

Special Session on Breaking the Frontier Between Artificial and Natural Intelligent Systems - X-FANIS 2018

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Organizer : NYMT

Venue :

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Special Session on Breaking the Frontier Between Artificial and Natural Intelligent Systems - X-FANIS 2018

16 - 18 January, 2018 - Funchal, Madeira, Portugal

Within the 10th International Conference on Agents and Artificial Intelligence - ICAART 2018

AIRS

▣ **Ulrico Celentano**

University of Oulu

Finland

Brief Bio

Ulrico Celentano holds a doctoral degree in technology from the University of Oulu, Finland, and a dott.ing. degree in electronics engineering from the University of Florence, Italy. He is a research doctor at the Faculty of Information Technology and Electrical Engineering, University of Oulu, where he has been studying adaptive systems and artificial interacting cognitive entities. He is with the Biomimetics and Intelligent Systems Group (BISG). In addition to publications, he holds five granted patents. His present research interests include networked artificial cognitive

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systems, human cognition and the social interaction of the above, along with systems modelling, system architecture and dependable systems.

▫ **Juha Röning**

University of Oulu
Finland

Brief Bio

Juha Röning is the head of the Biomimetics and Intelligent Systems Group (BISG) research unit and a professor in the Faculty of Information Technology and Electrical Engineering at the University of Oulu, Finland. He obtained a PhD and a licentiate, with honors, in technology, and an MS, with honors, in engineering, all from the University of Oulu. He holds two patents and has published more than 300 papers in the areas of computer vision, robotics, intelligent signal analysis, and software security. He has more than 30 years of experience in mobile robotics. He was a founding member to FP7 NoE European Robotics Research Network EURON, FP7 euRathlon, the SPARC robotics PPP, and is a member of the board of directors of euRobotics aisbl. He is a Fellow of SPIE, a member of IEEE and the International Society for Computers and Their Applications. His research interests include data mining, intelligent systems, mobile robots, and software security.

SCOPE

Intelligent interaction among natural organisms and artificial entities dates back to the first half of last century. This interaction has been since then mostly at a larger dimensional scale. More recent developments in neuroscience and biology are opening up plenty of new opportunities. Relations between natural and artificial domains include 1) biomimetics (learning from nature), and 2) interwork between these domains. Current technology makes it possible at micro and even nanoscale, down to DNA. In both cases, it is crucial to facilitate information transfer to natural and AI systems. This special session seeks contributions on either the two above approaches, where both natural and artificial intelligent properties (broadly conceived) are concurrently within the scope, although not necessarily with equal importance.

TOPICS:

- Biomimetics
- Heterogeneous multi-agent systems
- Interwork of human cognition and technology (e.g. virtual reality, human-brain interfaces, etc.)
- Technology-guided biological processes
- Heterogeneous interaction at different scale (e.g., human-robot, technology-cell, etc.).

Important Dates

Conference

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Regular Papers

Paper Submission: September 5, 2017 (extended)

Authors Notification: October 16, 2017

Camera Ready and Registration: October 30, 2017

Position Papers

Paper Submission: September 29, 2017

Authors Notification: November 7, 2017

Camera Ready and Registration: November 20, 2017

Workshops

Workshop Proposal: August 31, 2017

Doctoral Consortium

Paper Submission: November 9, 2017

Authors Notification: November 22, 2017

Camera Ready and Registration: December 5, 2017

Special Sessions

Special Session Proposal: August 31, 2017

Paper Submission: November 7, 2017

Authors Notification: November 21, 2017

Camera Ready and Registration: November 29, 2017

Tutorials

Tutorial Proposal: November 24, 2017

Demos

Demo Proposal: November 24, 2017

Panels

Panel Proposal: November 24, 2017

Open Communications

Paper Submission: November 9, 2017

Authors Notification: November 22, 2017

Camera Ready and Registration: December 5, 2017

European Project Spaces

Paper Submission: November 21, 2017

Authors Notification: November 29, 2017

Camera Ready and Registration: April 10, 2018

Keynote Lectures

Agent-based Models for Language Adaptation and Change

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Luc Steels, ICREA, Institute of Evolutionary Biology (UPF-CSIC) Barcelona, Spain

Accountability, Responsibility, Transparency: the ART of AI
Virginia Dignum, Delft University of Technology, Netherlands

Reading Agents that Hunger for Knowledge
Eduard Hovy, Carnegie Mellon University, United States

