AI Matters

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E **The NY AI Summit: A Meeting of AI Discipline Leaders**
Organized by IJCAI and AAAI
Francesca Rossi (IJCAI President) and Manuela Veloso (AAAI President)
Full article: http://doi.acm.org/10.1145/2639475.2639481

AAAI and IJCAI co-organized a meeting to discuss the future of AI, including conference coordination, how AI sub-disciplines relate, and societal impact. This report features highlights of the event and describes next steps to better coordinate sub-disciplines and create an open information structure to disseminate and coordinate community-wide information.

D **Submit your Ph.D. briefing here!**
See the AI Matters website for more info.

Upcoming Conferences

Registration discount for SIGAI members.

WI-IAT '14: Web Intelligence and Intelligent Agent Technology. Warsaw, Poland, Aug. 11-14, 2014.

ASE '14: ACM/IEEE International Conf. on Automated Software Engineering. Vasteras, Sweden, Sept. 15-19, 2014.

RecSys '14: ACM Conf. on Recommender Systems. Foster City, CA. Oct. 6-10, 2014.

AAAI Doctoral Consortium '15. Austin, TX. Jan. 25-25, 2015.
(Submission: Sept. 22, 2014)

HRI '15: ACM/IEEE International Conf. on Human-Robot Interaction. Portland, OR. Mar. 2-5, 2015.
(Submission: Oct. 3, 2014)

IUI '15: International Conf. on Intelligent User Interfaces. Atlanta, GA. Mar. 29 - Apr. 1, 2015.
(Submission: Oct. 17, 2014)

Links

SIGAI website: http://sigai.acm.org/
Newsletter: http://sigai.acm.org/aimatters/
Twitter: http://twitter.com/acm_sigai/

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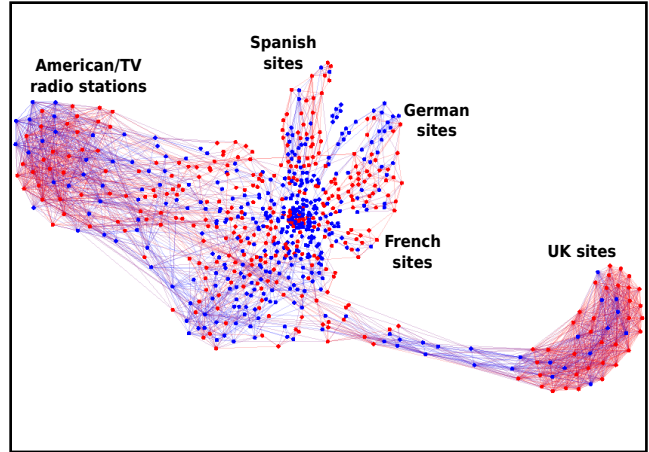
V **Information network for the 2011 Fukushima earthquake.** Jure Leskovec and Manuel Gomez Rodriguez. Full image and details: http://doi.acm.org/10.1145/2639475.2655757

AI Matters Editorial Board

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Welcome to AI Matters

Kiri Wagstaff, Editor (Jet Propulsion Laboratory, California Institute of Technology;
   aimatters@sigai.acm.org)

Welcome to *AI Matters*, the new quarterly newsletter for SIGAI, the ACM Special Interest Group on Artificial Intelligence. This newsletter features ideas and announcements of interest to the AI community. These include:

Book Announcement: Description of a newly published book and its major contributions.

Dissertation briefings: Extended abstracts from new Ph.D.s.

Event reports: Technical conference or workshop reports, policy forums, or community events on topics of general interest to an AI audience.

AI Impact: Description of an AI system or method that has had a tangible impact on the world outside of the AI research community.

AI News: Innovations, open source AI software, course materials, challenges and competitions, and other news of broad interest to AI researchers and practitioners.

Opinion: Discussion of thought-provoking issues and responses to previous items.

Paper Précis: Short summary of the major contributions of a recently published AI paper, written for the general AI audience.

Tutorial: Short introduction or explanation of an AI concept or technique.

Videos and Images: Audio-visual materials with content of general interest to an AI audience.

In this debut issue, we begin with an enthusiastic discussion by the Chair of SIGAI of the broad relevance of AI. We also include pieces discuss-ing a recently published poll of what AI experts think about the evolution of AI, how AI methods help underwater archaeology, AI methods for airline operations, a report on the NY AI Summit, and an announcement about the newly created SIGAI Career Network and conference.

We encourage you to submit your own material for future issues. You can learn more about submissions at the AI Matters website, where you can also download submission templates: http://sigai.acm.org/aimatters/ Authors retain copyright to their contributions, which are published by the ACM Digital Library. Submissions are reviewed by the AI Matters Editorial Board.

We hope you enjoy this newsletter and find that it points you in new directions or encourages new ideas and innovation.

Kiri Wagstaff is the Editor of AI Matters. She is also a senior researcher in machine learning and data analysis at the Jet Propulsion Laboratory in Pasadena, CA. She serves as a tactical planner for the Mars Exploration Rover Opportunity and continually brainstorms ways to make the rover more autonomous.

O Artificial Intelligence: No Longer Just for You and Me

Yolanda Gil, SIGAI Chair (Information Sciences Institute and Department of Computer Science, University of Southern California; yolandagil@acm.org)

As Chair of SIGAI, I wanted to share the excitement that I see emerging in our field for this first issue of AI Matters.

First, AI is having an impact in the world and can no longer be considered an exotic boutique research area. A wide range of AI technologies are permeating industry, science, entertainment, and our everyday lives. From the Siri speech-based phone assistant, to IBM's Watson learning from text to become a Jeopardy game winner, to self-driving cars, AI is becoming directly present in people's lives. People have come to appreciate the potential of intelligent machines in many areas of societal relevance. The rising challenges of big data and data science cannot be met without AI playing a major role not only in mining but also in understanding, summarizing, and modeling data. The Google Knowledge Graph has made knowledge bases familiar to everyone, and the Wikidata project at the Wikimedia Foundation has tens of thousands of contributors building a semantic network version of Wikipedia that had accumulated 30M statements after just one year. The Web is becoming increasingly structured with hundreds of knowledge bases and ontologies that are beginning to change how we access and interpret information. This is a truly exciting time for our field.

Another major reason for great excitement is the enthusiasm for AI that is palpable in new generations. I will recount here my recent experience as a judge for high school student AI projects, already selected among the best in the world. This was at the annual international Intel Science and Engineering Fair (ISEF) (which used to be the Westinghouse Science Fair). I was extremely impressed with the large amount of students interested in AI, the quality of the projects, and the excitement of the students about our field. Of the hundred or so CS posters, two-thirds were on AI. The most popular topics were machine learning, robotics, and image processing. Many

Figure 1. A rising tide of students interested in AI: More than two thirds of the computer science posters presented at the 2014 ISEF were on AI topics such as machine learning, robotics, and image processing.

of the student posters focused on biomedical applications of AI. In addition to those CS posters, we found thirty or so more from other areas of engineering and science that were relevant to AI. That signified around one hundred AI posters of excellent quality that made judging really challenging.

