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AAMAS 2011 Workshops
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Preface

The International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS) is without a doubt the most important conference in the area of agent research. Each year a number of workshops are organized in cooperation with AAMAS to discuss and present the latest results in more specialized areas. Some of these areas are big enough to warrant separate proceedings. However, certain workshops deal with very new or advanced topics and although they might be very successful they do not attract enough submissions to warrant separate proceedings. In this volume we bundle the papers from a number of these workshops.

I think we can rightfully state that the papers are of high quality and treat some of the new and advanced areas of research in agents. The workshops included are: Agent-based Modeling for PoLicy Engineering (AMPLE), Agent-Oriented Software Engineering (AOSE), Autonomous Robots and Multirobot Systems (ARMS), Data-Oriented Constructive Mining and Multi-Agent Simulation, Massively Multi-Agent Systems: Models, Methods and Tools ($DOCM^3AS$) and Infrastructures and Tools for Multiagent Systems (ITMAS). Revised versions of the papers are included for each of the workshops. Some papers that were presented at the workshops were consequently submitted (and accepted) at other conferences. From these papers a two-page abstract is included such that a complete overview of all workshops can be maintained. In subsequent sections each workshop will be briefly introduced and an introduction to the papers of the workshop will be given.

AMPLE

AMPLE was conceived as a workshop with particular focus on policy engineering as an application area for agent-based modeling. The goal of AMPLE is to connect agent and artificial society research on the one hand, with policy making, institutional analysis and tools like system dynamics and gaming on the other. We explore the benefits the combination could have for decision support in policy development, and for the further enrichment of agent-based modeling and simulation.

For the first AMPLE workshop at AAMAS 2011, we selected nine contributed papers, and invited Catholijn Jonker to give a talk at the start of the workshop. This talk very adequately set the stage for the rest of the day. It provided a number of central questions and a few statements on the main promises and challenges for agent-based modeling for policy engineering, which were illustrated with recent research experiences. These questions and statements served as threads throughout the workshop, to which everybody was able to connect their contribution.

We clustered the nine contributed papers around three themes: Methods, Culture and Policy Formulation. In the session on Methods, we collected the work on

influence mechanisms for information propagation presented by Andrew Wicker, a maritime customs simulation presented by Neil Yorke-Smith, and MAS as a decision support tool in the water rights market, presented by Pablo Noriega. The Culture session combined the contributions on distinguishing norm types in order to simulate compliance differences over different groups, presented by Francien Dechesne, on modeling culture in multi-agent organizations, presented by Alexis Morris, and on substantiating agent-based quality goals, presented by Sonja Pedell. The final session on Policy Formulation contained the work presented by Amineh Ghorbani on a framework for agent-based social simulation, and the work on agent-based motivation models, presented again by Sonja Pedell. An important and fruitful part of the workshop was an extended discussion session, for which we asked all speakers to prepare a statement on the main future perspectives and challenges for agent-based modeling for policy engineering. All in all, the participants agreed upon the joint conclusion that there are questions in policy making that require the fine granularity of agent-based modeling, but there is an important (and interesting!) challenge in developing evaluation methodologies. This has already proved to be material for new collaborations.

AOSE

Since the early 1990s, multi-agent system researchers have developed a large body of knowledge on the foundations and engineering principles for designing and developing agent-based systems. The 11 past editions of the Agent-Oriented Software Engineering Workshop (AOSE) had a key role in this endeavor. For 2011, the workshop organizers and the Steering Committee decided to organize a special edition of AOSE. In particular, the objective was to wrap up the previous editions of the workshop with a discussion of the state of the art in the key areas of AOSE, and based on that outline the future of the field. The aim was to find a way out of the increasing fragmentation and fuzziness on software engineering in AOSE.

The workshop program included invited papers complemented by accepted papers from the call for papers. Invited papers were presented by renowned researchers and engineers in different areas of the field, including agent-oriented methodologies, coordination infrastructures for multi-agent systems, programming agents and multi-agent systems, engineering multi-agent organizations, engineering self-organizing systems, and agents and services. In addition to the invited papers, the workshop received nine regular papers. In this volume, a selection of four revised papers is included. The papers cover various topics in the field, including agent architectures, inter-agent coordination, and work that focuses on reuse. The authors pay particular attention to challenges for future research and the position of their work in the broader field of agent-oriented software engineering and software engineering in general.

The organizers are sincerely grateful to Jorge J. Gómez Sanz and Ingrid Nunes for the support with organizing the workshop.

ARMS

Robots are agents, too. Indeed, agent researchers are sometimes inspired by robots, sometimes use robots in motivating examples, and sometimes make contributions to robotics. Both practical and analytical techniques in agent research influence, and are being influenced by, research into autonomous robots and multi-robot systems.

Despite the significant overlap between the multi-agent and robotics research areas, roboticists and agents researchers have only a few opportunities to meet and interact. The recently established robotics track at AAMAS is one such opportunity. The goal of the ARMS workshop is to extend and widen this opportunity, by offering a forum where researchers in this area of research can interact and present promising innovative research directions and new results. The workshop was coordinated and associated with the AAMAS robotics track.

For this year's call, special consideration was given to the coordination of autonomous mobile robots. Existing approaches such as motion planning (constructing conflict-free trajectories in space and time), route planning (e.g., based on reserving exclusive time slots), and designing traffic systems often originate from different fields of research; we believe all of these approaches can benefit from the cross-fertilization a workshop such as ARMS aims to achieve.

