
Maxime MORGE

Introduction (EN)

Volume 5, nº 4 (2024), p. 5-8.

https://doi.org/10.5802/roia.84en



*La Revue Ouverte d'Intelligence Artificielle est membre du Centre Mersenne pour l'édition scientifique ouverte*
*www.centre-mersenne.org*
*e-ISSN : 2967-9672*

**Revue Ouverte d'Intelligence Artificielle**
Volume 5, n° 4, 2024, 5-8

# Introduction (EN)

**Maxime MORGE**[a]

[a] Univ Lyon, UCBL, CNRS, INSA Lyon, UMR 5205 LIRIS, F-59622 Villeurbanne, France
*E-mail :* maxime.morge@univ-lyon1.fr.

The *Journées Francophones sur les Systèmes Multi-Agents* (JFSMA) are the annual meeting of the French-speaking community of researchers working in the fields of Distributed Artificial Intelligence and Multi-Agent Systems. The thirty-first edition of the JFSMA took place in Strasbourg from July 5 to 7, 2023, as part of the *Plate-Forme Intelligence Artificielle* [3]. These days represent a privileged opportunity for interdisciplinary scientific exchanges. They bring together academics and industry professionals who study, manipulate, and evolve the multi-agent paradigm to examine issues related to computer science (artificial intelligence and artificial life, software engineering, collective robotics, etc.), automation, natural sciences (epidemiology, ethology, ecology, etc.), and social sciences (economics, sociology, linguistics, etc.).

The multi-agent paradigm, multidisciplinary in nature, provides a conceptual framework for the analysis and design of systems whose global dynamics result from the interactions between autonomous entities, called agents, that share a common environment. Research associated with MAS thus proposes models, methodologies, techniques, and tools to address various questions that can be categorized into four aspects :

- the computational modeling of complex processes simulating a collective dynamic that results from individual behaviors and their interactions ;
- the collective problem-solving where a problem that arises globally for the community of agents is solved in a distributed manner ;
- the development of decentralized computer systems where the multi-agent approach enables semantic interoperability and the cooperation of autonomous applications and services ;
- the study, modeling, design, and evaluation of interaction in dialogue interfaces (verbal or non-verbal) and mediated systems where humans and machines cooperate.

Traditionally, each edition of the JFSMA highlights a specific theme that authors are invited to consider in their contributions if they wish. The theme of JFSMA'23 was **the explainability of multi-agent systems**. Far from myths but to address social issues (legal, ethical, or economic), an artificial intelligence system must be able to support

an explanation process by providing users with the means to understand the data used, the model employed, and the result produced in the specific context of its practical deployment. This challenge is even more difficult for a MAS because its audience is heterogeneous (designers, simple users, specialists) and the result produced stems from the interweaving of microscopic phenomena and global dynamics.

The contributions encouraged during this edition of JFSMA'23 were those that employ the multi-agent paradigm to :

- simulate an explanatory model to provide a visual representation of its properties and inspect it through a sensitivity analysis of the parameters ;
- design an interactive dialectical explanation process between the machine and the human, particularly for eliciting their preferences ;
- promote the transparency and fairness of deliberative processes that underpin the design of socio-technical environments where users, despite having potentially conflicting interests, must collaborate to achieve their goals.

In line with the post-proceedings of previous editions [4, 2, 1], this special issue contains the revised and extended versions of five articles selected from the best contributions presented at the thirty-first edition of JFSMA. The first two contributions are co-winners of the JFSMA'23 Best Paper Award.

The paper entitled *"**Négociation pour la consommation adaptative d'allocation continue**"* is set in the context of the distributed deployment of the MapReduce design pattern. Ellie Beauprez *et al.* contribute to the MAS field by proposing a task reallocation method to ensure better service for users. During operation, agents representing the computing nodes negotiate delegations or task exchanges to improve the mean flowtime. The contribution lies in the composite architecture of the node agents to manage task execution and multiple negotiations in parallel. The authors demonstrate that the multi-agent reallocation strategy improves the flowtime without penalizing task processing, while adapting to execution hazards and job releases.