Our top award went to an agent-based simulation for understanding the spread of disease. Our second award went to a computer vision algorithm for grading the stage of prostate cancer. Our third award recipient, who ended up taking also the top award at the fair, used machine learning to analyze how gene mutations affect the properties of proteins. Many of these students had formulated and carried out their projects independently, just researching about AI on the Web. Their excitement was very palpable. One student told me his hobby was to read AI papers from the sixties. Another student in the biomedical engineering area overheard me say that I was there to judge AI projects and approached me to tell me he had enjoyed a lot the AI work that he had done in his project and

wanted to learn more about how to get involved. Students from countries like Nigeria, Georgia, Peru, Oman, and many others represented the talent of this new generation.   The future of our field is in great hands.

Finally, an exciting recent development is the announcement of the XPRIZE for Artificial Intelligence jointly with TED. The challenge is to put an AI system on the TED stage to give a talk that will get a standing ovation. Addressing this challenge would require fundamental advances in many areas of AI research. But that is not a new thing, for example we have had the Turing test as a standing challenge for decades and many other challenges with awards.   What is notable about the A.I. XPRIZE is the crowdsourcing of the rules that will test how the AI system demonstrates intelligence. There is some chance that, as has happened with other similar challenges, some students or perhaps garage tinkerers will pull together a competitive entry, even a winning one.

The future of our field is bright. The trends above suggest that we need to broaden our activities and reach practitioners, adopters, and students beyond the arena of academic research. We need to get the public interested when there are major breakthroughs in our field. Astronomers, biologists, and physicists do it – why shouldn't we? Our quest is important and we must get others excited, as we bring to the world smart machines like no others, improve our under-

standing of the brain, and form new areas of science such as social computation and the Semantic Web.

SIGAI is committed to helping our community grow. Its membership is diverse and includes not only researchers and students but also industry and government practitioners. SIGAI has embarked on new activities that are geared to grow and strengthen our field.   SIGAI officers work with ACM's committees and initiatives that are reaching out to new constituencies like CS teachers, garage tinkerers, policy makers, and the international community. Please contact any SIGAI officer if you are interested in being part of any of our community building efforts.

Yolanda Gil was re-elected Chair of ACM SIGAI in 2013.   She is Director of Knowledge Technologies at the Information Sciences Institute and Research Professor of Computer Science at the University of Southern California. She is a Fellow of AAAI.   Her research interests include intelligent user interfaces, knowledge-rich problem solving, semantic workflows, AI-mediated scientific collaboration, provenance, and semantic web.

N Announcing the SIGAI Early Career Researchers Network and Conference

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Yolanda Gil (Information Sciences Institute and Department of Computer Science, University of Southern California; yolandagil@acm.org)

Any research field is as healthy as the new talent that it is able to attract, and AI is no exception. For this reason, AI conferences hold mentoring events for doctoral students and researchers in the early stages of their careers to support their advancement and connections to other researchers in the field. SIGAI holds one such event annually at the AAAI conference: the AAAI/SIGAI Doctoral Consortium. But we think that much more can be done, as these events are held once a year and do not necessarily cover all the topics that young researchers would want to.

To support these goals, SIGAI is planning to launch a Career Network website and an associated annual conference. Our goal is to create a network for early-career scientists, one that will support them as they transition from Ph.D. / postdoctoral research to independent research in academia, industry, or government. The SIGAI Career Network Conference (SIGAI CNC) will be an official ACM conference that showcases the work of early career researchers to their potential mentors and employers. This showcase will be a significant extension beyond what currently occurs at AI conferences. In 2015, we plan to hold CNC in Austin, Texas, collocated with AAAI. In parallel with the conference, the Career Network website will provide a virtual community for AI researchers in the early stages of their careers.

SIGAI CNC

SIGAI will hold an annual conference, SIGAI CNC, to showcase high-quality research from graduating Ph.D.s and postdocs. CNC will also include a wide range of opportunities for career development and mentoring. CNC will be a face-to-face event complemented by on-line exchanges through the SIGAI Career Network website.

SIGAI CNC will feature presentations from students who have recently completed (or nearly completed) their dissertations. Applicants will be Ph.D. students who are about to defend and current postdocs. To apply, a researcher will submit a CV, a research statement, and letters of recommendation. Based only on research quality, several applicants will be selected (by an independent panel or program committee) and invited to give an oral presentation (20-25 minute) and/or a poster presentation. Each presentation will be a broad summary of their thesis or postgraduate research, rather than a single paper.

SIGAI will contribute significant travel funding for many of the selected students. Registration at CNC will be open to all SIGAI members, with a token fee for any graduate student attendees. The event's format will be designed with each year's event chairs. Accepted submissions will be published in the ACM Digital Library and disseminated through the Career Network website.

SIGAI CNC will also include networking opportunities in the form of interactive poster sessions, professional booths, mentoring events, and a job fair. One of the main goals is to allow young researchers to network with researchers outside of academia. The experience of most Ph.D. students and postdocs is limited to the academic world. SIGAI believes that the opportunity to meet and interact with the research community in industry and government could broaden early-career scientists' horizons, and prepare them for future careers outside of academia.

The Career Network Website
To facilitate the creation of a virtual community for early-career AI researchers (those who have completed their Ph.D.s within the last six years, or graduate students in the final year of their Ph.D. program), SIGAI will launch the SIGAI Career Network website in the fall of 2014. The website will be run by early-career researchers under oversight from SIGAI.

The SIGAI Career Network website will not only connect early-career AI researchers, but also provide a matching service between potential employers and recent Ph.D. graduates. Recent Ph.D. graduates and other early-career researchers, as well as potential employers, can register to make use of the website. Information on potential employers would be publicly available (simply, University X Dept. Y, or Company Z seeks to hire in AI). Potential employees either make their profiles public or restrict them only to potential employers they select. The latter would support personal privacy, for example, for someone seeking a new job.

SIGAI CNC and the Career Network website will complement each other to provide a community for support, information sharing, and networking among early-career AI researchers.

On the "Job Market" Aspects of the Career Network and CNC
Many computer scientists are frustrated by how disorganized our job market is in comparison those of other disciplines. In particular, there is limited information on the range and nature of the many non-academic jobs available to graduating AI Ph.Ds. These jobs exist in government labs, at research organizations that do government contract work, and at smaller industry-research labs and startups. There are also some little-known teaching opportunities in predominantly undergraduate institutions and smaller colleges.

