

A dynamic logic for the aggregation and the diffusion of opinions

Sujet de stage M2



Unité d'accueil : Institut de recherche en Informatique de Toulouse (IRIT)

Équipe : LILAC - UTC1 (Logique, Interaction, LAngue et Calcul)

Encadrement : Umberto Grandi, Andreas Herzig, Emiliano Lorini, Laurent Perrussel

Mots clés : intelligence artificielle, systèmes multiagents, agrégation de jugements, logique dynamique

1. Résumé

Ce projet a comme but l'exploration des liens entre la logique dynamique “dynamic logic of propositional assignments” et les modèles d'agrégation de jugements et d'opinions. Une bonne connaissance en logique et la capacité de concevoir des démonstrations mathématiques sont des compétences importantes pour ce stage. Le stage s'effectuera à l'IRIT dans l'équipe LILAC à l'Université Toulouse 1 Capitole.

2. Scientific background

In recent years several mathematical models of collective decision making have been developed and studied in artificial intelligence, from classical voting to logic-based representations of judgments and opinions. The theory of judgment aggregation represents individual expressions by means of propositional formulas or propositional models, and in view of its axiomatic framework it is a good candidate to test the expressibility of logics for multi-agent systems. Dynamic logic of propositional assignments (DL-PA) is a dynamic logic constructed on atomic programs representing assignments of propositional variables to truth values, and hence is a prime candidate for expressing the framework of judgment aggregation (in its form known as binary aggregation).

3. Research program

In the first part of the internship the student will plunge into the literature on judgment aggregation and on DL-PA, getting acquainted to the two settings (circa 2 months). The main papers modeling judgment aggregation in propositional, modal and first-order logic will also be compared.

A second stage will be to start translating the axioms defining aggregation procedures as formulas of DL-PA, until a stable model is found in which we will be able to express problems of aggregation in a dynamic logic (circa 2 months).

The third and last step consists in expanding this logic by considering problems related to the dynamic of opinions and social influence, exploring the limits of its expressiveness (circa 1 month).

Depending on the quality of the results developed, this internship can easily outcome a scientific publication in a workshop such as “Logic and the Foundations of Game and Decision Theory” or the “International Conference on Logic, Language and Interaction”.

References

Umberto Grandi, Emiliano Lorini and Laurent Perrussel. Propositional Opinion Diffusion. In *Proceedings of the 14th International Conference in Autonomous Agents and Multiagent Systems (AAMAS-2015)*, 2015.

Umberto Grandi and Ulle Endriss. Binary Aggregation with Integrity Constraints. In *Proceedings of the 22nd International Joint Conference on Artificial Intelligence (IJCAI-2011)*, 2011.

Philippe Balbiani, Andreas Herzig, and Nicolas Troquard, Dynamic logic of propositional assignments: a well-behaved variant of PDL. In *Logic in Computer Science (LICS)*, 2013.

Contacts

Email : umberto.grandi@irit.fr

Tel: 05 61 12 87 86