Reports on the 2012 AAAI Fall Symposium Series

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■ *The Association for the Advancement of Artificial Intelligence was pleased to present the 2012 Fall Symposium Series, held Friday through Sunday, November 2–4, at the Westin Arlington Gateway in Arlington, Virginia. The titles of the eight symposia were as follows: AI for Gerontechnology (FS-12-01), Artificial Intelligence of Humor (FS-12-02), Discovery Informatics: The Role of AI Research in Innovating Scientific Processes (FS-12-03), Human Control of Bio-Inspired Swarms (FS-12-04), Information Retrieval and Knowledge Discovery in Biomedical Text (FS-12-05), Machine Aggregation of Human Judgment (FS-12-06), Robots Learning Interactively from Human Teachers (FS-12-07), and Social Networks and Social Contagion (FS-12-08). The highlights of each symposium are presented in this report.*

AI for Gerontechnology

The development of user-centered technologies that assist older adults to live independently and also reduce the burden on caregivers is gaining more attention due to increasing healthcare costs and the aging population. AI is central to these technologies as it deals with the process of transforming raw sensor data into human-interpretable abstractions, innovating new human computer interfaces, as well as planning and reasoning. The symposium provided an intimate setting for researchers from the disciplines of computer science, engineering, nursing, psychology, cognitive science, and health informatics to take stock of the state of the art, highlighting successes and failures, while discussing new problems and opportunities. Incidentally, the symposium happened to be the fourth one in a series of symposiums related to the topic held over the past decade and thus presented updated perspectives on the topic.

A common theme reflected in all the discussions at the symposium was the confluence of AI and information and communication technologies (ICT) in the smart home environment. The smart home environment can provide safety, can facilitate the assessment of functional and cognitive skills, and can provide just in time interventions to promote independent living. It can also enable deriving nonpharmacological behavioral parameters to identify changes in health that may indicate early signs of illness. There were discussions on using depth imagery in both home and hospital settings for detecting falls and for engaging older adults in physical exercises. The role of artificial intelligence in gerontechnology was highlighted through the use of AI techniques such as support vector machines, logistic regression, statistical hypothesis testing, naïve Bayes classifiers, and Bayesian optimization for hyperparameter learning. These techniques were applied in various gerontechnology applications such as detecting daily activities, detecting falls, language analysis, and analyzing other behavioral markers such as gait and sleep quality. Participants also learned about smart assistive devices such as intelligent wheelchairs and the COACH prompting system.

The symposium participants also learned about real-world smart home deployments being used for monitoring older adults over long periods of time, both in the United States and Europe. There were many presentations that illustrated how sensor data from these smart homes are being used to detect changes in the lifestyle of the residents as potential early signs of onset of a debilitating condition. There was also an extensive discussion on cognitive computer games that are designed using AI principles to capture the cognitive state of an older adult, much similar to the traditional paper-based psychological tests. One of the panel discussions highlighted current challenges associated with the collection of data and ground truth information from the real world. An outcome of this discussion was the distinction made between the big data problems associated with social networking and Internet data from the ones associated with gerontechnology. The former deals with storage and communication issues, while the latter concerns problems associated with complex patterns in longitudinal data collected from smart home sensors and electronic health records. All the participants unanimously agreed that real-world data, though difficult to collect and challenging to model, is more important than data that is generated in a lab under constrained settings for developing and evaluating these gerontechnology systems. The symposium attendees also participated in a panel discussion on the relation between interventions and monitoring systems that highlighted that while sometimes it is the intervention that drives the design of monitoring systems, there are occasions when an unexpected outcome of a monitoring system can lead to an intervention.

The symposium ended with a breakout session outlining the vision for the future of these technologies. The need to investigate trends and deviations in the behavioral patterns of a person against his/her baseline was stressed during the discussion. AI challenges pertaining to designing algorithms resulting in minimal false positives while predicting abnormal behaviors was also highlighted. The deliberation on user-centered design emphasized the coevolution of the user and technology and recognized that successful technologies can be developed only through active engagement of target users in the design and development phases.