Most academic disciplines pursue a more coordinated approach to hiring, even when significant options are available outside academia (in, for example, economics and finance). In the typical process, employers have first-round interviews with candidates at an annual meeting or convention in the fall or winter. Moreover, these interviews cost little, because both employers and job seekers already attend the annual meeting; the main issues are time and scheduling. First-round interviews serve both employers and job seekers well. Employers can briefly screen candidates without an on-campus or on-site visit, while job seekers can establish contact with employers and test their potential fit with them before more substantial on-site interviews. This gives job seekers an early idea about work possibilities and a better overall perspective on their job search. Overall, there are fewer failed searches and better matches. For more on this issue, see this blog post by Lance Fortnow: http://blog.computationalcomplexity.org/2007/02/organizing-academic-job-market.html .

While we envision SIGAI CNC as an exciting opportunity to gather the best young researchers in AI in a forum where the entire community can learn about their research, it also presents opportunities to connect job seekers with potential employers. The conference will be well timed (in January) for both job seekers and employers. SIGAI CNC will provide an important service to our community.

SIGAI and AAAI Collocation
AAAI and SIGAI already cooperate with the AAAI/SIGAI Doctoral Consortium (DC). SIGAI CNC and the DC will be complementary events: DC will focus on students at early stages of their PhD and at institutions without many faculty in AI, while CNC will focus on soon-to-graduate PhD students and post-doctoral researchers. SIGAI CNC will be held immediately before the main AAAI conference, in parallel with the workshops and the DC.

Summary
SIGAI's planned activities for early career AI researchers and AAAI's move to a winter conference schedule have presented a rare opportunity for AI and for our organizations: the collocation of SIGAI CNC with the annual AAAI meeting. This will benefit not only young researchers, who will

showcase their work and get career advice, but also potential employers, given the event's timing. SIGAI CNC will become a destination for AI scientists to discuss the best new research and meet the people who make it possible.

For the most up-to-date information on the SIGAI Career Network, see:
http://sigai.acm.org/cnc/

Sanmay Das' research interests are in multi-agent systems, machine learning, and computational social science. He is the vice-chair of SIGAI.

Susan L. Epstein develops knowledge representations and machine learning algorithms to support programs that learn to be experts. An interdisciplinary scholar, she has worked with and published for mathematicians, psychologists, geographers, linguists, microbiologists,

and roboticists to identify important principles about knowledge and learning, and to help computers exploit them. Her current research interests include plausible recommendations, human-multi-robot teams for search and rescue, protein-protein interaction networks, and parallel search for solutions to constraint satisfaction problems. She is Professor of Computer Science at Hunter College and The Graduate Center of The City University of New York.

Yolanda Gil was re-elected Chair of ACM SIGAI in 2013. She is Director of Knowledge Technologies at the Information Sciences Institute and Research Professor of Computer Science at the University of Southern California. She is a Fellow of AAAI. Her research interests include intelligent user interfaces, knowledge-rich problem solving, semantic workflows, AI-mediated scientific collaboration, provenance, and semantic web.

P Future Progress in Artificial Intelligence: A Poll Among Experts

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Nick Bostrom (Future of Humanity Institute, Oxford University; nick@nickbostrom.com)

This is an abbreviated version of: Müller, Vincent C. and Bostrom, Nick (forthcoming 2014), 'Future progress in artificial intelligence: A poll among experts', in Vincent C. Müller (ed.), Fundamental Issues of Artificial Intelligence (Synthese Library; Berlin: Springer). A pre-print of the full paper is available on http://www.sophia.de/publications.htm. Please cite the full version.

Abstract: In some quarters, there is intense concern about high–level machine intelligence and superintelligent AI coming up in a few decades, bringing with it significant risks for humanity; in other quarters, these issues are ignored or considered science fiction. We wanted to clarify what the distribution of opinions actually is, what probability the best experts currently assign to high–level machine intelligence coming up within a particular time–frame, which risks they see with that development and how fast they see these developing. We thus designed a brief questionnaire and distributed it to four groups of experts. Overall, the results show an agreement among experts that AI systems will probably reach overall human ability around 2040-2050 and move on to superintelligence in less than 30 years thereafter. The experts say the probability is about one in three that this development turns out to be 'bad' or 'extremely bad' for humanity.

1. Problem

The idea of the generally intelligent agent continues to play an important unifying role for the discipline(s) of artificial intelligence, it also leads fairly naturally to the possibility of a superintelligence. If we humans could create artificial general intelligent ability at a roughly human level, then this creation could, in turn, create yet higher intelligence, which could, in turn, create yet higher intelligence, and so on … "We can tentatively define a superintelligence as any intellect that greatly exceeds the cognitive performance of humans in virtually all domains of interest." (Bostrom, 2014 ch. 2).

For the questionnaire we settled for a definition that a) is based on behavioral ability, b) avoids the notion of a general 'human–level' and c) uses a newly coined term. We put this definition in the preamble of the questionnaire: "Define a 'high–level machine intelligence' (HLMI) as one that can carry out most human professions at least as well as a typical human."

2. Questionnaire

The questionnaire was carried out online by invitation to particular individuals from four different groups. The groups we asked were:

- **PT–AI:** Participants of the conference on "Philosophy and Theory of AI", Thessaloniki October 2011, organized by one of us (see Müller, 2012, 2013). Response rate 49%, 43 out of 88.
- **AGI:** Participants of the conferences of "Artificial General Intelligence" (AGI 12) and "Impacts and Risks of Artificial General Intelligence" (AGI Impacts 2012), both Oxford December 2012, organized by both of us (see Müller, 2014). Response rate 65%, 72 out of 111.
- **EETN:** Members of the Greek Association for Artificial Intelligence (EETN). Response rate 10%, 26 out of 250 (asked via e-mail list).
- **TOP100**: The 100 'Top authors in artificial intelligence' by 'citation' in 'all years' according to Microsoft Academic Search in May 2013. Response rate 29%, 29 out of 100.

Total response rate: 31%; 170 out of 549. We also review prior work in (Michie, 1973, p. 511f), (Moor, 2006), (Baum, Goertzel, & Goertzel, 2011): and (Sandberg & Bostrom, 2011).

3. Answers

1) "In your opinion, what are the research approaches that might contribute the most to the development of such HLMI?: …" There were

no significant differences between groups here, except that 'Whole brain emulation' got 0% in TOP100, but 46% in AGI.

2) "For the purposes of this question, assume that human scientific activity continues without major negative disruption. By what year would you see a (10%/50%/90%) probability for such HLMI to exist?"

Predicted years, sorted by HLMI probability:

10%	Median	Mean	St. Dev.
PT-AI	2023	2043	81
AGI	2022	2033	60
EETN	2020	2033	29
TOP100	2024	2034	33
ALL	2022	2036	59
50%	Median	Mean	St. Dev.
PT-AI	2048	2092	166
AGI	2040	2073	144
EETN	2050	2097	200
TOP100	2050	2072	110
ALL	2040	2081	153
90%	Median	Mean	St. Dev.
PT-AI	2080	2247	515
AGI	2065	2130	202
EETN	2093	2292	675
TOP100	2070	2168	342
ALL	2075	2183	396

The median is 2050 or 2048 for three groups and 2040 for AGI – a relatively small group that is defined by a belief in early HLMI. We would suggest that a fair representation of the result in non–technical terms is: *Experts expect that between 2040 and 2050 high–level machine intelligence will be more likely than not.*

3) For the transition from HLMI to superintelligence, responses were:

	Median	Mean	St. Dev.
Within 2 years	10%	19%	24
Within 30 years	75%	62%	35

Experts allocate a low probability for a fast take-off, but a significant probability for superintelligence within 30 years after HLMI.