The paper entitled *"**Covoiturage dynamique multi-saut avec modélisation des préférences utilisateur**"* opens up the possibility for a traveler to compose their ridesharing service by using multiple vehicles. Corwin Fèvre *et al.* adopt an user-oriented approach to solve a dynamic variant of the problem where requests and available routes arrive on the fly. The actors in the ridesharing system, passengers and drivers, are represented by autonomous agents equipped with individual preferences regarding detours and routes. The contribution lies in the dynamic representation of agent perception based on a spatial indexing structure called R-Tree. The exhibited results show that the system allows for the dynamic handling of complex passenger requests while minimizing the impact of ridesharing for drivers, accommodating a wide range of preferences and behaviors.

The paper entitled *"**État de l'art sur la co-simulation robotique et réseau des systèmes multi-robots**"* focuses on complex cyber-physical systems, particularly multi-robot aerial systems. Théotime Balaguer *et al.* emphasize the importance of simultaneous simulation of the physics and control of the robots on one hand, and data communication through the network on the other. In this state of the art, nine co-simulators are analyzed, and the progress of the co-simulator developed by the authors is presented. Besides high-level reflections on the technologies used and the necessary reuse of existing tools, the authors identify the obstacles to achieving realistic simulation, such as synchronization and information exchange between simulators.

The paper entitled *"**COBAI : un modèle générique à base d'agents centré sur les contextes et les interactions pour la simulation de comportements**"* addresses a case study in the field of emergence crisis management. To simulate a wide variety of coherent individual and collective behaviors, Maëlle Beuret *et al.* adopt a generic behavioral animation model based on contexts and propose a new architecture to simultaneously execute multiple behaviors resulting from a combination of circumstances, thus contributing to the realism of the simulation.

The paper entitled *"**Vérification formelle de propriétés de vivacité pour des systèmes multi-agents probabilistes à l'aide d'arbre à décomposition de buts**"* addresses theorem proving to verify properties related to the execution of a multi-agent system in which the choices of actions and the outcomes of actions are stochastic. Mathias Déhais *et al.* propose an extension of the GDT4MAS model, which relies on first-order logic, to specify probabilistic actions, probabilistic choices between actions, and probabilistically determine the order of agent activation. The contribution lies in the generation of proof obligations that do not depend on the number of agents.

This special issue is the result of collective work. We thank Pascale Kuntz, editor-in-chief of the ROIA journal, the members of the JFSMA program committee, and the members of the ROIA journal editorial committee who reviewed these extended versions of the best papers from JFSMA'23. Our thanks go especially to :

- Aurélie Beynier (LIP6, Sorbonne Université) ;
- Olivier Boissier (LIMOS, École des Mines de Saint-Etienne) ;
- Zahia Guessoum (CReSTIC, Université de Reims) ;
- Domitile Lourdeaux (Heudiasyc, Université de Technologie de Compiègne) ;
- Gildas Morvan (LGI2A, Université d'Artois) ;
- Laurent Perrussel (IRIT, Université Toulouse Capitole) ;
- Suzanne Pinson (LAMSADE, Université Paris Dauphine) ;
- Clement Raievsky (LCIS, Université Grenoble Alpes) ;
- Olivier Simonin (CITI lab, INSA Lyon) ;
- Laurent Vercouter (LITIS, INSA Rouen Normandie).

We would also like to thank all the individuals who, through their presentations, contributions, and reports, have been participating in the life of the French-speaking MAS community for over 30 years.

## Bibliographie

[1] V. Camps, « Introduction », *Revue Ouverte d'Intelligence Artificielle* **5** (2024), n° 1 (en), p. 5-7.
[2] J.-P. Jamont, « Introduction (EN) », *Revue Ouverte d'Intelligence Artificielle* **4** (2023), n° 2 (en), p. 5-7.
[3] M. Morge (éd.), *Explicabilité des systèmes multi-agents – Trente-et-unièmes journées francophones sur les systèmes multi-agents, JFSMA 2023, Strasbourg, France, July 5-7, 2023*, Cépaduès, 2023.
[4] G. Picard, N. Sabouret & O. Simonin, « Introduction (EN) », *Revue Ouverte d'Intelligence Artificielle* **3** (2022), n° 5-6 (fr), p. 419-421.