Narayanan C Krishnan and Parisa Rashidi served as cochairs of this symposium with the help of three other organizers — Diane J. Cook, Marjorie Skubic, and Alex Mihailidis. The papers of the symposium were published as AAAI press Technical Reports FS–12–01.

Artificial Intelligence of Humor

The immediate goal of the Artificial Intelligence of Humor symposium was to consolidate efforts in or toward computational humor in various disciplines contributing to AI.

Human ability to communicate is incomplete without the use of humor. The ultimate goal of the proposed symposium was to advance the state of the art in developing an AI system capable of handling jokes, comedy, and humorous situations, but we recognized that this goal was probably an "AI complete" problem. It may not be fully realized until every other aspect of human intelligence has been successfully implemented in AI systems. Therefore, submissions were invited from any discipline that could advance any aspect that might contribute to the goal of understanding humor. The effort is multidisciplinary in nature, and the participants from all of the contributing disciplines, namely computational semantics, knowledge representation, computational psychology, robotic intelligence and communication, human-computer interface, human factors, to name just a few, were invited to participate. We also welcomed contributions on such phenomena as novelty, surprise, disruption, incongruity, and others that may not be humorous by themselves but are important factors in humor. Similarly, papers that were not computational per se but dealt with an aspect of humor that bears on its computation were acceptable for the symposium as well.

The symposium generated a considerable amount of interest both among the veterans of computational humor and new contributors,

including students, for whom the organizers succeeded in obtaining a small National Science Foundation grant for their travel expenses, which they would like to acknowledge gratefully here. The symposium was the first on this subject in the western hemisphere. Besides the two European workshops on computational humor at the very inception of the field in 1996 and on the completion of the first research grant on humor funded by the European Union in 2002, the symposium had an impromptu one-day prequel in Amsterdam in June 2012. Serendipitously, the Amsterdam workshop attracted several major scholars in computational humor who could not participate in the fall symposium. All the participants were veterans of computational humor rather than of AI of humor. The two fields are closely related and occasionally, including above, are used almost interchangeably, but they are rather distinct. Computational humor has definitely included the various attempts to design toy systems capable of generating and detecting jokes as well as deeper concerns about basing the study of humor on a rigorous, formal foundation that would lend itself to computation. AI of humor shares most of the latter efforts but not so much of the former—unless there are interesting extrapolations and generalizations from a toy system to the way humans process humor and computers can emulate them. Another distinguishing dichotomy dividing the two fields is the use of statistical or machine-learning methods in detecting jokes within computational humor, competing there with meaning, knowledge, and rule-based approaches, of which two, again, AI would be more interested in the latter.

As planned and hoped for, the AAAI symposium attracted participants outside of the Amsterdam workshop's insiders. Many participants were venturing into humor research for the first time, bringing into it fresh energies and enthusiasms as well as new perspectives. For these researchers, this turned out an excellent opportunity to learn more about computational approaches to humor. Obviously, the student participants (six graduate students and two undergraduate) had the greatest opportunity to learn not only the substance of the nascent area but also about the nature of academic discourse and feedback on their own work: the students presented two papers and four posters. As all the papers, theirs prompted active questions and discussions, and the students commented verbally and by email to the organizers how much they appreciated this unique opportunity to be part of an ambitious initiative and to be able to contribute to it.

The symposium attracted contributions from scholars in linguistics, psychology, knowledge representation, computer science, engineering and technology, business, physics, therapy, psychiatry, and other areas. The centerpiece of the symposium, by general admission, was the panel that addressed the basic elements and central topics of humor computation, from its philosophy to the role of meaning in it, and what resources would be necessary for its implementation. Very characteristically for the entire symposium, their lively discussion, showing a variety of views and positions, tended to easily abandon the area of humor and to expand the thinking to vaster areas of major AI issues and concerns.