4) For the overall impact of superintelligence on humanity, the assessment was:

%	PT-AI	AGI	EETN	TOP 100	ALL
Extremely good	17	28	31	20	24
On balance good	24	25	30	40	28
More or less neutral	23	12	20	19	17
On balance bad	17	12	13	13	13
Extremely bad (existential catastrophe)	18	24	6	8	18

We complement this paper with a small site on http://www.pt-ai.org/ai-polls/. On this site, we provide a) the raw data from our results, b) the basic results of the questionnaire, c) the comments made, and d) the questionnaire in an online format where anyone can fill it in.

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Vincent C. Müller's research focuses on the nature and future of computational systems, particularly on the prospects of artificial intelligence. He is the coordinator of the European Network for Cognitive Systems, Robotics and Interaction (2009-2014) with over 900 members (3.9 mil. €, www.eucognition.org). He has organized a number of prominent conferences in the field. Müller has published a number of articles and edited volumes on the philosophy of computing, the philosophy of AI and cognitive science, the philosophy of language, and related areas. He works at Anatolia College/ACT and at the University of Oxford.

Nick Bostrom is a professor of the Philosophy & Oxford Martin School, Director of the Future of Humanity Institute, and Director of the Programme on the Impacts of Future Technology at the University of Oxford.

Using Agent-Based Modeling and Cultural Algorithms to Predict the Location of Submerged Ancient Occupational Sites

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John O'Shea (University of Michigan Ann Arbor)
Ashley Lemke (University of Michigan Ann Arbor)

Some of the most pivotal questions in human history, such as the origins of early human culture, the spread of hominids out of Africa, and the colonization of New World necessitate the investigation of archaeological sites that are now under water. These contexts have unique potentials for preserving ancient sites without disturbance from later human occupation. The Alpena-Amberley Ridge (AAR) beneath modern Lake Huron in the North American Great Lakes offers unique evidence of prehistoric caribou hunters for a time period that is very poorly known on land.

An NSF funded research team headed by Archaeologist John O'Shea from the University of Michigan, Guy Meadows an Engineer from the University of Michigan, and Robert Reynolds from Wayne State University have developed a novel approach to predicting the location of ancient hunting sites in over 120 feet of water underneath Lake Huron using techniques from Artificial Intelligence.

In addition to the archaeological investigations, intelligent systems was employed to better understand the movement of caribou and caribou hunters on the AAR. Drawing on the environmental reconstruction and a detailed map produced from side scan and multi-beam sonars, an intelligent agent based simulation of caribou herd movement across the AAR was developed (Reynolds et al., 2013; Vitale et al., 2011). This simulation provided a level of social intelligence to the individual animals as they iteratively transited and learned the landscape over time.

A machine learning tool, Cultural Algorithms, based upon models of Cultural Evolution generated "hot spots" representing areas that were
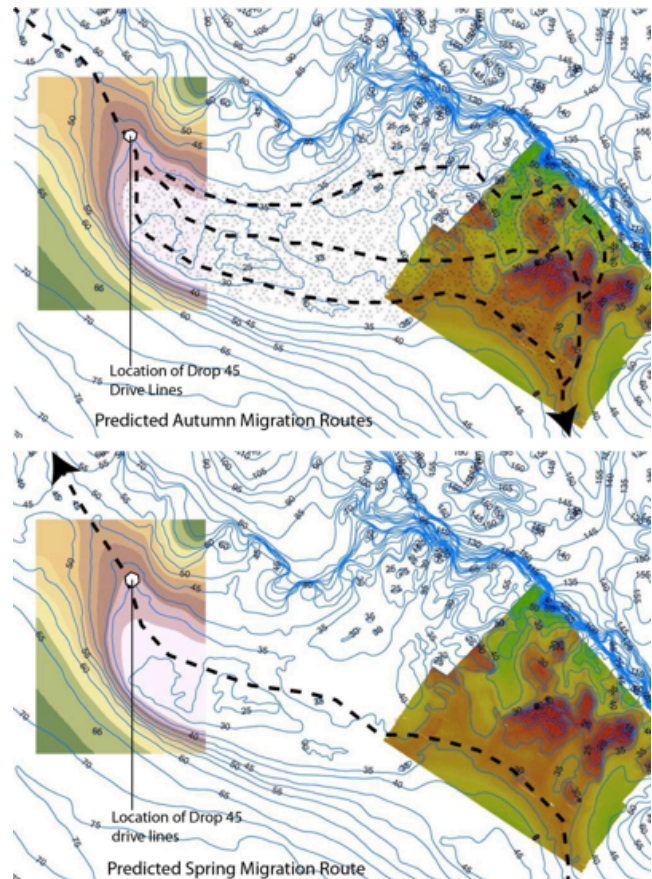

Figure 1. Predicted Annual Spring and Fall Migration routes using the intelligent agent model of caribou herd movement.

likely to contain hunting structures using the caribou herd movement simulation data and ethnographic information (Reynolds, 1999). An important result of the simulation was the prediction that there should be distinctive routes for the autumn and spring migrations (Figure 1). The simulation also highlighted two critical choke points within the study area where all preferred migrations routes for both seasons converge. Drop 45 is located at one of these predicted choke points.

The newly discovered Drop 45 Drive Lane is the most complex hunting structure found to date, and it provides a compelling picture of later Paleoindian/Early Archaic caribou hunting in the Great Lakes region (O'Shea et al., 2014). The site also provides important insight into the social and seasonal organization of these early Great Lakes inhabitants. When combined with environmental and simulation studies, it is suggested that distinctly different seasonal approaches were used by early hunters on the AAR, with autumn hunting being carried out by small groups and spring hunts being conducted by larger collective groups.

The Drop 45 Drive Lane and associated artifacts are the oldest known evidence of ancient hunting structures in the world. As such, they provide an unprecedented insight into the social and seasonal organization of early peoples in the Great Lakes Region as well Paleo-Indians in general. In addition, the interdisciplinary research program provides a general model for the investigation of submerged prehistoric landscapes using Artificial Intelligence techniques (O'Shea et al., 2014).

