by one agent).
- Retain only those tuple which contain each time the same extension $\langle \mathcal{E}, \ldots \mathcal{E} \rangle$ (hyper-skeptical: acceptable by all agents).

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Compatibility as argumentation

Compatibility can be expressed as argumentation: retain only those tuples $\langle \mathcal{E}_1, \ldots \mathcal{E}_p \rangle$, such that $\bigcup_{i=1}^{p} \mathcal{E}_i$ is:

- admissible;
- preferred;
- your choice...

But which attack relation for these argumentation frameworks?

This really is a model of communication because the effect of compatibility is similar to agent communicating the arguments which affects their extensions.

Compatibility as consistency

If $\mathcal{T}$ is the sets of assertions that are supported by the arguments in $\bigcup_{i=1}^{p} \mathcal{E}_i$, we may want to select those tuples such that:

- consistency ($\mathcal{T}$ has models),
- absence of anti-patterns (a syntactic configuration that must not be matched $\mathcal{T} \not\models \pi$).
- other criteria

Anti-pattern can be used for approximating inconsistency.

This would filter inconsistency both:

- locally: if one extension is inconsistent;
- globally: if several extensions are incompatible.

Questions (my questions!)

- the representation question? (not likely)
- merging the attack relation and its relation to the selected tuples;
- modelling pairwise relations between agents (so far, we have gone global).
- distinguishing a global set of arguments (cautiously, skeptically) or keeping the agents independent by having their own sets of extensions (those which are compatible with the others).

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