Victor Raskin and Julia M. Taylor served as cochairs of this symposium. The papers of the symposium were published as AAAI Press Technical Report FS-12-02.

Discovery Informatics: The Role of AI Research in Innovating Scientific Processes

The increasing complexity of scientific processes offers new opportunities for intelligent systems, information sciences, and human-computer interaction. The Discovery Informatics symposium was kicked off with an overview of discovery informatics by the organizers, focusing on improvements and innovations across the spectrum of scientific activities that could have significant impact on the rate of scientific discoveries. The symposium included several invited presentations, two panels, and several papers. Participants came from academe, industry, and several government agencies.

Science is a great challenge domain for AI. Scientists are overwhelmed by the growing availability of data, analytic methods, and publications. Many scientific questions require reaching outside of a given discipline, but it is often hard to identify relevant expertise. Intelligent systems that can assist or automate any aspects of scientific processes are of great value to scientists. Pat Langley of Carnegie Mellon University gave a historical perspective of AI research in computational discovery and presented his most recent work on explanation and causal modeling. Larry Hunter of the University of Colorado proposed biomedicine as a grand challenge for AI, as it is an AI-complete problem with some simplifying features and great potential for profound impact in science and society. Vasant Honavar of Iowa State University argued that there are hard AI problems in all aspects of scientific discovery processes. Barbara Ransom of the National Science Foundation discussed opportunities within EarthCube, a new NSF initiative to transform scientific practice across all geosciences through new capabilities that vastly improve productivity and support knowledge management for cross-disciplinary earth, atmospheric, and ocean sciences.

Coping with the growing availability of data is

an active area of research. Automated techniques are a way to approach this challenge. Hod Lipson of Cornell University described feature-free learning and symbolic regression techniques that enable the discovery of natural laws and invariants in a variety of large scientific data sets. A current challenge for these techniques is that when scientists are presented with interesting findings they want to see an explanation for the findings, which is hard to generate. Susan Epstein of City University of New York presented a novel clustering algorithm and its application to protein discovery. Taha Bahadori of the University of Southern California presented a new approach to extracting causal models from temporal data. Arman Masoumi from Ryerson University presented the use of automated planning to generate novel chemical compounds. An alternative to automated techniques is to recruit volunteers to process data. Chris Lintott of Oxford University talked about the expanding Zooniverse citizen science framework and the lessons learned about people's motivation and interests as an unprecedented number of volunteers classified millions of galaxy images. Citizen scientists want to investigate things they notice in the data and make discoveries for themselves, so a great challenge is to make science data and analytic software accessible to them. A panel discussed additional challenges in "big data," including relational data, genomic data, and spatiotemporal data.

The growing size of the scientific literature is another major challenge. Jude Shavlik of the University of Wisconsin talked about machine reading, where humans provide initial rules that are refined through examples extracted from text. Evaluations in web documents and geoscience articles show that human rules increase performance, but the challenge is to allow non-AI experts to specify them. William Cohen of Carnegie Mellon University described several uses of text mining in science: recommending articles to scientists, extracting and integrating facts, and integrating extracted facts with hand-coded biomedical databases. He pointed out that specialized techniques are needed to handle biomedical text. Tim Clark of Harvard University described an ontology for annotating scientific papers using semantic web infrastructure, and the challenges in creating knowledge bases that allow scientists to explore related evidence from different publications. Gully Burns of the University of Southern California described an ontology-based approach for meta-analysis of the literature applied to HIV vaccines.

Intelligent support for data analytics is also an active area of research. Leonardo Salayandia and Nicholas del Rio of the University of Texas El Paso presented workflow management and provenance support tools and discussed the challenges of assisting scientists to create visualizations. A panel discussed the opportunities in supporting individual scientists to manage metadata, publish data, and benefit from existing but difficult to use science infrastructure.