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Dr. Robert G. Reynolds is a Professor in the Department of Computer Science in the College of Engineering at Wayne State University and a Visiting Associate Research Scientist in the Museum of Anthropological Archaeology at the University of Michigan-Ann Arbor, Michigan. He received his Ph.D. degree in Computer Science, specializing in Artificial Intelligence, in 1979 from the University of Michigan, Ann Arbor. He is currently a professor of Computer Science and director of the Artificial Intelligence Laboratory at Wayne State University. Dr. Reynolds produced a framework, Cultural Algorithms, in which to express and computationally test various theories of social evolution using multi-agent simulation models. He has applied these techniques to problems concerning the origins of the state in the Valley of Oaxaca, Mexico, the emergence of ancient urban centers, the origins agriculture, and the disappearance of the Ancient Anasazi in Southwestern Colorado.
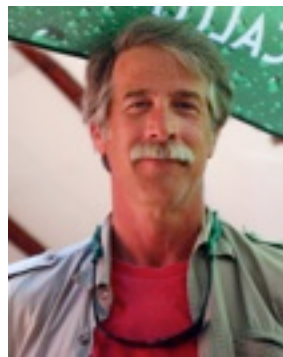
John O'Shea is the Emerson F. Greenman Collegiate Professor of Anthropology at the University of Michigan and Curator of Great Lakes Archaeology at the Museum of Anthropology, University of Michigan. He received his Ph.D. in Prehistoric Archaeology at Cambridge University in 1979. His work has focused on using archaeology to document tribal societies before they are disrupted by contact with modern states and empires. His research areas include Native North America on the eve of European Contact and on the development of Bronze Age societies in the Carpathian Basin and their larger connections into Europe and the Mediterranean. Professor O'Shea is also the director of the Museum's Archaeology Underwater program which considers

both historic era shipwrecks and submerged prehistoric settlements in the Great Lakes.

Ashley Lemke is a doctoral candidate in the department of Anthropology and Museum of Anthropological Archaeology at the University of Michigan. Her primary research interests include the anthropology of hunting and archaeology of hunter-gatherers. These research questions have led her to work in North America and Europe on both terrestrial and underwater archaeological projects from the Lower Paleolithic to 20th century shipwrecks.

Areej Salaymeh is a Ph.D. candidate student in computer science department at Wayne State University. She is a member of the Artificial Intelligence Lab. Her research interest is Artificial Intelligence, Game programming, Artificial Intelligence in Game, Evolutionary Algorithms, Cultural Algorithms, Multi-Objective Evolutionary Algorithms.

B A New Approach for Disruption Management in Airline Operations Control

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As a sequel of a recent Ph.D. thesis at the University of Porto and LIACC research lab, a new book appeared at Springer, Series: Studies in Computational Intelligence, Vol. 562, 2014, XII, 242 p., entitled *A New Approach for Disruption Management in Airline Operations Control* by Antonio J. M. Castro, Ana Paula Rocha, and Eugénio Oliveira.

The relevance of this book is mainly to show how the multi-agent system paradigm can be used to solve a very relevant real life real size problem. The book introduces a new concept for disruption management in current Airline Operations Control Centers, taking into account their organization, tools, problems, methods and costs. Most of the research efforts dealing with airline scheduling have been done through off-line plan optimization methods. However, nowadays, with the increasingly complex and huge traffic at airports, the real challenge is how to react to unexpected events that may cause plan disruptions, leading to flight delays.

Moreover these disruptive events usually affect at least three different dimensions of the situation: the aircraft assigned to the flight, the crew assignment and, often forgotten, the passengers' journey and satisfaction.

This book includes answers to this challenge and proposes the use of the Multi-agent System paradigm to rapidly compose a multi-faceted solution to the disruptive event taking into consideration possible preferences of those three key aspects of the problem.
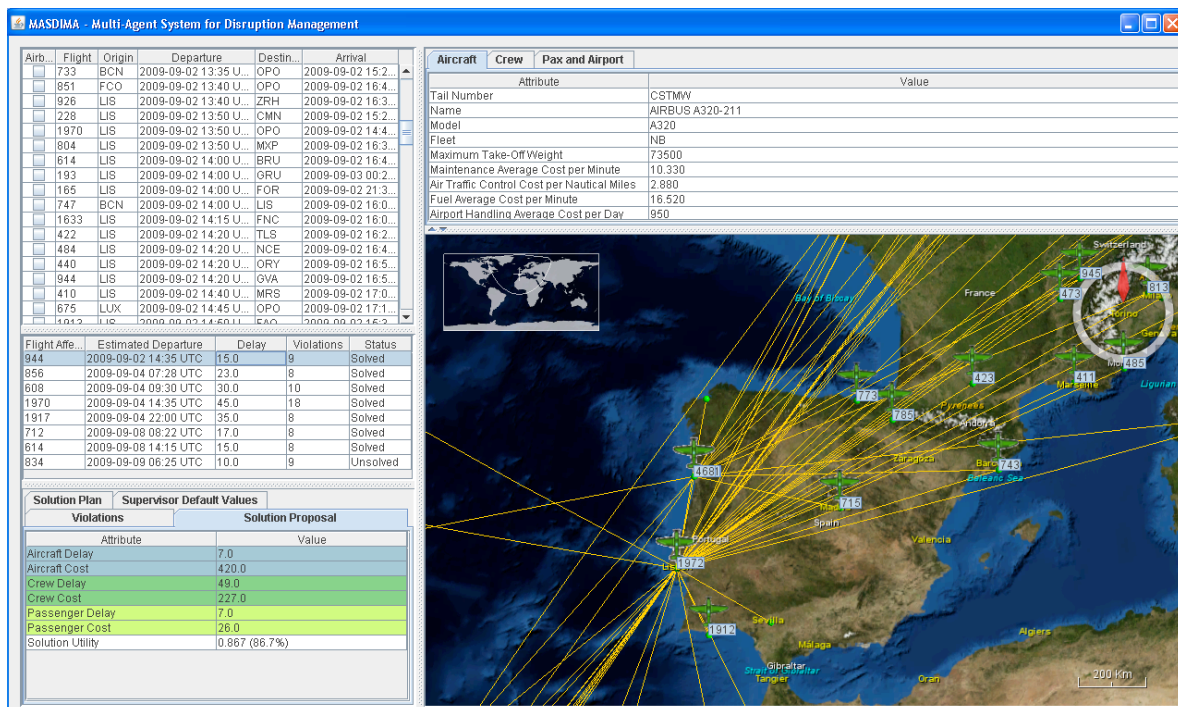

Figure 1. MASDIMA user interface displaying, on the left, problems encountered and proposed solutions, including costs and, on the right, flights being monitored by the system. On top right we may access relevant information for each dimension (Aircraft, Crew, Pax) of selected flights.

Negotiation protocols taking place between agents that are experts in solving the different problem dimensions (regarding aircrafts, crew and passengers), combination of different utility functions and, not less important, the inclusion of the human in the automatic decision-making loop make MASDIMA, the system described in this book, well suited for real-life plan-disruption management applications.