To be announced soon.
Luís Antunes, Universidade de Lisboa, Portugal

Agent-based Models for Language Adaptation and Change

Luc Steels

ICREA, Institute of Evolutionary Biology (UPF-CSIC) Barcelona
Spain

Brief Bio

Luc Steels is currently an ICREA research fellow at the Institute for Evolutionary Biology (UPF-CSIC) in Barcelona. He studied computer science at MIT (US) and returned to Europe in 1983 as a professor of Artificial Intelligence (AI) at the University of Brussels (VUB). He founded the VUB AI Lab at the same time. Over the past three decades, this laboratory has been at the forefront of AI research. In the eighties it focused on the domains of knowledge representation and expert systems. In the nineties the focus shifted to the application of complex systems to AI (particularly neural networks and genetic algorithms) as well as behavior-based robotics. In 1996 Steels founded the Sony Computer Science Laboratory in Paris. This laboratory is particularly active in three domains: (i) technologies for addressing issues in sustainability, (ii) AI based music creation, and (iii) constructional language processing. Steels is currently an ICREA fellow in Barcelona where he pursues his interests in modeling language evolution, more concretely, how autonomous robotic agents could develop their own language and ontologies in situated embodied interactions.

Luc Steels gives about a dozen talks per year in various fora, ranging from public talks for a wide audience to workshop and conference contributions. He has also produced a series for educational television, as well as written and edited a dozen books on various topics in AI. Google Scholar lists 300 publications in journals and conferences with a Google Scholar H-index of 66. His work is also regularly featured in the media, such as in broadcasts of the BBC (Horizon) and Discovery Channel (US).

Apart from his scientific activities, Luc Steels explores also the arts. He co-authored a play about the Russian mathematician Sonya Kowalevskaya which premiered at the French Avignon
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Theatre Festival in 2005 and at the French National Theatre (Chaillot) in 2006. He has also participated in exhibitions at the Musee d'art Moderne in Paris, the Venice Biennale, the Aachener Kunstverein, the Whitney Biennale, and other venues. Together with the neuroscientist Oscar Vilarroya, he created an opera about a humanoid robot Casparo which premiered at IJCAI 2011 in Barcelona, and was then performed in Brussels, Paris, Leuven (Belgium) and Tokyo. His second opera Fausto premiered at the Monnaie Brussels opera house in september 2017.

Abstract

Human natural languages and the conceptual frameworks underlying them are profoundly changing, not just for lexicon or phonology but also for grammar and semantics. Languages thus adapt their expressive power to changing needs of their language communities. They change because of fashions and new communication media (such as texting or twitter). They change also because there is no ideal solution to verbal communication so that a community will continue to navigate in a multi-criterion landscape trying to increase communicative success and decrease cognitive effort for one area while increasing complexity for another.

I will argue that it is worthwhile to try and model language as a complex adaptive systems, both from the viewpoint of linguistic theory, which has so far failed to come up with adequate explanations for this phenomenon, and from the viewpoint of AI because this challenge pushes us to develop new formalisms for grammar, new language processing mechanisms that are more flexible than currently standard parsers and producers, new learning mechanisms that not only focus on parsing but also on producing in interaction.

The talk will be illustrated with videoclips of our experiments with humanoid robots playing language games.

The agents are initialized with no or very limited forms of language and then develop grammars and lexicons in order to be successful in their language games.

Accountability, Responsibility, Transparency: the ART of AI

□ **Virginia Dignum**

Delft University of Technology
Netherlands

Brief Bio

Virginia Dignum is Associate Professor on Social Artificial Intelligence at the Faculty of Technology Policy and Management at TU Delft. Her research focuses on value-sensitive design of intelligent systems and multi-agent organisations, in particular on the ethical and societal

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impact of AI. She is Executive Director of the Delft Design for Values Institute, secretary of the International Foundation for Autonomous Agents and Multi-agent Systems (IFAAMAS), member of the Executive Committee of the IEEE Initiative on Ethics of Autonomous Systems. She was co-chair of ECAI2016, the European Conference on AI, and vice president of the BNVKI (Benelux AI Association).

Abstract

As robots and other AI systems move from being a tool to being teammates, and are increasingly making decisions that directly affect society, many questions raise across social, economic, political, technological, legal, ethical and philosophical issues. Can machines make moral decisions? Should artificial systems ever be treated as ethical entities? What are the legal and ethical consequences of human enhancement technologies, or cyber-genetic technologies? What are the consequences of extended government, corporate, and other organisational access to knowledge and predictions concerning citizen behaviour? How can moral, societal and legal values be part of the design process? How and when should governments and the general public intervene?