The symposium was chaired by Will Bridewell (Stanford University), Yolanda Gil (University of Southern California), Haym Hirsh (Rutgers University), Kerstin Kleese van Dam (Pacific Northwest National Laboratory), and Karsten Steinhaeuser (University of Minnesota). The papers of the symposium were published as AAAI Press Technical Report FS-12-03.

Human Control of Bio-Inspired Swarms

Robotic systems composed of a large number of entities, often called robot swarms, are envisioned to play an increasingly important role in applications such as search, rescue, surveillance, and reconnaissance operations. Today mobile robots that are deployed for such applications are still teleoperated or very closely controlled in more automated modes by a single or multiple operators. While these platforms are individually very capable, the development of cheaper hardware allows the consideration of swarm systems composed of many more robots but with each individual being far less powerful. Examples from biology indicate that such systems can be collectively more powerful than any individual robot within the team and also more than many larger, more sophisticated individual robots. Enabling a human to control such bio-inspired systems is a considerable challenge due to the limitations of each individual robot, limitations in communications, and the sheer number of robots that need to be coordinated to successfully complete a mission. Autonomous algorithms provide an opportunity to mitigate some of the complexity an operator faces in controlling such swarms, but it is not clear either (a) which tasks will ultimately need to be executed by the operator rather than by the swarm, or (b) what kinds of interactions would be needed. The goal of the Human Control of Bio-Inspired Swarms AAAI symposium was to investigate alternative forms of swarm coordination and their susceptibility to human control.

The symposium brought together academic, military, and industrial researchers from a variety of fields including control engineering, AI and intelligent agents, human factors, and distributed computing. While there was considerable commonality in the equations, interactions, and behaviors, interpretations varied among researchers with distributed robotics, biomimetic, and physicomemetic perspectives all represented. The symposium was inaugurated by a presentation

from Marc Steinberg introducing the range of research in autonomous coordination and identifying issues in human-swarm interaction setting the agenda for the symposium. Invited talks by Vijay Kumar (University of Pennsylvania) and Edward Olson (University of Michigan) provided insight into problems encountered in controlling robot teams in real environments. Olson, winner of the 2010 MAGIC competition in which his 13-robot team performed realistic large-scale search and surveillance tasks, reported on contrasting human roles that included both strategic decision making and low-level interactions with mapping software. Kumar, an early researcher in both control and biologically inspired swarms and control of formation and collective transport, addressed those subjects.

In an invited talk on the second day Magnus Egerstedt (Georgia Tech) reported on his work modeling group behaviors including models accounting for lionesses hunting in teams of threes (necessary to envelop prey) and dolphins surrounding fish between two lines (many dolphins/low effort) or in a torus (few dolphins/high effort). This line/torus distinction followed a paper presented by Michael Goodrich on the first day showing that under proper parameterization flocking behavior could take the form of one or the other holding out the possibility that this gating function might be performed by a human. Other talks addressed the problem of leader following with Jean-Pierre de la Croix demonstrating that human ability to influence swarm configurations was determined by the system's reachability and Amirpour Amraii presenting results for commands and leader influence for convergence to a consensus. Papers by Phillip Walker and Steven Nunnally addressed problems related to communication latency and bandwidth limitations. Three papers on the second day addressed the problem of incorporating memory into behavior using a pheromone metaphor. Also on the second day Thomas B. Apker presented an intriguing physicomemetic paper in which P3 AT Pioneer robots were controlled in a search and surveil task through switching behavioral laws modeled after phases of matter based on sensory triggers.

The last paper session presented alternative approaches to coordinating and controlling large numbers of robots. Chris Miller presented his Playbook approach to supervisory interaction with a hierarchical task network planner along with recent experiments demonstrating robustness in controlling UAV teams under unfavorable conditions while Scerri presented a similar scheme that automatically generated an appropriate interface for controlling teams of autonomous boats. Jacob Beal demonstrated a very different amorphous programming approach that allowed operators to specify composable individual and group behaviors so that, for example, flocking agents might also return to base for recharging and then rejoin the flock based on a second behavioral definition. A final panel chaired by Marc Steinberg and evenly divided between academics and military researchers addressed questions of human controllability over emergent coordination and the state of the art for technology transfer and integration of swarm technologies.