We received 14 submissions to the ARMS workshop, 12 of which were accepted; the authors of 11 submission decided to publish their papers in these joint proceedings. The wide range of topics covered by these contributions were treated in five sessions at the workshop. In the Human–Robot Interaction session, a paper by Hindriks et al. studied a robot with socio-cognitive interaction abilities in an interaction setting, while Sklar et al. considered how a team of robots, each with limited mobility and sensing capabilities, can work with a human operator in a dynamic environment. Finally, the paper by Scerri posed a challenge problem on flood disaster mitigation using multiple, unmanned surface vehicles (boats); if you join in the research, they may even send you a boat!

The Robot Perception session consisted of two contributions. Sadeh-Or and Kaminka presented an anytime version of the feature-matching algorithm SURF that aims to reduce the computation time for real-time vision-based tasks. In the paper by Agmon and Elmaliah, a robot tries to navigate an environment when it is unable to accurately determine its location, for instance, due to low-quality sensors. In the related session on Robot Exploration, Mesbah and Doshi considered the situation where not only a robot's own location is uncertain, but also the location of other, possibly non-cooperative robots. The authors generalize particle filtering, and employ behavioral models of other robots, to tackle the localization tasks. Finally, Keidar et al. developed frontier exploration methods that save computation time by processing only new readings, rather than the entire map, as is common in frontier-detection algorithms.

The session on Robots in Motion contained two papers on route planning through the use of reservations: robots reserve locations in space and time to avoid collisions, and to be able to find route plans that are optimal with regard to a set of existing reservations. Wang and Goh showed how their algorithm can

be applied in an interactive educational system in which cube-like mobile robots arrange themselves on a mat to assist children in spelling exercises. Callies et al. developed an approach in which agents negotiate over potential conflicts as late as possible, because future conflicts may be resolved as a by-product of earlier negotiation outcomes.

The final session of the workshop was on Multi-Robot Teamwork. In the paper by Cheng et al., robots employ Q-learning to learn both the formation and the size of a coalition in area coverage problems. Korsah et al. studied the problem of optimal assignment of spatially distributed tasks to multiple cooperative robots. An envisioned application domain is emergency response, in which patients need to be brought to a safe location, and medical personnel needs to be present to assist in the extraction and transportation.

DOCM^{3}AS

The primary aim of the DOCM^{3}AS workshop is to facilitate the collaboration among researchers on multi-agent simulation (MASim), data mining (DM), and massively multi-agent systems (MMAS). While MASim researchers have simulation and modeling technologies, DM researchers have analytical and knowledge-retrieval techniques. There is thus a complementary relationship between MASim and DM researches. Furthermore, MMAS technologies are fundamental for reproducing and generating mega-scale complex systems, such as human society, social systems, the Internet, and the WWW. Therefore, the ultimate goal of this workshop is to create a new multi-agent research area by synthesizing these different areas.

In fact, to understand mega-scale complex phenomena, technologies and methodologies for simulation, knowledge discovery, and computational modeling are required. Although MASim and MMAS researchers are good at working on the implementation of tools for multi-agent simulations and the design of computational models, they are not necessarily experts of knowledge discovery who can extract essentials of complex systems. On the other hand, DM researchers are technicians for knowledge discovery although, it is usually hard for them to actively analyze obtained knowledge through simulations. The challenge of DOCM^{3}AS is to create a bridge between multi-agent simulation and DM technologies, and subsequently find the best mix of MASim and DM technologies.

For the first workshop, we got seven submissions and selected five papers from these. Even in five papers, we could secure diversities of research topics, such as human behavior modeling, analysis of emergent organizational phenomena, and massive multi-agent simulations for practical issues. However, this is still not enough to develop a good combination among MAS and DM researches. We will continue to make an effort at accelerating new research activities.

ITMAS

ITMAS 2011 followed the success of its predecessor ITMAS 2010, which was the very first edition of ITMAS. ITMAS 2010 was held in conjunction with AAMAS 2010 in Toronto (Canada). ITMAS 2011 was again held in conjunction with AAMAS 2011, this time in Taipei (Taiwan).

ITMAS aims at bringing together leading researchers from both academia and industry to discuss issues on the design and implementation of infrastructures and tools for multi-agent systems. When developing applications based on multi-agent systems, developers and users demand infrastructures and tools which support essential features in multi-agent systems (such as agent organizations, mobility, etc.) and facilitate the system design, management, execution and evaluation. Agent infrastructures are usually built using other technologies such as grid systems, service-oriented architectures, P2P networks, etc. In this sense, the integration and inter-operability of such technologies in multi-agent systems is also a challenging issue in the area of both tools and infrastructures for multi-agent systems. A long-term goal is the industrial development of infrastructures for building highly scalable applications comprising pre-existing agents that must be organized or orchestrated.

In order for multi-agent systems to be included in real domains such as media and Internet, logistics, e-commerce and health care, infrastructures and tools for multi-agent systems should provide efficiency, scalability, security, management, monitoring and other features related to building real applications.

This year we had 17 submissions from which 9 were finally accepted. This confirms both the relevance and interest of the workshop. Moreover, all of the submissions received were of high quality. We had three papers describing works that integrate different existing technologies to support MAS (Frantz et al., Sensoy et al., and Such et al.); two papers describing infrastructures and tools that support normative MAS (Criado et al., and Oh et al.); two papers describing infrastructures and tools for MAS with adaptive capabilities (Alberola et al., and Centeno et al.); Laclavik et al. presented an evaluation of agent platforms for the simulation of human behavior modeling; and finally, Sensoy presented an architecture based on evolving semantics for agent-based collaborative search.

October 2011

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