Answering these and related questions requires a whole new understanding of Ethics with respect to control and autonomy, in the changing socio-technical reality. Means are needed to integrate moral, societal and legal values with technological developments in Artificial Intelligence, both within the design process as well as part of the deliberation algorithms employed by these systems. In this talk I discuss leading Ethics theories and propose alternative ways to model ethical reasoning and discuss their consequences to the design of robots and softbots. Depending on the level of autonomy and social awareness of AI systems, different methods for ethical reasoning are needed. Given that ethics are dependent on the sociocultural context and are often only implicit in deliberation processes, methodologies are needed to elicit the values held by designers and stakeholders, and to make these explicit can lead to better understanding and trust on artificial autonomous systems.

The urgency of these issues is acknowledged by researchers and policy makers alike. Methodologies are needed to ensure ethical design of AI systems, including means to ensure accountability, responsibility and transparency (ART) in system design.

Reading Agents that Hunger for Knowledge

□ **Eduard Hovy**
Carnegie Mellon University
United States

Brief Bio

Eduard Hovy is a professor at the Language Technology Institute in the School of Computer Science at Carnegie Mellon University. He holds adjunct professorships at universities in the US, China, and Canada, and is co-Director of Research for the DHS Center for Command, Control, and Interoperability Data Analytics, a distributed cooperation of 17 universities. Dr. Hovy completed a Ph.D. in Computer Science (Artificial Intelligence) at Yale University in 1987, and was awarded honorary doctorates from the National Distance Education University (UNED) in Madrid in 2013 and the University of Antwerp in 2015. He is one of the initial 17 Fellows of the Association for Computational Linguistics (ACL) and also a Fellow of the Association for the Advancement of Artificial Intelligence (AAAI). From 1989 to 2012 he directed the Human Language Technology Group at the Information Sciences Institute of the University of Southern California. Dr. Hovy's research addresses several areas in Natural Language Processing, including machine reading of text, question answering, information extraction, automated text summarization, the semi-automated construction of large lexicons and ontologies, and machine translation. His contributions include the co-development of the ROUGE text summarization evaluation method, the BLANC coreference evaluation method, the Omega ontology, the Webclopedia QA Typology, the FEMTI machine translation evaluation classification, the DAP text harvesting method, the OntoNotes corpus, and a model of Structured Distributional Semantics. In November 2016 his Google h-index was 67. Dr. Hovy is the author or co-editor of six books and over 400 technical articles and is a popular invited speaker. In 2001 Dr. Hovy served as President of the ACL, in 2001–03 as President of the International Association of Machine Translation (IAMT), and in 2010–11 as President of the Digital Government Society. Dr. Hovy regularly co-teaches courses and serves on Advisory Boards for institutes and funding organizations in Germany, Italy, Netherlands, and the USA.

Abstract

True intelligent agenthood (as opposed to mere agency) is characterized by self-driven internal goal creation and prioritization. Few AI systems enjoy the freedom today to autonomously decide what to do next; even robots and planning systems start with a fairly concrete goal and stop acting when they have achieved it. In a small experimental project at CMU we have been exploring what it might mean for a Natural Language text reading engine to experience a 'hunger for knowledge' that drives what it chooses to read and learn about next, in an ongoing manner. There is no overall goal other than trying to increase its understanding (coverage and interpretations) of the world as described in Wikipedia. The starting point is a sketchy representation of the Infoboxes of all the people listed in Wikipedia, and the principal criterion for choosing what to read about next is the desire to minimize knowledge gaps and remove inconsistencies. In contrast to Freebase, Knowledge Graphs, and other text mining projects, internal generalization is central to our work. To implement the system we combine traditional AI frame proposition representation for the basic information (to make it readable by humans) with neural networks such as autoencoders to perform generalization and anomaly detection.

□ **Luís Antunes**

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Universidade de Lisboa
Portugal

Brief Bio

Mr. Luis Antunes holds a PhD in Computer Science from University of Lisbon (2001). He has been a researcher in Artificial Intelligence since 1988 and published more than 80 refereed scientific papers. He was the founder and first director of the Group of Studies in Social Simulation (GUESS). Luis Antunes is on the Program Committee of some of the most important international conferences on Artificial Intelligence, Multi-Agent Systems and Social Simulation, such as AAMAS, ECAI, ESSA, WCSS and MABS. He was co-chair of the international workshops MABS'05, MABS'06, MABS'07 on Multi-Agent-Based Simulation, and co-editor of the Springer-Verlag proceedings volumes. He is or was a member of the MABS Steering Committee, of EUMAS Advisory Board, member of ESSA Management Committee and of APPIA (Portuguese Association for AI) board of directors. Antunes hosted EUMAS 2006 and AAMAS 2008, and ECAI 2010 as chair of the organising committee. He was the proponent and a co-chair of the first IJCAI workshop on Social Simulation (SS@IJCAI 2009), and the founder of the first Portuguese Workshop on Social Simulation as a Special Track of EPIA, and the Program Chair of EPIA 2011.

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