

Scientific Report STSM-AT-88 (Martin Caminada)

For the first two weeks in February, Martin Caminada (University of Luxembourg) has made a Short Term Scientific Mission to Iyad Rahwan and his research group at the British University in Dubai. Arrival in Dubai was on Friday the 29th of January, and departure was two weeks later in the early hours of Saturday February 13. The overall aims of the visit were to exchange ideas on the topic of formal argumentation, to define an overall research agenda and to identify concrete topics for further collaboration.

As for the first aim (to exchange ideas), Caminada has explained some current developments on the topic of argument labellings, which are an alternative way of determining argument-based semantics compared to the traditional extension-based approach. In particular, he has explained the notion of a labelling-based justification status of arguments, of which a first description has recently been submitted to the NMR workshop. The idea is that the status of an argument depends not only on whether it can be accepted, but also on whether it can be rejected or abstained. Caminada and others recently defined a procedure on how to compute such a justification status. Since Rahwan has previously taken one of the labelling approaches of Caminada as a starting point of his work on argument-based judgement aggregation, and generally sees argument labellings as having clear advantages above the traditional extension-based approach, this discussion was seen as relevant and useful.

Another topic regarding ongoing research that was discussed was the issue of argument-based judgement aggregation in the possible presence of dishonesty. This topic is close to previous work on argument-based judgement aggregation that was done independently by Rahwan and Tohmé (as has recently been accepted for presentation at AAMAS 2010) and by Caminada and Pigozzi (as has been published at JAAMAS). The work of Rahwan and Tohmé proves, this time in the context of abstract argumentation, the classical impossibility results for judgement aggregation, namely that not all desirable postulates can be satisfied at the same time. Moreover, this work proposes a solution by dropping the postulate of “universal domain”. The work of Caminada and Pigozzi, at the other hand, proposes to drop the postulate of “independence of irrelevant alternatives” and also shows that by dropping this postulate, one can then not only satisfy a fair number of remaining classical postulates but also the previous unstudied though in many occasions highly relevant postulate of “compatibility”.

Caminada then described some current research that is going on at the University of Luxembourg. Basically, the idea is to examine what are the effects of the judgement aggregation procedures in the presence of dishonesty of the individual participants. Some preliminary (though yet unproven) conjectures state that under the sceptical aggregation operator of Caminada and Pigozzi, there is no incentive for dishonesty, since dishonesty will never yield a better result for the agent being dishonest. In a slightly altered version, where there are focal sets of arguments, there is an incentive for dishonesty, although the other agents will not suffer from this, since the overall outcome will have a greater approval of them. The precise details are currently worked out by the research group in Luxembourg, but it was considered to be useful to already keep each other informed on these developments, since both of our groups are interested in the issue of argumentation based judgement aggregation. Overall, the idea is to cooperate instead of to compete, and keeping each other informed on recent developments is one of the ways to achieve so.

As for the second aim of the STSM, to define an overall long-term research agenda, we have discussed the topic of social epistemology. This is a topic that both of us have done some preliminary research on in the past. Rahwan, for instance explored the strategy-proofness of argumentation under grounded semantics, together with Tohmé and Larson (paper presented at IJCAI 2009). Here, the idea is that an agent may decide to reveal only a subset of the arguments it has at its disposal, leaving some of its arguments hidden, in order to have a favourable outcome

when the other agents also reveal their arguments. This form of dishonesty would be called “deception” in the classification of Caminada. Caminada, at the other hand, has together with Staab explored the incentives agents may have in order to become less informed than they ideally could be (since gathering all relevant arguments costs resources) yet at the same time trying to appear more informed than they actually are (to potential clients of their advice). This form of dishonesty is called “BS” in the classification of Caminada, and the first results have been published in 2009 at the Benelux Conference on Artificial Intelligence. A more elaborate paper on this is currently under review for the workshop on Multi-Agent-Based Simulation (MABS) which is co-located with AAMAS 2010. One of the overall long term research aims in formal argumentation, as both Caminada and Rahwan see it, is to study the effects of dishonesty on social epistemology. That is, when a group of agents has incentives for dishonest behaviour (either by telling lies, BS or deception) what will be the consequences on the collective beliefs of the group as a whole? Under what circumstances will the effects of dishonesty be cancelled out, and under what circumstances will the effects of dishonesty lead to collective beliefs that strongly deviate from social rationality? These questions are important not only for the field of multi-agent systems, but also for the more general field of economics, because it touches on the delicate issue of market rationality.

Given that both Caminada and Rahwan agree on the importance of the long term research topic described above, the next question then became what would be concrete steps that make progress on dealing with this research topic. Identifying these has been the third aim of the STSM. Both Rahwan and Caminada feel that as a first step, what is needed is a formal description of the notion of knowledge and informedness, that is specifically tailored to the context of formal argumentation. The traditional philosophical notion of knowledge is “justified true belief”. In standard epistemic logic, this is simplified to “true belief”, whereas in some of Caminada's work it has been argued that the most practical notion is actually that of “justified belief”, which is the notion of knowledge that Caminada and Rahwan are interested in. One particular aim determine whether an agent is more knowledgeable (or more informed) on a particular topic than another agent. Once such a criterion has been defined, one can then examine in which circumstances the market is actually able to detect this informedness, and attribute a higher value to the advice of informed information sources than on the advice of ill-informed information sources. During the STSM, Caminada and Rahwan have examined various candidate formal criteria for such a notion of informedness. This involved some on-the-spot research of the formal properties of these. During the STSM, it turned out that the particular problematic property is that of transitivity, which both Caminada and Rahwan would like to be satisfied. We were able to formulate counterexamples that show that transitivity is violated for some of the simpler (dialectical) notions of informedness. We then focused our attention on a non-dialectical notion of informedness. Although at this moment we have no proof that it satisfies all our previously stated formal postulates, we have good hope that it in fact does, and we intend to keep working on this together, until we find either a formal proof or a counterexample. If successful, we would then like to write a paper which describes these results. Thus, the collaboration will continue after the STSM has been finished.

Overall, the STSM brought about three main results:

- increased understanding of each other's work and the common research interests
- the identification of a shared long-term research agenda regarding the current research challenges in formal argumentation and social epistemology
- the identification of a first step (concrete research question) towards handling this long-term research agenda (formal criteria of informedness)