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Introduction (EN)

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Introduction (EN)

This special issue of ROIA brings together the extended versions of various papers selected from the 2018, 2019 and 2020 editions of the *Journées Francophones sur les Systèmes Multi-Agents (JFSMA)*.

Fueled by multidisciplinary, the multi-agent paradigm serves to provide a conceptual framework for studying and designing systems in which the overall dynamics result from autonomous entities – agents – interacting in a shared environment. Since 1993, the *Journées Francophones sur les Systèmes Multi-Agents (JFSMA)* has been uniting researchers who study, use, and contribute to this paradigm in order to address certain issues in fields related to computer science (artificial intelligence and life, software engineering, collective robotics, etc.) and the humanities and natural sciences (economy, sociology, ethology, etc.). JFSMA is thus a special scientific gathering where exchange and openness are the key objectives.

Customarily, each edition of JFSMA highlights a specific theme that authors are invited to consider with respect to their contributions. In 2018 the theme involved “distribution and decentralization”, in 2019 it focused on “distributed, embedded and diffuse systems” and in 2020 it concerned “multi-agent architectures for simulating complex systems”. Instead of being arranged by year, however, the articles in this special issue are organized according to three topics that are familiar to the JFSMA community: multi-agent simulation, cooperative models, and non-cooperative approaches.

The first four papers in this publication share the fact that they are centered on the use of multi-agent models for simulation. The article entitled “Self-organizing multi-agent model for foraging within a bee colony” by Jérémy Rivière et al. uses the multi-agent paradigm to simulate the foraging activity of bee colonies. They demonstrate the benefits that non-computer experts can glean from using agent-based models and their simulation in order to better understand and validate certain natural phenomena models. In “Force-based lateral behavior model of light-duty vehicles”, Julien Saunier proposes a new behavioral model for traffic simulation that specifically takes the cross-sectional profile of the road into account, thereby reproducing the lateral behavior of vehicles through a set of attractive and repulsive forces. The work of Jérémy Albuys-Perrois et al. entitled “A study of different configurations of collective self-consumption of energy on a district level and using multi-agent simulation” presents a multi-level, multi-agent approach for studying energy consumption. The authors illustrate the capabilities of MAS when it comes to modeling, simulating and studying various socio-technical phenomena. Concluding this section on multi-agent simulation, the article by Mathieu

Bourgais et al. entitled “BEN: An architecture for cognitive, affective and social agents within a simulation” proffers an architecture for social simulation that integrates both affective and social dimensions, coupled with a decision-making mechanism based on a BDI-type architecture.

The next four papers seek to define methods and algorithms for building collectives with a common goal via a cooperative approach. In “Synchronization policies in parallel distributed multi-agent systems”, Paul Breugnot et al. study the impact of synchronization on implementing models and on their execution. Through various experiments, the authors highlight the issues surrounding synchronization in MAS, and propose a generic synchronization interface for the FPMAS simulation platform. The second paper, furnished by Quentin Baert et al. and entitled “An adaptive multi-agent system for task reallocation within a MapReduce job”, presents a cooperative agent strategy for optimizing task scheduling within a MapReduce job. The extensive experimental work contained therein serves to demonstrate that the total execution time is significantly improved as compared to the conventional Hadoop process. In the third paper, submitted by Pierre Rust et al. and entitled “Resilience and self-repair of multi-agent decision processes – application to the self-configuration of intelligent environments”, the authors introduce the notion of the k -resilience of computational graphs in support of decisions implemented in systems with agent losses. The ability to repair constrained optimization processes is applied to the problem of the multi-agent coordination of objects in smart homes. The last paper, provided by Nicolas Gauville and François Charpillat, entitled “Local approach for the autonomous exploration of unknown environments by a fleet of robots”, addresses the issue of multi-robot mapping of unknown environments. The paper delivers a local decision-making version of the Brick-and-Mortar model exploiting environmental mapping, and compares it to conventional frontier-based exploration approaches.

Finally, the last two papers included in this special issue focus on situations in which agents confront potentially adversarial agents, called non-cooperative approaches. Cédric Buron et al., in “MoCaNA, an automated negotiation agent using Monte-Carlo tree search”, propose an agent approach equipped with methods for modeling the opponent's behavior that is capable of arbitrating in negotiation domains including discrete and continuous attributes, be they linear or non-linear, in a context where no deadline is specified, and that is motivated by applications such as factoring platforms. The paper by Gregory Bonnet et al. entitled “Confidentiality in Reputation Systems” focuses on reputation systems. In order to enable the dissemination of all customer testimonials without anonymizing them, the authors introduce a confidentiality-based approach in which user feedback is noisy and subject to certain time limits, thereby decorrelating the transactions from the dissemination of reviews.

In closing, we would like to extend our thanks to the members of the ROIA journal editorial board who assisted in proofreading and evaluating the aforementioned extended versions of those top papers selected from the 2018, 2019 and 2020 JFSMAs. Our appreciation also goes to the JFSMA committee members who participated in reviewing these extended versions:

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