Michael Lewis served as chair of this symposium supported by organizing committee consisting of Katia Sycara, Michael Goodrich, Paul Scerri, and Marc Steinberg. The papers of the symposium were published as AAAI Press Technical Report FS-12-04.

Information Retrieval and Knowledge Discovery in Biomedical Text

Dramatic achievements in the biomedical domain have resulted in the exponential growth of biomedical literature over the past decade. However, the abundance of scholarly material is valuable only if efficient and reliable ways of accessing and analyzing that information are available. The purpose of this symposium was to focus our attention on novel techniques or novel applications of existing techniques to text mining and natural language processing, leading to advances in information retrieval and knowledge discovery in the biomedical domain.

The symposium brought together researchers from a variety of fields in AI. Several prominent topics emerged from the presented works, such as information extraction from biomedical literature and social media, machine learning, and natural language processing methods.

Papers in the symposium presented novel techniques for extracting explicit facts such as relations between biomedical entities, as well as discovering hidden knowledge such as new hypotheses relating biomedical concepts. This was also the theme of the talk of the invited speaker William Cohen (Carnegie Mellon University). In addition, papers examined information embedded in social media such as online forums, twitter messages, or other nontraditional sources that may help discover knowledge that might be surprisingly helpful. Personal experiences documented in these sources are often not available in traditional medical communications. Another invited speaker, Suchi Saria (Johns Hopkins University), also presented research based on nontraditional data sources. Her probabilistic model made use of easily obtainable and noninvasive physiologic measurements to recognize complex patterns for predicting infants at risk in a neonatal intensive care unit.

The symposium also featured presentations on community-organized text-mining challenges focusing on biomedical literature and clinical health records. There is a growing interest in these challenges from both academe and other research institutions as they pose key real-world problems in the medical domain and identify state-of-the-art approaches to solving such problems. The speakers discussed BioCreative, the TREC medical records track, and the BioASQ challenges. Talks covered recent advances and outlined upcoming directions in developing methods, evaluation measures, and standard formats for data interoperability and reuse. The difficulty of obtaining large-scale clinical data was discussed as an obstacle to progress in clinical health informatics.

Finally, keynote speaker David Lipman (director of the National Center for Biotechnology Information) gave a philosophical perspective on why biomedical text mining might be harder than we thought. In his talk he spoke about the productivity paradox in the computing age and the change in productivity attributed to the use of computers. In the scientific field, undeniably, computers have driven progress. But, how much has the biomedical text-mining field been affected? He further examined ways that measure success and highlighted related issues. For example, scientific literature data could be flawed, as revealed in recent thought-provoking studies on reproducibility of scientific findings in the biomedical domain (for example, Begley and Ellis, *Nature* 2012). So, how does one design the measures that correctly reflect the quality of extracted information and discovered knowledge?

In conclusion, the symposium was successful in bringing together scientists from different subfields of text mining and in creating an interactive and productive environment for discussion. The participants found the symposium useful and expressed interest in attending future events with the same focus as this one. In addition, the symposium organizers would like to thank the reviewers, for their hard work and dedication to maintaining a professional review process, and all authors of submitted papers, for their diligences in responding to reviewers' comments.

Lana Yeganova and Rezarta Islamaj Dogan served as cochairs of the symposium. Vahan Grigoryan and Mark Dredze served as members of the organizing committee. The papers of the symposium were published as AAAI Press Technical Report FS-12-05.

Machine Aggregation of Human Judgment

Traditionally, data is the input and judgments are the output in most of AI. However, for data-poor problems, there is no substitute for human judgment. Or as is well known, there are many circumstances where humans can make a lot better estimates than machines. Then after humans turn data or their beliefs into judgments, the machines or institutions combine those judgments. This work is often inspired by a wisdom-of-the-crowd idea that we often rely too much on arrogant overrated experts instead of the underrated insight of everyone else. It helps to transform probability estimates into logarithmic odds before aggregating them in some ways. Weights can then correct well for predicable over- or underconfidence.