Antonio Castro was born in 1965 in Porto, Portugal and studied at Porto Polytechnic Engineering Institute where he got his degree in Information Systems Engineering in 1997. In 2007 he got his Master Degree in Artificial Intelligence and Intelligent Systems from the Faculty of Engineering, University of Porto and the Ph.D. in Computer Engineering from the same institution in 2013. Additionally, he has a postgraduate course in Air Transport Operations from ISEC in 2008. Antonio works for TAP Portugal since 1990 and currently he is a Board Advisor for IT/IS projects and responsible for projects related with airline operations control. Antonio is also the CEO of MASDIMA (http://www.masdima.com), a start-up company created together with two other colleagues, from the research made during his Ph.D. where a Multi-Agent System for Disruption Management applied to Airline Operations Control was proposed, that includes the passenger point of view in the Irregular Operations Management Process (IROPS).

Ana Paula Rocha got her degree in Electrical and Computers Engineering at the University of Porto in 1990. She got her Ph.D. in Computer Engineering from the same institution in 2002. Currently, she is Auxiliary Professor at the Department of Informatics Engineering, University of Porto. She participated in European as well as national funded projects concerning the use of intelligent agents advanced features for applications. Her main current research topics of interest include Agent-based frameworks for B2B, Multi-Agent Learning, Negotiation, Argumentation and Trust. She was co-organizer of Artificial Intelligence and Multi Agent Systems related workshops. She is member of DAIAS (Distributed Artificial Intelligence and Agent-based Simulation) group at LIACC (Laboratory of Artificial Intelligence and Computer Science) since 1990. She is also member of APPIA (Portuguese Association for Artificial Intelligence).

Eugénio Oliveira is full professor at the University of Porto, Faculty of Engineering. He is director of the Doctoral Program in Informatics Engineering and Coordinator of the scientific research AI Lab (LIACC). He got his Ph.D. in 1984 at the New University of Lisbon in Logic Programming for Knowledge-based Systems. He was Guest Academic at IBM-IEC, La Hulpe, in 84-85. He was, during several sabbatical terms, at the University of London (QMWC), University of Nice, University of Utrecht, URJC (Madrid) and INPG (Grenoble). He was awarded with Gulbenkian Prize for Science and Technology. His main interests are on Distributed Artificial Intelligence, Multi-agent Systems, Trust And Reputation models and Text Mining. He supervised more than 20 Ph.D. students in these mentioned subjects.

E The NY AI Summit: A Meeting of AI Discipline Leaders

Francesca Rossi (President, IJCAI; University of Padova; frossi@math.unipd.it)
Manuela Veloso (President, AAAI; Carnegie Mellon University; mmv@cs.cmu.edu)

AI is becoming pervasive in our lives. Its impact on society is increasing every day. Its potential is enormous and there have recently been several outstanding achievements.

However, AI as a science is very complex and vast. Because of this, historically and inevitably it has fragmented into sub-disciplines, all with fantastic contributions. It could however be the case now that the existence of a large number of AI-related disciplines, conferences, and associations, could hinder a rapid and effective development of AI, both research-wise and in real-life applications.

AAAI (Association for the Advancement of AI) and IJCAI (International Joint Conference on AI) are the two main associations worldwide that cover a very large spectrum of the AI topics. They have recently joined forces to try to turn these multiple research directions into an opportunity, by fostering fruitful cooperations and positive synergies among all these actors in the world-wide AI arena.

As a first step in this direction, as presidents of these two associations, (Francesca Rossi, IJCAI and Manuela Veloso, AAAI) we co-organized a meeting to brainstorm about the future of AI as a discipline, the cooperation among the various associations of AI researchers, and the impact of AI in the society at large.

The meeting was held in New York City on February 24-25, 2014, and saw the participation of about 50 of the most active researchers in AI, coming from academia, companies, large research centers, and AI-related organizations and journals. The meeting was termed "The NY AI Summit."

The main goal of the meeting was to discuss the future of AI and brainstorm about possible developments, at several levels, to improve its positive impact on society. More precisely, the plan was to discuss and concretely make steps forward on the following topics:

- How IJCAI, AAAI, and other AI-related conferences and associations can have a more fruitful and effective collaboration;
- The impact of AI on society;
- The relationships among the various AI sub-disciplines;
- The future of AI as a discipline;
- The definition and organization of innovative events related to AI.

The discussion was organized around four main themes:

- *AI disciplines and practice:* Vision and accomplishments of AI disciplines and their varied nature, in different parts of the world, in research, in education, and in practice.
- *Associations, conferences, journals:* Relationship among AI associations; Conferences vs. journals; Role of large AI conferences.
- Strong AI, Integrated AI, Open AI, and Grand Challenges.
- *Societal impact:* Outreach; Funding strategies; Ethical issues in AI.

Before the meeting, the participants were invited to prioritize their interests on each theme. We then divided the participants across the four themes, such that each would participate in a panel of at least one theme. At the meeting, the discussion of a theme was scheduled to include the very brief presentation of a panel (of about 12 participants), followed by a few questions, and then, most importantly the discussion continued in six round tables led by two panelists and concluded with the summary presented the members of each table.

The discussion was very intense and productive, it and led to several important deliberations and plans for concrete actions to advance AI and improve its positive impact on society. In particular, besides several specific suggestions for concrete actions, there was the feeling that AI needs to be united again, while maintaining the identity of the several disciplines.

There are many AI-related organizations and disciplines. Some, like AAAI, IJCAI, SIGAI, and ECCAI, encompass most of the AI spectrum, while others, like ACP, ICAPS, KR, ML, Robotics,

and SAT, focus on a specific AI discipline. Their cooperation and synergic activities are often left to the initiative of single people and not organized in structured ways. The summit's participants felt the need to investigate the possible birth of a new AI organization whose role would be to facilitate interaction and cooperation among all disciplines of AI, through various initiatives such as joint events, an open information structure for AI knowledge to foster integration, common activities to outreach the society at large and to have a positive impact, as well as guidelines for behavior of AI researchers about ethical issues in AI. A committee has been formed, and it is currently brainstorming about this in order to put forward a concrete proposal soon to the whole community.

More details about the NY AI Summit and the complete list of its participants can be found at http://ijcai.org/NY-AI-Summit/ .

We would like to thank all the Summit's participants for their very enthusiastic response to our invitation to participate, as well as the tremendous energy and positive attitude during the

Summit discussions.   We would also like to thank the sponsors that generously helped in the organization of this meeting: AAAI, IJCAI, the Artificial Intelligence Journal, Elsevier, and the Center for Urban Science and Progress (CUSP) at NYU, where the meeting took place. Helmut Simonis is credited for the photos.

Francesca Rossi is professor of computer science at the University of Padova, Italy.   Her research interests include constraint reasoning, preferences, multi-agent systems, computational social choice, artificial intelligence.   She is both an ECCAI and a AAAI fellow. She has been the president of the international association for constraint programming (ACP) and she is now the president of IJCAI. She has been program chair of CP 2003 and of IJCAI 2013. She is in the editorial board of Constraints, Artificial Intelligence, JAIR, AMAI, and KAIS. She has published more than 160 papers on international journals and conferences, she co-authored one book, and she co-edited several volumes, among which the handbook of constraint programming.

