

Reports of the 2012 AIIDE Workshops

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■ *The 2012 AIIDE Conference included four workshops: Artificial Intelligence in Adversarial Real-Time Games, Human Computation in Digital Entertainment and AI for Serious Games, Intelligent Narrative Technologies, and Musician Metacreation. The workshops took place October 8–9, 2012, at Stanford University. This report contains summaries of the activities of those four workshops.*

Artificial Intelligence in Adversarial Real-Time Games

With the advent of the BWAPI StarCraft programming interface, interest in real-time strategy (RTS) game AI has increased considerably. At the 2011 AIIDE conference, several papers on the subject were presented, ranging from build order planning, over state estimation, to plan recognition. In addition, a panel discussion on RTS game AI took place, the StarCraft competition was discussed, prizes were awarded, and two exhibition match replays were shown. For some conference attendees this was a bit too much StarCraft content. For others it wasn't enough because little was said about the inner workings of the strongest competition entries. To address these concerns, holding a workshop on RTS game AI topics at AIIDE 2012 was proposed in the organizing meeting that concluded the AIIDE 2011 conference. In subsequent discussions with members of the organizing committee it was felt that the coverage of the workshop should be extended to adversarial real-time games, so that, for instance, First-Person-Shooter game AI would be included.

The goal of the workshop was to bring together AI researchers and game AI programmers from industry interested in adversarial real-time game AI, to present and exchange ideas on the subject, and to discuss how academe and game companies can work together to improve the state of the art in AI for real-time games. We received nine paper submissions, of which seven were accepted and six were presented in three 75-minute sessions. This gave presenters lots of time for covering details and discussions on topics ranging from algorithms for improving small-scale combat, learning actions, switching policies, game replay data mining, and playing pursuit-evasion games.

After the paper presentations, David Churchill gave an overview of this year's StarCraft AI Competition and showed five videos: a highlight reel that demonstrates current RTS game AI technology and four commented man-machine games that remove all doubt about who dominates RTS games.

The workshop was concluded by a group discussion about ways RTS game AI research contributes to the field of AI in general, what the biggest obstacles are toward reaching profession-

al RTS playing strength, how to attract more interest in RTS competitions, and creating RTS game AI benchmarks.

We'd like to thank the program committee members and AAAI for their help organizing this successful event. Given the considerable interest in it, we are looking forward to a follow-up workshop next year.

The Artificial Intelligence in Adversarial Real-Time Games workshop was organized by Michael Buro (University of Alberta, Canada). The six papers were published as AAAI Technical Report WS-12-15.

Human Computation in Digital Entertainment and AI for Serious Games: A Joint Workshop

This joint workshop was formed from the Human Computation in Digital Entertainment workshop and the AI for Serious Games workshop.

Human Computation in Digital Entertainment

The rise of social computing has provided instant access to massive groups of people and the digital artifacts they are producing. The ability to leverage the knowledge and skills of individuals in these online communities is radically changing the way we think of computation, artificial intelligence, and how research is conducted in general. The types of problems being explored using human computation are extraordinarily diverse, ranging through molecular biology, neuroscience, economics, social science, robotics, computer vision, machine learning, and natural language processing. Although these fields are highly diverse, digital interactive entertainment is emerging as a common thread that binds many of these approaches together.

The goal of the Human Computation in Digital Entertainment workshop was to explore this emerging relationship between human computation and entertainment. Our primary interest was to understand how games were being used as a mechanism for delivering human-computation tasks and conversely how human computation is being used to expand the scope of inter-

active digital entertainment. For example, one of the major impacts in this area is a growing body of research showing that the engagement people have with games can be a more powerful motivator than monetary rewards in encouraging meaningful participation with a task. There have also been many compelling uses of crowdsourcing for creating digital content specifically for enhancing the realism and playability in digital media experiences.

The Human Computation workshop brought together work in a variety of unique topics of interest within this area, including network security, sentiment analysis, cultural modeling, story topic modeling, facilitating creativity, data collection, and level design. We were surprised not only by the largely heterogeneous topics pursued within this area, but also by the diverse methods and views of how human computation and digital entertainment complement each other. In some cases games were used as a motivational tool to engage users to perform boring tasks in lieu of direct monetary payment. In others they were used as a mechanism for transforming problems from a representation that is difficult for people to reason about into an isomorphic representation that is more suitable for human manipulation. Additionally, not all of the work used games at all but were tools for inspiring creativity or for creating content for digital entertainment platforms.

Although the approaches and applications were highly varied, there were several themes and open questions that persisted throughout the workshop. A surprisingly pervasive question arose about whether the transformation of a target problem to a game was worth the effort or if a more direct method of crowdsourcing would be more effective. Several of our participants also noted that it was difficult to maintain enthusiasm and participation after the first week of launching a crowdsourcing game. Conversely, there was a consensus that games provide a platform that facilitates work forces capable of solving highly complex problems that is typically not possible in other crowdsourcing platforms and labor markets.

Reid Swanson, Jeff Orkin, and Rajan Vaish served as co-chairs of this portion

of the joint workshop. The papers of the workshop were published as AAAI Press Technical Report WS-12-17.

Artificial Intelligence for Serious Games

The AI for Serious Games workshop explored the unique problems, methods, and solutions in serious game AI, both in current research and existing serious games, and used this exploration to identify and define promising research pathways and needs. Four papers were published as a result of this workshop. The papers were written by Marcela Borge (Pennsylvania State University) and Barbara White (University of California, Berkeley); A. Brisson and colleagues (Technical University of Lisbon); Joseph Bohn and Elizabeth O'Neil (ONR); and Brent Harrison and David Roberts (North Carolina State).

