Opinion diffusion: measuring agreement and conflict between opinions

Sujet de stage 2016-2017
Master "Données et Connaissances"

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Salary: Yes (5 months)

Continuing with a thesis: Possible.

Description: Understanding opinion diffusion in networks of agents is an important question in the multi-agent system community [3,4,5,6].

At ONERA, we recently proposed a formal model of opinion diffusion in a population of agents [1,2] in which: opinions are modelled by formulas of propositional logic; agents are influenced by other agents and their influence is more or less strong; agents change their opinions by merging the opinions of its influencers, from the most influential one to the least. This formal model has been theoretically analysed and some of its properties have been studied. In particular, convergence of opinion diffusion has been studied aiming at characterizing networks in which the process of opinion diffusion reaches an equilibrium in which agents stop changing their minds. Besides, an implementation of this model is beeing carried out in NetLogo.

Among the different open questions, we will focus on the characterization of closeness between opinions. This will be helpul to characterize communities of agents i.e., groups of agents which have close opinions, and their dynamics as well.

In this internship, the student will define a model for characterizing opinion closeness. In a first step, he/she will investigate a model according to which the closeness of two opinions is defined by the measure *how much they agree* and the measure of *how much they conflict.*

For instance, if O_1 is "the 2026 olympic winter games will be hosted by Canada and there will be acroski trial", O_2 is "the 2026 olympic winter games will be hosted by Norway and there will be acroski trial" and O_3 is "the 2026 olympic winter games will be hosted by Canada", then we can say that O_1 and O_2 partly agree and partly disagree; O_1 and O_3 partly agree; O_2 and O_3 disagree.

Since opinions are modelled as propositional logic formulas, the problem comes to model how strong two propositional formulas agree and how strong they conflict.

The student will take inspiration from the model of [7] for measuring conflict and agreement between prioritized bases. Models of inconsistency measures [8] will also be useful.

ONERA references

[1] L. Cholvy. *Influence-based Opinion Diffusion.* (Extended Anstract) AAMAS 2016.

[2] L. Cholvy. *Diffusion of Opinion and Influence.* SUM 2016.

Other references

[3] C. Crawford, L. Brooks, S. Sen. *Opposites Repel: The Effect of Incorporating Repulsion on Opinion Dynamics in the Bounded Confidence Model.* AAMAS 2013.

[4] A. Tsang, K. Larson. *Opinion dynamics of skeptical agents.* AAMAS 2014.

[5] U. Grandi, E. Lorini, L. Perrussel. *Propositional Opinion Diffusion.* AAMAS 2015.

[6] N. Schwind, K. Inoue, G. Bourgne, S. Konieczny, P. Marquis. *Belief Revision Games.* AAAI 2015.

[7] G. Qi, W. Liu, D.A. Bell. *Measuring conflict and agreement between two prioritized belied bases* IJCAI 2005.

[8] J Grant, A. Hunter. *Analysing Inconsistent Information using Distance-based Measures* International Journal of Approximate Reasoning, (in press).