Manuela Veloso is Herbert A. Simon University Professor at Carnegie Mellon University.   She researches in artificial intelligence and robotics, in particular on agents that Collaborate, Observe, Reason, Act, and Learn (CORAL group). She is Fellow of AAAI, IEEE, and AAAS. Veloso co-founded RoboCup, a worldwide initiative investigating teams of autonomous robots in highly uncertain environments. With her students, realizing that autonomous robots inevitably have limitations in perception, cognition, and action, Veloso introduced symbiotic autonomous robots that can proactively ask for help from humans, other AI agents, and the web. For additional information, including publications, see www.cs.cmu.edu/~mmv .
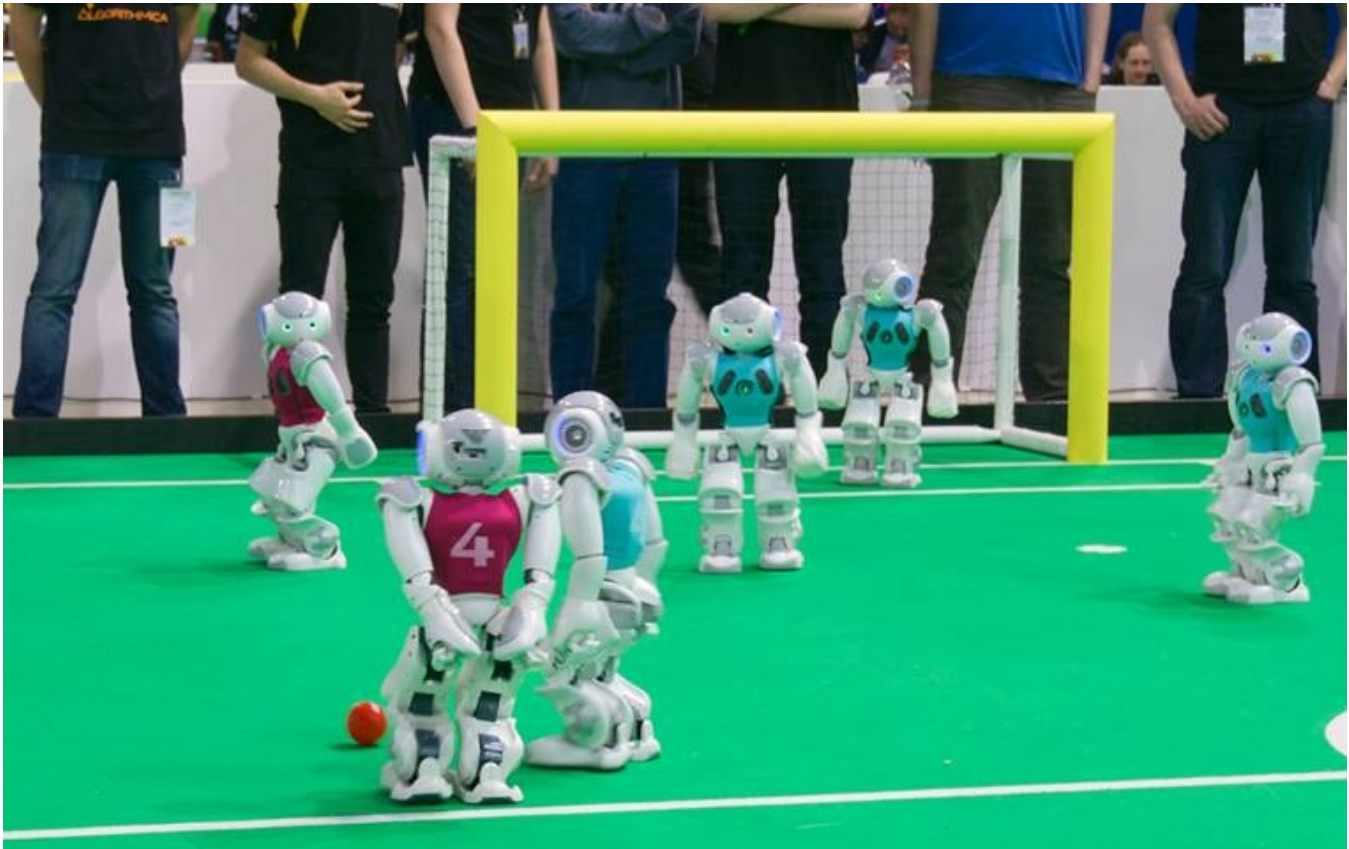
Ⅴ Drop-in Games at RoboCup

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This picture shows a snapshot from one of the first "Drop-in Challenge" games that was held at RoboCup 2013 in Eindhoven, The Netherlands. Typically, RoboCup soccer games involve a team of robots programmed by one university against a team programmed by another. As such, the teamwork strategies can all be "programmed in." However, as robots and their agents become more capable of long-term autonomy, there will be increasing opportunities and need for "ad hoc teamwork" in which agents need to cooperate without prior coordination. The drop-in challenge at RoboCup provides an opportunity to study ad hoc teamwork by ran-

domly selecting different RoboCup teams to each contribute one robot to a team that plays against another such team. The robots must be programmed to work with previously unknown teammates.

In this picture, each robot was programmed by a different RoboCup team. At RoboCup 2014, in Joao de Pessoa Brazil, the drop-in challenge was repeated as a formal competition (from July 20th to July 24th, 2014). Afterwards, the top five players in the competition were put together on an all-star team to play against the 2014 champions of the main (full team) competition.

A paper documenting the 2013 drop-in challenge will be presented at IROS 2014 in September:

http://www.cs.utexas.edu/~pstone/Papers/bib2html/b2hd-IROS14-MacAlpine.html

A paper describing ad hoc teamwork as an AI challenge was presented at AAAI 2010:

http://www.cs.utexas.edu/~pstone/Papers/bib2html/b2hd-AAAI10-adhoc.html

Dr. Peter Stone is an Alfred P. Sloan Research Fellow, Guggenheim Fellow, AAAI Fellow, Fulbright Scholar, and University Distinguished Teaching Professor in the Department of Computer Science at the University of Texas at Austin. He received his Ph.D. in Computer Science in 1998 from Carnegie Mellon University. From 1999 to 2002 he was a Senior Technical Staff Member in the Artificial Intelligence Principles Research Department at AT&T Labs - Research. Peter's research interests include machine learning, multiagent systems, robotics, and e-commerce. In 2003, he won a CAREER award from the National Science Foundation for his research on learning agents in dynamic, collaborative, and adversarial multiagent environments. In 2004, he was named an ONR Young Investigator for his research on machine learning on physical robots. In 2007, he was awarded the prestigious IJCAI 2007 Computers and Thought award, given once every two years to the top AI researcher under the age of 35. In 2013 he was awarded the University of Texas System Regents' Outstanding Teaching Award and in 2014 he was inducted into the UT Austin Academy of Distinguished Teachers.