The Machine Aggregation of Human Judgment AAAI symposium brought together researchers from a variety of interdisciplinary fields such as human computation, collective intelligence, graphical modeling, probabilistic inference, machine learning, crowdsourcing, psychology, computational social science, and prediction markets. Many participants are from the research teams of the Aggregative Contingent Estimation (ACE) program awarded by the Intelligence Advanced Research Projects Activity (IARPA). One of their goals is to beat the simple average on the opinion pool. In addition, papers presented in the symposium cover topics such as information elicitation, problem decomposition using graphical models, and heuristics for improving forecast aggregation. The symposium also included two very interesting invited talks. A talk given by Greg Siegle (University of Pittsburgh) focused on the promise of combining AI techniques and crowdsourcing in psychiatric neuroscience. A live demonstration using a cheap 14-sensor headset for measuring the brain electroencephalogram excited the audience and showed the potential of recording and identifying patterns by crowdsourcing. A talk given by Jason Matheny (IARPA) outlined the current and past research using human and machine models to forecast global events, and some unexplored opportunities to combine human and machine forecasts had been well discussed.

The symposium participants realized that the best way to obtain good crowd wisdom is to have a good crowd. Contributions that most improve accuracy are more extreme, more recent, by those who contribute more often, and come with more confidence. Training, better elicitation, and making better incentives all help to establish such an elite crowd. Last, participants shared the goal of developing methods for better aggregation on human judgment and followed up with a joint document for possible future publications and funding opportunities.

Wei Sun served as the chair of this symposium. The papers of the symposium were published as AAAI Press Technical Report FS-12-06.

Robots Learning Interactively from Human Teachers

To harness the full capabilities of robots, we should enable human end users to customize their robots' behaviors and teach them new ones. Furthermore, it should be intuitive for these users to do so — as simple as teaching other humans. Because of its accessibility to nonexpert users, interactive learning is a promising method to achieve this goal and has attracted widespread attention in recent years. However, many challenges remain to make these methods applicable to robots.

The goals of this symposium were (1) to increase awareness and interest in interactive learning methods, (2) to foster interdisciplinary collaboration among a diverse set of attendees, and (3) to develop a taxonomy of the various research topics in this area, so as to tie different topics together and discover fruitful directions for future efforts.

The symposium hosted four plenary talks, each focusing on different aspects of interactive learning for robots. John Laird from the University of Michigan gave an overview of the instructional learning. This involves humans teaching tasks to a robot with natural language instructions, and by answering the robot's questions.

Julie Shah from MIT talked about human-robot cross-training in collaborative manufacturing domains. Her work addresses the challenge of teaching collaborative tasks to robots, by exchanging the roles of the human and the robot back and forth. Siddhartha Srinivasa from Carnegie Mellon University talked about state-of-the-art methods for manipulation in cluttered environments, which can be used as a vocabulary of skills for learning higher-level tasks. Finally, Paul Ruvolo from Bryn Mawr College spoke about learning models of infant-mother interaction, with applications to generation of infantlike behavior on a robot and detection of abnormal development in infants.

Fourteen peer-reviewed papers were presented throughout the symposium. Some common themes in the presented papers were the use of teleoperation for teaching skills to a robot, teleoperation in the context of robotic prosthetics, interactive instructional learning through natural language, active learning through questions asked by the robot, and interactive sequential learning methods such as learning from demonstration or from human-generated reward. Symposium organizers also presented their works in the sessions that aligned with their own research topics.

