

Multi-Agent Argumentation Systems

Proposition of Stefano Moretti (stefano.moretti@dauphine.fr) and Gabriella Pigozzi (gabriella.pigozzi@dauphine.fr)

The internship is financed by a recently started ANR project AMANDE (Advanced Multilateral Argumentation for Deliberation) involving LAMSADE (Paris Dauphine), LIP6 (Paris-6), LIPADE (Paris-5), CRIL (Lens) and IRIT (Toulouse).

Argumentation theory has been an active topic in Artificial Intelligence since the nineties [Dung95]. Roughly, an argumentation framework represents the different and possibly conflicting information an agent has, or may represent the dialogue between two agents, one supporting one stance and the other counter-attacking the arguments provided by the first agent. However, a truly multi-agent perspective is still missing in the literature.

Two main approaches can be envisaged for the purpose of generalizing argumentation theory to a deliberation system among several agents: a centralized one, where each agent provides his own argumentation framework and the goal is to merge the individual frameworks to obtain one that represents the group position; or a protocol approach, where agents interact in a dynamic context, each providing a new argument, an attack or a defence to the given framework at a given time.

As emphasised in [CP11], unanimity is not ensured to be satisfied when evaluations on argumentation frameworks are aggregated. Yet, unanimity seems an unquestionably desirable properties for aggregation procedures. The reason for such impossibility seems to reside in the fact that setting an argument as accepted/rejected triggers the acceptance/rejection of the arguments that are attacked by it. One of the goals of this internship is therefore to study the influence that arguments can have on other arguments in the same framework [BCPR12].

Intertwined to this issue, is the consideration that, arguably, agents may have different preferences on the arguments at stake and, in particular, may deem some arguments more important than others.

Some questions that can be addressed in this internship: How can we define influence in an argumentation framework and focus arguments? What kind of feasible aggregation procedures can be defined that exploit these rather two novel notions?

References:

[CP11] M. Caminada and G. Pigozzi. On judgment aggregation in abstract argumentation. *Autonomous Agents and Multi-Agent Systems*, 22(1):64-102, 2011.

[Dung95] P. M. Dung. On the acceptability of arguments and its fundamental role in nonmonotonic reasoning, logic programming and n-person games. *Artificial Intelligence*, 77:321-357, 1995.

[BCPR12] R. Booth, M. Caminada, M. Podlaskowski, and I. Rahwan. Quantifying disagreement in argument-based reasoning. In *Proceedings of the 11th International Conference on Autonomous Agents and Multiagent Systems-Volume 1*, pages 493–500. International Foundation for Autonomous Agents and Multiagent Systems, 2012.

[GR13] D. Gabbay and O. Rodrigues. An equational approach to the merging of argumentation networks. *Journal of Logic and Computation*, 2013.