Patrick MacAlpine is a fifth year Computer Science Ph.D. student at the University of Texas at Austin. He received his B.S. and MSEE degrees in Electrical Engineering from Rice University. He is a member of the Learning Agents Research Group (LARG), advised by Peter Stone. His current focus is on using reinforcement learning to develop locomotion skills and strategy for the the UT Austin Villa RoboCup 3D Simulation League team. He is currently supported by a NDSEG fellowship.

Katie Genter is a fifth year Computer Science Ph.D. student working on multiagent systems research in Dr. Peter Stone's Learning Agents Research Group at the University of Texas at Austin. Her research focuses on how to design agents that can be added to a pre-existing team and influence that team to behave in a particular way. She specifically studies adding controllable agents to flocks, where the non-controllable agents in the flock determine their orientation based on the agents nearest to them. She works to design algorithms for the controllable agents such that they can influence the flock to travel in a particular way, such as to avoid obstacles during migration. Before beginning her Ph.D., she obtained a bachelors degree in Computer Science from the Georgia Institute of Technology in 2009.
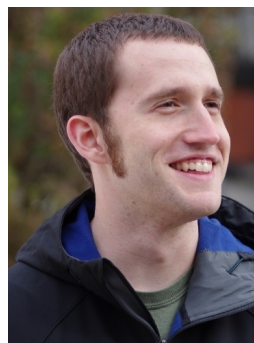
Samuel Barrett is a Ph.D. candidate at the University of Texas at Austin. He is a member of the Learning Agents Research Group (LARG) led by Peter Stone. In 2012, Sam led the UT Austin Villa team to win the international RoboCup championship for robot

soccer in the Standard Platform League (SPL). In 2009, he received an NDSEG graduate fellowship. He received his B.S. in Computer Science in 2008 from Stevens Institute of Technology. His research focuses on ad hoc teamwork, enabling robots and other agents to adapt to new teammates on the fly. His interests also include machine learning, multiagent systems, and robotics. After graduating, Sam will join Kiva Systems.

Visualizing Information Networks: The 2011 Fukushima Earthquake

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March 18, 2011

June 25, 2011
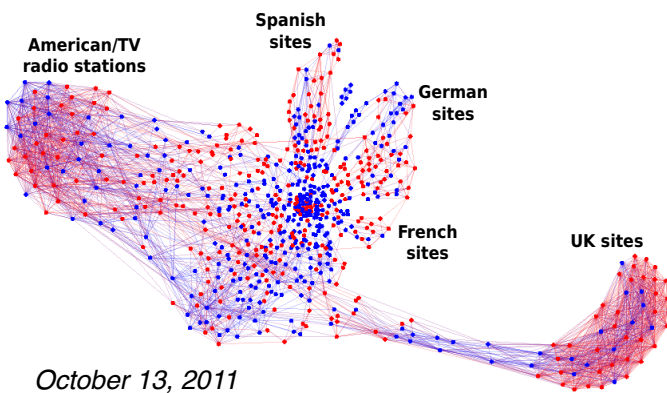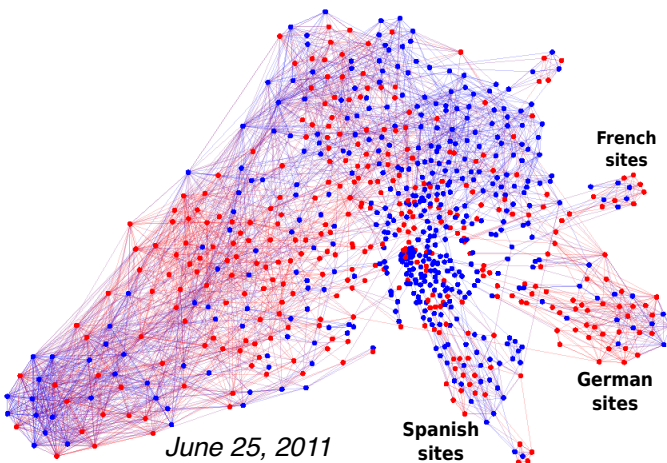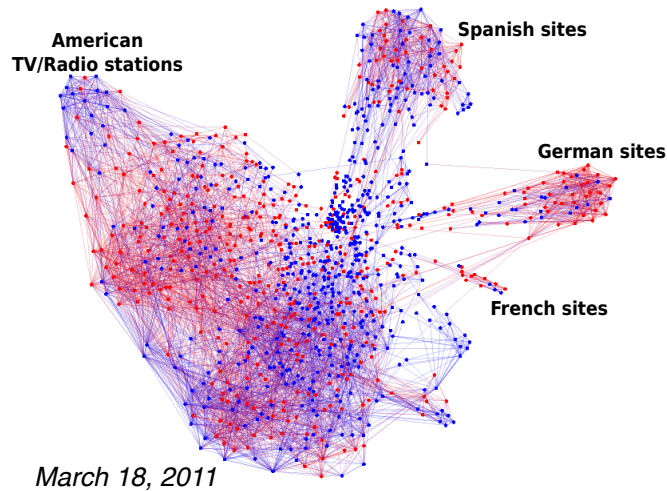
October 13, 2011

These networks visualize the way in which memes about Fukushima's earthquake propagate among blogs (in red) and mainstream media sites (in blue) at three different points in time (March 18, 2011; June 25, 2011; and October 13, 2011), as inferred by InfoPath. Infopath is a network inference algorithm that infers "who-copies-from-whom" from massive crawls of the Web. The inferred networks give insights about the position and roles various sites play in the spread of ideas over the Web as well as helping us understand how information pathways change over time. Infopath was developed by researchers at Stanford University and Max Planck Institute for Intellingent Systems. Learn more about it at
http://snap.stanford.edu/infopath .

Manuel Gomez Rodriguez is a tenure-track research group leader at Max Planck Institute for Software Systems. Manuel develops machine learning and large-scale data mining methods for the analysis and modeling of large real-world networks and processes that take place over them. He is particularly interested in problems arising in the Web and social media and has received several recognitions for his research, including an Outstanding Paper Award at NIPS'13 and a Best Research Paper Honorable Mention at KDD'10. Manuel holds a Ph.D. in Electrical Engineering from Stanford University and a B.S. in Electrical Engineering from Carlos III University in Madrid (Spain). You can find out more about him at
http://people.tuebingen.mpg.de/manuelgr/ .

Jure Leskovec is assistant professor of Computer Science at Stanford University. His research focuses on mining large social and information networks. Problems he investigates are motivated by large scale data, the Web and on-line media. This research has won several awards including a Microsoft Research Faculty Fellowship, the Alfred P. Sloan Fellowship, and best paper awards at KDD, WSDM, WWW, and ICDM. Leskovec received his bachelor's degree in computer science from the University of Ljubljana, Slovenia, and his Ph.D. in in machine learning from the Carnegie Mellon University and postdoctoral training at Cornell University. You can follow him on Twitter @jure or visit http://cs.stanford.edu/~jure/ .