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Preface

The International Conference on Artificial Neural Networks has entered this year its fourth decade. After two years of disturbance the conference has returned in a hybrid mode with delegates attending on site and remotely via an immersive online space. In 2022 the 31st ICANN was organized under the auspices of the European Neural Networks Society (ENNS) and hosted by the University of the West of England, in Bristol, United Kingdom.

The event attracted a large number and wide range of new and established researchers from five continents and 27 countries in total. The delegates came from Australia, Belgium, Brazil, Canada, China, Czech Republic, Egypt, Finland, France, Germany, Greece, India, Israel, Italy, Japan, Mexico, Morocco, New Zealand, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland, Turkey, UK, and USA.

The research themes explored all innovative pathways in the wider area of Neural Networks and Machine Learning. There were 561 papers submitted. These were reviewed by at least two reviewers with the average number of reviews being 3 per paper. The quality of the submitted work was very high and the program committee chairs had the challenge and delight to be able to select 259 papers in total to be presented orally at the conference. These papers are included in the four volumes of these proceedings. Out of the selected papers, 255 were regular papers, with an additional four submissions accepted for presentation as extended abstracts. These, despite their short length, represent future concepts that promise very high quality research outputs, and the program committee agreed to offer the authors the opportunity to share their ideas with the delegates of the conference.

The papers included in these four volumes of the Lecture Notes in Computer Science series addressed a variety of topics, representing a wide breadth of research, not just in the area of Artificial Neural Networks but in related AI topics themes too: Deep Learning, Neural Network Theory, Neural Network Models, Recurrent Networks, Reinforcement Learning, Natural Language Processing, Generative Models, Graphical Models, Supervised Learning, Image Processing, CNN, Evolutionary Neural Networks, Unsupervised NN, Relational Learning, Image Processing, Recommender Systems, and Features Based Learning.

The conference delegates benefited from the inspiring keynote speeches by four distinguished invited speakers, details of which are given below.

Agnieszka Wykowska leads the unit Social Cognition in Human-Robot Interaction at the Italian Institute of Technology, Genoa, Italy. Her background is cognitive neuroscience with a Ph.D. in psychology from Ludwig Maximilian University Munich. In 2016 she was awarded an ERC Starting grant for InStance: Intentional Stance for Social Attunement, which addresses the question of attribution of intentionality to robots. She is Editor-in-Chief of the International Journal of Social Robotics. She is the President of the European Society for Cognitive and Affective Neuroscience (ESCAN). She is a delegate to the European Research Area (ERA) Forum, and a member of ELLIS (European Lab for Learning and Intelligent Systems). Her research

bridges psychology, cognitive neuroscience, robotics and healthcare. Among other work her team develops robot-assisted training protocols to help children diagnosed with autism-spectrum disorder improve social skills.

Věra Kůrková is a senior scientist in the Institute of Computer Science of the Czech Academy of Sciences. She received a Ph.D. in mathematics from Charles University, Prague, and a Dr. Sc. in theoretical computer science from the Czech Academy of Sciences, from which she received the Bolzano Medal for her contribution to mathematical sciences. Her main interests are the mathematical theory of neurocomputing and machine learning. She has served as president of the European Neural Network Society (ENNS), and she is a member of the editorial boards of the journals Neural Networks, Neural Processing Letters, and Applied and Computational Harmonic Analysis. She has been involved in the organization of many conferences, among them ICANN 2008 and 2001.

The Anh Han is a professor of Computer Science and head of the Centre for Digital Innovation, Teesside University. His research covers several topics in AI and interdisciplinary research, including evolutionary game theory, behavioural and cognitive modelling, agent-based simulations, knowledge representation and reasoning, and AI safety. He has published over 100 peer-reviewed articles in top-tier conferences (AAAI, IJCAI, AAMAS) and journals. He regularly serves in the program committees of top-tier AI conferences, and he is on the editorial boards of several journals (Adaptive Behavior, PLOS One, Frontiers in AI and Robotics, Entropy). He has been awarded prestigious research fellowships and grants from the Future of Life Institute, the Leverhulme Trust Foundation, and FWO Belgium.

Lyndon Smith is a professor in the Centre for Machine Vision, University of the West of England, Bristol. He has over 28 years of research experience in the field of Computer Simulation and Machine Vision, with particular emphasis on 3D analysis of complex surface textures and object morphologies. A strong area of ongoing research is the development of deep learning for vision-based solutions for complex problems, the automation of which had been previously considered intractable. This is leading to strong industrial impact in a number of sectors.

September 2022

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