This workshop was organized by James Niehaus (Charles River Analytics), Alex Godwin (Charles River Analytics), Sean Guarino (Charles River Analytics), and G. Michael Youngblood (University of North Carolina, Charlotte). No further information about the workshop was submitted to *AI Magazine* by press time.

The papers of the workshop were published as AAAI Press Technical Report WS-12-17.

Intelligent Narrative Technologies

Narrative is a pervasive aspect of human culture; it is one of the fundamental frameworks by which people view the world and comprehend their experiences. The processes of understanding and manipulating a narrative come naturally to people, but this task poses significant challenges to computational systems. As computers play an ever-increasing role in social interaction, education, and entertainment, they introduce novel opportunities for leveraging narrative technologies to facilitate communication. Built upon the past interactive narrative technologies workshops, this workshop aimed to advance research in artificial intelligence for the computational understanding and expression of narrative.

The workshop brought together a

multidisciplinary group of researchers including computer scientists, psychologists, narrative theorists, media theorists, creative writers, and members of the interactive entertainment industry. From this broad expertise, the workshop focused on computational systems to represent, reason about, adapt, and perform interactive and noninteractive narrative experiences. The workshop opened with a keynote by Emily Short, Creative director at Linden Lab, on Constructive Interference: Techniques for Blending Traditional Narrative Structures with Character Simulation.

Four themes emerged from the papers presented in the two-day workshop. First, it is no longer adequate for digital stories to be simply interactive; in order to deeply engage players, these stories need to be adapted to the intention and preferences of individuals. Papers on the theme of adaptive stories presented a wide range of approaches, including player modeling, goal recognition, adaptive quest narrative, and automated story evaluation. A second major theme was more efficient authoring of interactive adaptive story content, currently a well-known bottleneck for interactive narrative technologies systems. Papers on this theme explored new ways of eliciting story structures from human story authors as well as collecting stories using crowdsourcing. A third theme was reexamining what is a good starting domain for the whole field. Farce and a simple improv game named Three-Line Scene were both used as a good starting domain because these genres can tolerate the sort of weaknesses found in the output of current AI narrative systems and thus allow us to bootstrap toward more complex stories. Finally, the workshop looked at a range of AI techniques for interactive narrative technologies, including planning, network analysis, and procedural animation for nonverbal cues.

The workshop included a panel discussion on the near future of interactive narrative technologies. The three panelists, each prominent members of the interactive narrative technologies community with very different backgrounds, showed a surprising amount of agreement. All three expressed a desire for a set of publically available, modular narrative tools into which

researchers could plug new pieces of experimental technology. All agreed on the importance of empowering the users of intelligent narrative systems to create stories of interest specifically to them.

Following the tradition of the previous workshops, this workshop included an interactive narrative game and activity session as part of the community building activities. Games included *Fiasco*, *Fabula*, *Resistance*, and *Aye*, *Dark Overlord!*

The Interactive Narrative Technologies workshop was coorganized by Stephen G. Ware (North Carolina State University), Jichen Zhu (Drexel University), and Rania Hodhod (Ain Shams University and Georgia Institute of Technology). The 10 full papers and 2 poster abstracts of the workshop were published as AAAI Technical Report WS-12-14.

Musical Metacreation

There are many forums presenting the advances in the practice and theory of computer music. However, no academic, peer-reviewed event is focusing solely on generative music. The Musical Metacreation workshop at AIIDE12 was organized to fill this gap. As such, this one-day event marked a significant step toward the formation of an international research network focused on the automatic generation of music and its application to professional music creation, new music compositions and performance, interactive game music, and the like.

As explicit in its name, this new workshop series focuses on musical metacreation, that is, endowing software with musical creativity. While open to the usual problems covered in computer music, such as providing computational models for music perception, representation, and cognition, the workshop focused on the challenges specific to generative music. For example, the composition problem is to generate a composition (often represented as a score), while the interpretation problem is to generate an audio rendering of a given composition. Systems that address these two canonic problems or any related ones cover the whole spectrum between (1) symbolic

computing versus raw audio signal processing, (2) corpus-based systems that have been exposed to musical compositions or interpretations versus systems that generate from first principles, computational heuristics, and expert knowledge, (3) individual versus collective musical creativity, and (4) entirely generative systems versus interactive computer-assisted musical creativity.

In its first iteration, the workshop included 17 contributions selected through peer reviewing out of 33 submissions. Technical papers, position papers, and demonstrations were evenly spread across theory and practice. Topics included deep learning for music, computational music theory, the evaluation and aesthetics of automated music generation, as well as the role of generative music in the scientific and sociological understanding of music as a system of cultural activity.

Much research in this growing field has been led by technically competent creative artists, and its natural mode of evaluation is in the everyday context of musical performance and composition. Nevertheless, major music technology research labs bring together engineering, systematic musicology, and the creative arts to produce scientifically rigorous research combined with creative outputs. One of the major outcomes of the Musical Metacreation workshop was the honing of this double evaluation framework.

This workshop was cochaired by Philippe Pasquier, Arne Eigenfeldt, and Oliver Bown. The papers of the workshop were published as AAAI Press Technical Report WS-12-16.

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