

Preface: The 27th AIAI Irish Conference on Artificial Intelligence and Cognitive Science (AICS 2019)

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Abstract. The 27th AIAI Irish Conference on Artificial Intelligence and Cognitive Science (AICS) is hosted by NUI Galway on behalf of AIAI, the Artificial Intelligence Association of Ireland, on the 5th and 6th of December 2019. AICS 2019 features 23 presentations, 24 posters, and 2 keynote presentations. Papers cover topics including: Deep Learning and AI techniques for Sustainable Agricultural Practices, Human Activity Recognition, Traffic Management, Skin Cancer Classification, Quantification of Knee Osteoarthritis Severity, Epidemic Spread, Music Scores, and AI Social and Ethical Considerations.

Keywords: Artificial Intelligence, Machine Learning, Cognitive Science, Ireland, Conference, AICS

1 Introduction

In 2019 the 27th Irish Conference on Artificial Intelligence and Cognitive Science is hosted by the NUI Galway Data Science Institute and the School of Computer Science. AICS will take place at the Institute for Lifecourse and Society (ILAS) on the NUIG Campus, from 5-6th December 2019. While once a niche area, the fields of Cognitive Science and Artificial Intelligence, which encompass Data Analytics, Information Retrieval, and Machine Learning, are now at the forefront of Irish computing research and industry. The theme of this year's conference is "AI and Cognitive Science Applications for Sustainability." AI-driven solutions to tackling the climate crisis require us to bring together the researchers from multiple disciplines and to engage citizens and industry in collective solutions.

We have witnessed significant progress in the mainstreaming of AI over the last twelve months. For instance, the United Nations (UN) through its AI for Good platform is building a global coalition for harnessing AI in accelerating

progress towards meeting the Sustainable Development Goals and building the necessary institutional capacities to scale AI deployments. To guide these developments, guidelines for ethical deployment of AI have been published this year by the European Union [1] and China.

Despite these positive developments for AI, several challenges remain. The AICS 2019 conference takes place at a critical time in the development of research and innovation policy for AI within Ireland and Europe. In Ireland, these challenges are being addressed through mechanisms such as the National Strategy on AI being developed and the Disruptive Technologies Innovation Fund designed to foster academia-industry collaboration. At the European-level, Industry and the European Commission are developing a proposal for an AI, Data, and Robotics Public-Private Partnership [2] to boost European industrial competitiveness and lead the world in developing and deploying value-driven trustworthy AI based on fundamental European rights, principles, and values. Members of the Irish AI community are actively leading and contributing to these critical challenges, and the discussions over the next two days will move the AI agenda forward at both National and European levels.

The AICS 2019 programme 23 presentations and 24 posters with submissions from all Universities on the Island of Ireland, Institutes of Technology, Industry (i.e., UTRC, Jaguar Land Rover), and State Agencies (i.e., Teagasc). The topics of the presentations and posters reflect the wide range of world leading artificial intelligence and cognitive science research undertaken in Ireland. Papers cover topics including: Deep Learning and AI techniques for Sustainable Agricultural Practices, Human Activity Recognition, Traffic Management, Skin Cancer Classification, Quantification of Knee Osteoarthritis Severity, Control of Epidemic Spread, and Identifying Sub-genres in Music Scores. AI Social and Ethical Considerations are also discussed.

2 The Main Themes of AICS 2019

We are particularly delighted to have two keynote speakers, namely Heiko Paulheim (University of Mannheim, Germany) and Barak Pearlmutter (Maynooth University, Ireland). Heiko Paulheim’s keynote addresses techniques for the extraction of knowledge graphs from Wikipedia and other Wikis. Barak Pearlmutter’s talk explores how we can make complex systems adaptive using differentiable programming.

The primary themes that emerged from the successful submissions to this year’s conference include AI and Cognitive Science research on Numerical Reasoning and Algorithms, Big Data and Machine Learning, Deep Learning, AI and Reasoning, Understanding Data, and Speech, Video and Language processing. These themes are reflected in the conference thematic sessions.

Papers in the thematic session on Numerical Reasoning and Algorithms include multi-class classification using Kalman filters by Pakrashi & Mac Namee, as well as papers on a new software tool to automatically build dynamic bayesian

networks by Ajmal et al., and on the validity of Bayesian Neural Networks by Mitros & Mac Namee. The paper by McDermott offers a novel view of the real meaning of No Free Lunch Theorem.

The Big Data and Machine Learning theme focuses on AI developments in dealing with data that include identifying sub-genres in music scores by Shingte and d’Aquin, ethical issues around the development of conversational agents are considered by Ruane et al., while stochasticity in biological ODE models are discussed by Ajmal et al.

Papers on the theme of Deep Learning include human activity recognition, sustainable agricultural practices and advanced methodologies for skin cancer classification by Browne et al., Pereira et al., and Farooq et al. An approach to autonomous road segmentation using deconvolutional pixel layers are discussed by Wahid and Ali.

Papers on Reasoning Applications include AI applications to control epidemics via Reinforcement Learning by Yanez et al., Affective Computing by Furey & Blue, and a study on the memorability of deep features extracted from the embedding models by Keany and McDermott.

Further developments in Understanding Data are described in papers on time series analysis of cryptocurrency commodities, topic-based corpus comparison technique and comparative modelling based on data and images by Barry & Crane, Lu et al., and Abedin et al. The performance of word and sentence embedding models are discussed by Queiroz et al.

The Speech, Video, and Language processing session includes papers on text classification methods and machine translation by Le et al., and Masoud et al. The effect of audio-visual mismatch on the sensory integration in a VR context are discussed by Siddig et al. A statistical analysis of authors’ roles in contributions sections, and a way to extract this information from sections are considered in a paper by Tkaczyk et al.

3 AICS 2019 in Numbers

We received 58 submissions describing new research for AICS 2019 from a large number of Irish universities, institutes of technology, and companies as well as international institutions. The list of Irish institutions includes:

- Cork Institute of Technology (CIT)
- Dublin City University (DCU)
- Limerick Institute of Technology (LIT)
- Maynooth University
- National College of Ireland (NCI)
- National University of Ireland, Galway (NUIG)
- Queen’s University Belfast (QUB)
- Teagasc
- Technological University Dublin (TUD)

- TopQuadrant
- Trinity College Dublin (TCD)
- Ulster University (UU)
- University College Cork (UCC)
- University College Dublin (UCD)
- University of Limerick (UL)
- United Technologies Research Centre (UTRC)
- Jaguar Land Rover

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