Guest Editorial

Formal tools and methods of Artificial Intelligence

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This special issue gathers extended versions of papers presented at JIAF 2022, the French conference on formal tools and methods of Artificial Intelligence, which was held in July 2022 within the French AI Platform (PFIA) 2022 at Saint-Etienne.

After the conference, the authors of accepted papers were invited to submit extended versions to this special issue, on the basis of the reviews they received at the conference. Six papers were submitted for consideration of inclusion in this special issue. After an additional reviewing process, five papers were eventually selected for publication within this special issue. These accepted papers offer a diverse view of the topics presented at JIAF and a relatively broad picture of formal tools for AI in general.

- In their paper "A Logical Modeling of the Yokai Board Game", Jorge Fernandez, Dominique Longin, Emiliano Lorini, and Frédéric Maris investigate how to represent the beliefs and actions of an artificial player for the Yokai board game. For this purpose, they propose an epistemic language, study its properties, and encode the game in this language. By proving that the associated satisfiability problem is NP-complete, they enable the use of SAT solvers for the automated reasoning of such an artificial player.

- The paper "Constrained Incomplete Argumentation Frameworks: Expressiveness, Complexity and Enforcement", by Jean-Guy Mailly, deals with uncertainty in argumentation. It shows that the incomplete argumentation frameworks (IAFs), already introduced in the literature, are not expressive enough, and proposes constrained IAFs which are based on a propositional formula. While constrained IAFs are shown to be very expressive, most associated decision problems are not harder than those related to IAFs.

- The goal of the paper "Using N-Ary Multi-Modal Logics in Argumentation Frameworks to Reason about Ethics", by Christopher Leturc and Grégory Bonnet, is to combine modal logic and argumentation to reason about ethics. The article proposes a new argumentation framework where arguments are built from an n-ary multi-modal logic. Standard attacks are enriched with modal-mappings, which characterize how oppositions between modal operators arise. These modal attacks are not quasi-symmetric, contrary to standard logic-based attacks, which enables to better decide on dilemmas.

- In their paper "On the Links between Belief Merging, the Borda Voting Method, and the Cancellation Property", Patricia Everaere, Chouaib Fellah, Sébastien Konieczny, and Ramón Pino Pérez, study the links between the Borda voting rule, well known in the social choice theory, and belief merging operators. Taking inspiration from the characterization of the Borda rule by Young, the authors adapt the cancellation property to belief merging, and introduce two families of Borda-like merging operators while analyzing them.

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- Finally, the paper "Some thoughts about artificial stupidity and artificial dumbness", by Jean Lieber, Jean-Guy Mailly, Pierre Marquis, Henri Prade, and François Rollin, opens the discussion on the notions of artificial stupidity and artificial dumbness. Whereas artficial stupidity could be basically seen as the counterpart of artificial intelligence, the authors show that it is not that simple, and bring some reflection about why and how one could design a system of artificial stupidity. In the same time, they suggest that these thoughts can help to better understand artificial intelligence.

We would like to thank the authors for their interesting contributions, the reviewers for their constructive and detailed reports, and the members of the *AI Communications* editorial office for their assistance with the preparation of this special issue.