A highlight of the symposium was a series of organizer-led discussion sessions. During these sessions, attendees sought to identify key challenges of interactive learning and define a set of standardized benchmarking tasks that could be used to compare approaches. In addition, we tried to identify the characteristics of problems for which interactive learning from humans is the ideal approach and to reach an agreement that different approaches (preprogramming, exploration-based learning, planning) might be better solutions for certain problems. With enthusiasm and collaboration from the participants, the symposium concluded with consensus goals to facilitate follow-up discussions and broader collaboration within the Robots Learning Interactively from Human Teachers community.

Cetin Mericli served as chair of this symposium. Brenna D. Argall, Maya Cakmak, W. Bradley Knox, and Tekin Mericli all served on the organizing committee. The papers of this symposium were published as AAAI technical report FS-12-07.

Social Networks and Social Contagion

With the emergence of computational social science as a field of collaboration between computer scientists and social scientists, the study of social networks and processes on these networks (social contagion) has been gaining interest. Many topics of traditional sociological interest (such as the diffusion of innovation and the emergence of norms) can now be studied using detailed computational models and extensive simulation. The advent and popularity of online social media also allow the creation of massive data sets that can inform models and underlying sociological theory. The ubiquity of smart devices (such as smart phones) also provides opportunities to gather extensive data on the behaviors and interactions of humans in real space.

The goal of this symposium was to bring together a community of researchers interested in addressing these issues and to encourage interdisciplinary approaches to these problems. It attracted researchers from multiple fields, including game theory, network science, social science, public health, data mining, and security.

One major theme of the symposium was the use of very large-scale, detailed simulation models known as synthetic information models for addressing policy problems, such as interventions during an infectious disease outbreak or during a disaster (natural or human-initiated).

The symposium included four invited talks. Ross Hammond (Brookings Institution) presented work on modeling the spread of obesity, Jure Leskovec (Stanford University) spoke about the spread of information in social media networks, Patricia Mabry (Office of Behavioral and Social Science Research, NIH) discussed the NIH perspective on computational social science, and V. S. Subrahmanian (University of Maryland), who spoke to a

joint session with the symposium on Machine Aggregation of Human Judgement, presented work on a new measure of centrality of nodes in a network, called diffusion centrality.

The symposium also included a panel discussion, titled "Computational Social Science: Challenges and Opportunities," in which Jure Leskovec, Patricia Mabry, and Stephen Eubank (Virginia Tech) participated. Winter Mason (Stevens Institute of Technology) moderated the panel.

Another major theme was the use of game theory in blocking social contagion and its application to security domains. Papers on these topics presented novel techniques for incrementally constructing the payoff matrices of very large games and using these to find a good set of nodes to block the spread of a contagion.

A third theme was the analysis of online social environments. Work presented on this topic included a study of the outbreak of "wars" in a massively multiplayer online game, a study of temporal mobility patterns of location-based social network users, and the emergence of consensus and common knowledge on online social networks. Work was also presented on analyzing cooperation and collaborative problem-solving in networks.

The variety of topics and breadth of discussion served as a reminder of the diversity of applications and approaches in computational social science. Symposium participants discussed possibilities for crossover and collaboration and agreed on the importance of having a forum such as this symposium for encouraging new ideas.

Samarth Swarup served as the chair of this symposium. Madhav Marathe, Kiran Lakkaraju, Noshir Contractor, Milind Tambe, and Winter Mason were coorganizers. The papers of this symposium were published as AAAI Press Technical Report FS-12-08.

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Michael Lewis is a professor of information science in the School of Information Sciences at the University of Pittsburgh.

Cetin Mericli is a postdoctoral fellow in the Computer Science Department at Carnegie Mellon University.

Parisa Rashidi is an assistant professor in the Biomedical Informatics division of the Feinberg School of Medicine at Northwestern University.

Victor Raskin is a distinguished professor of English and linguistics at Purdue University.

Samarth Swarup is a research scientist at the Virginia Bioinformatics Institute, Virginia Institute of Technology.

Wei Sun is a research assistant professor at the Center of Excellence in Command, Control, Communications, Computing and Intelligence (C4I), George Mason University.

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