

Lecture Notes in Artificial Intelligence

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AIxIA 2021 – Advances in Artificial Intelligence


20th International Conference
of the Italian Association for Artificial Intelligence
Virtual Event, December 1–3, 2021
Revised Selected Papers

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Preface

The 20th International Conference of the Italian Association for Artificial Intelligence (AIxIA 2021), held during November 29 – December 3, 2021, was organized by the Associazione Italiana per l’Intelligenza Artificiale (AIxIA), a non-profit scientific association founded in 1998 fostering artificial intelligence (AI) through academic, social, and production environments. The association aims at increasing the public awareness of AI, encouraging teaching, and promoting advanced research in the field.

AIxIA 2021 (<https://aixia2021.disco.unimib.it/home-page>) featured a main track and a set of 12 thematic workshops, grouping the communities working on various research areas of the field. Keynote speakers, award events, and open satellite events completed the conference. Two invited keynote speakers kindly gave their lectures at the conference: Evelina Fedorenko (Massachusetts Institute of Technology, USA) addressed “The language system in the human brain” and Pascal Hitzler (Kansas State University, USA) spoke about “Neuro-Symbolic Deep Deductive Reasoning”.

The main track hosted a set of sessions focusing on planning and strategies; constraints and logic programming; knowledge representation, reasoning, and learning; natural language processing; AI for content and social media analysis; signal processing: images, videos, and speech; machine learning for argumentation, explanation, and exploration; machine learning and applications; and AI and applications.

The conference received 58 submissions, and each paper was reviewed by at least two Program Committee members in a single blind review process. In total, 47 papers were selected, of which 36 are included in this volume and 11 in a separate Discussion Papers publication.

AIxIA 2021 also covered many aspects of theoretical and applied AI through a series of workshops dedicated to specific topics and grouping the related AI communities:

- 5th Workshop on Advances in Argumentation in Artificial Intelligence (AI³ 2021)
- 10th Italian Workshop on Machine Learning and Data Mining (MLDM 2021)
- 5th Workshop on Natural Language for Artificial Intelligence (NL4AI 2021)
- Towards smarter health care: can Artificial Intelligence help? (SMARTERCARE 2021)
- 2nd Italian Workshop on Artificial Intelligence for an Ageing Society (AIxAS 2021)
- 28th RCRA International Workshop on Experimental Evaluation of Algorithms for Solving Problems with Combinatorial Explosion (RCRA 2021)
- 1st International Workshop on Causality (Causal-ITALY 2021)
- 2nd Italian Workshop on Explainable Artificial Intelligence (XAI.it 2021)
- 2nd Workshop on Evolutionary and Population-based Optimization (WEPO 2021)
- 9th Italian Workshop on Planning and Scheduling (IPS 2021)
- Italian Workshop on Artificial Intelligence and Applications for Business and Industry (AIABI 2021)
- 8th Italian Workshop on Artificial Intelligence and Robotics (AIRO 2021)

The workshop proceedings are published independently; however, 12 papers selected from the workshops are also included in this volume; following the original (single blind) reviewing and selection process adopted by the workshops, these papers have been further revised and extended. The additional papers have been included together with the papers from the main conference in the relevant sections.

To cater for the growing interest in AI and its applications, the conference hosted four open events for the general public (in Italian):

- Intelligenza Artificiale per lo Sviluppo Sostenibile (Chair: Piero Poccianti)
- Intelligenza Artificiale e impatti di genere: una questione urgente (Chair: Chiara Lupi)
- Il rilievo politico dell’Intelligenza Artificiale (Chair: Francesco Varanini)
- Intelligenza Artificiale: quali benefici per l’Area delle Risorse Umane? (Chair: ASSINTEL)

As is the tradition of AIxIA, the conference hosted the presentations of the winners of three awards, whose selection was coordinated by Stefania Costantini: Elena Bellodi and Riccardo Guidotti received the “Marco Somalvico” young researchers award; Alberto Maria Metelli received the “Marco Cadoli” PhD award; and Giorgio Franceschelli received the “Leonardo Lesmo” MS award.

We would like to thank all individuals, institutions, and sponsors that supported AIxIA 2021: the Artificial Intelligence Journal for the “Funding Opportunities for Promoting AI Research” program; the European Commission (DG CNECT - DG for Communications Networks, Content and Technology); the Department of Informatics, Systems and Communication (University of Milano-Bicocca) for the website hosting; and Angelo Ferrando (University of Genoa) for his collaboration and assistance with the website. We thank all the authors for submitting high-quality research papers and the reviewers for their contribution in the selection of the papers. We are also indebted to the workshop coordination chairs (Fabio Stella, Gabriella Cortellessa, and Silvia Rossi), the members of the workshop program committees, and the additional reviewers that spent their valuable time providing careful reviews and recommendations. A special acknowledgement goes to Daniela Briola, Stefano Ferilli, and Marta Giltri for their indispensable support to the organization of the whole event. Finally, a special thanks to Piero Poccianti, the President of the AIxIA, for his constant effort in supporting this event and the association activities.

April 2022

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