

Preface to the International Workshop on Artificial Intelligence for Climate Change, Italian Workshop on Planning and Scheduling, RCRA Workshop on Experimental evaluation of algorithms for solving problems with combinatorial explosion, and SPIRIT Workshop on Strategies, Prediction, Interaction, and Reasoning in Italy (AI4CC-IPS-RCRA-SPIRIT 2024)

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This volume contains the papers presented at AI4CC 2024 (1st International Workshop on Artificial Intelligence for Climate Change <https://ai4cc-2024.unibs.it/>), IPS 2024 (12th Italian Workshop on Planning and Scheduling <http://ips2024.unibs.it>), RCRA 2024 (31st RCRA workshop on Experimental evaluation of algorithms for solving problems with combinatorial explosion <https://rcra2024.wordpress.com>) and SPIRIT 2024 (Workshop on Strategies, Prediction, Interaction, and Reasoning in Italy <https://sites.google.com/view/spirit2024/>) Workshops, held within the XXIII Conference of the Italian Association for Artificial Intelligence (AI*IA 2024), November 26-28th, 2024.

AI4CC is a workshop focused on the intersection of Artificial Intelligence (AI) and Climate Change, aiming to bring together researchers from both fields. The workshop highlights the diverse ways AI and machine learning can contribute to climate change mitigation and adaptation, as well as advance climate science in sectors such as energy, agriculture, forestry, climate modeling, and disaster response. Recognizing the nuanced relationship between AI and climate action, the workshop emphasizes the importance of using AI responsibly, ensuring that its impact on climate action is measurable and positive. AI4CC seeks to foster collaboration among AI experts and climate change specialists from around the world, encouraging both established researchers and newcomers to engage with the community. Moreover, we also had an invited talk by Prof. Roberto Ranzi and Hai Yen Nguyen on “Multi-Purpose Reservoir Optimization using Genetic Algorithms for the Hoa Binh Reservoir, Viet Nam”.

The 2024 edition of AI4CC accepted papers focusing on applications of AI in environmental and agricultural domains. The workshop covered topics such as spatial, temporal, and spatio-temporal explanations for water table depth forecasting [12], deep learning for land cover segmentation using aerial datasets in agricultural regions [13], and assessing the impact of climate change on mineral-associated organic carbon using machine learning models [14]. Additionally, the workshop explored machine learning models for analyzing urban heat islands and approaches for mitigation [15]. Further contributions included AI planning models applied to water resource management [1], as well as optimization models for managing reservoir systems [2], and AI techniques in hydrology, with a focus on machine learning for predicting water inflows in lakes [3].

The aim of the IPS series of workshops is to bring together researchers interested in different aspects of planning and scheduling, and to introduce new researchers to the community. Al-

though the primary target of this workshop is the Italian community of planning and scheduling, over the past years IPS [16, 17, 18] has attracted an international gathering, fostering contributions and participation from around the world. In particular, this year, 10 papers were accepted for presentation at the workshop, involving different authors from Italy and other International countries. Moreover, we also had an invited talk by Prof. Mauro Vallati on “A Decade of Planning-based Urban Traffic Control: What did We Learn and Where Are We Going?”.

The accepted papers at IPS 2024 address a variety of topics, such as Natural Language Processing and Integration with Planning Systems [19], Automated Planning for Digital System Design [20], Production Systems and Model-Based Planning [21], Optimization in Healthcare Planning [22], handling numeric and metric time constraints in PDDL3 for more efficient planning [4], and deploying PDDL+ models for traffic signal optimization to enhance urban traffic management [6]

The scope of the RCRA workshop is, instead, fostering the cross-fertilisation of ideas stemming from different areas, proposing benchmarks for new challenging problems, comparing models and algorithms from an experimental viewpoint, and, in general, comparing different approaches with respect to efficiency, problem modelling, and ease of development. In particular, this year 8 original papers were accepted for presentation at the workshop, involving different authors from Italy and other European countries.

The 2024 edition of RCRA accepted papers considering a wide range of combinatorial problems. In particular, the workshop featured works on many-valued temporal logics [23], stronger integration techniques for combinatorial problems [24], and applications of Answer Set Programming to scheduling problems in digital health [25]. Additional topics included automata-based LTL satisfiability checking [26], distributed architectures for efficient robotic agents [27], and translating requirements using large language models for property specification patterns [28]. The workshop also explored anomaly recognition with trustworthy neural networks [29], as well as information flow analysis during constraint satisfaction search [30], defeasible reasoning with prototype descriptions to create new preference orders [9], enhancing GPT-based planning policies with model-based plan validation for more robust planning solutions [8], and LTLf bounded satisfiability in ASP for logic programming [7].

The scope of the SPIRIT workshop is gathering the scientific communities on artificial intelligence, machine learning, theoretical computer science, multi-agent systems, and microeconomics to promote their integration and contamination. Over the past fifteen years, researchers in artificial intelligence, machine learning, theoretical computer science, multi-agent systems, and microeconomics have joined forces to tackle problems involving incentives and computation. Interestingly, while microeconomics provides computer science with the basic models, computer science raises crucial questions related to computation and learning that suggest the study of new models. The result is a synergic integration of all these fields. Interestingly, the final goal is the provision of rigorous, theoretically-proved methods to deal with multiple strategic players. In the last years, these topics have been central in the Artificial and Machine Learning venues. This year, 10 papers were accepted for presentation at the workshop. We also had invited talks by Luca Moscardelli on “Individually Stable Dynamics in Coalition Formation over Graphs” and Nicolas Troquard on “Strategizing in environments with common-pool resources”.

SPIRIT 2024 accepted papers mainly focused on the development of natural strategies in strategic logics [31], mitigating disagreement and polarization in opinion formation on social networks [32], strategic reasoning for smart contracts in the BitML framework [33], compositional and user-friendly tools for multi-agent systems verification [34], situation calculus for generalized planning [35], temporal (non-)paradox [36], and reasoning about real-time and probability in obstruction logic [37].

As a final remark, the program co-chairs would like to thank all the members of the Program Committees (listed below), as well as the organizers of the AI*IA 2024 Conference.

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