work put in by the team from Rees Management Group led by Jane Shepard was also instrumental in the successful organization of the conference.

In addition to the proceedings, IJCNN 2011 also generated other useful multimedia. The IEEE CIS VP for Education, Jennie Si, organized the recording of all plenary talks, which will be available through the IEEE Computational Intelligence Society. All talks in the "From Brains to Machines" symposium were also recorded, and

will be made available to the public. A special issue of *Neural Networks* with expanded versions of selected IJCNN papers will be published in mid-2012, edited by Jean-Philippe Thivierge and the members of the IJCNN 2011 Executive Committee.

Three decades ago, the computer revolution took root and flourished in the fertile soil of what came to be known as Silicon Valley. It is appropriate that those who are igniting another technological revolution to create truly

life-like intelligence assembled in the heart of Silicon Valley once again to exchange ideas and celebrate the future. It was a great honor for me to be a part of this exciting event. I am sure that IJCNN 2011 will be the prelude to greater growth and success for the entire field of neural networks.

[Note: This report is being published simultaneously in the *International Neural Network Society Magazine* and the *IEEE Computational Intelligence Magazine*.]

2011 IEEE Conference on Computational Intelligence and Games

Kyung-Joong Kim
Sejong University, SOUTH KOREA
Sung-Bae Cho
Yonsei University, SOUTH KOREA

Out of the economic and climatic turmoil, we had a dreamy summer-end with game fever in Seoul, Korea, from 31 August to 3 September 2011. This is the seventh IEEE Conference on Computational Intelligence and Games (CIG)[1]. Since 2005, the conference had been in Essex, Reno, Hawaii, Perth, Milan, Copenhagen, and finally South Korea, which is famous for the popularity of enthusiastic young gamers as well as traditional board games. GO is so popular that it is not difficult to find private GO academies and playing rooms in Seoul (called as KI-WON). StarCraft is one of the most popular games in Korea; there are plenty of professional gamers sponsored by major companies and a few TV channels specialized for games. When we got appointed as the host of the CIG, General Chair Sung-Bae Cho and Local Chair Kyung-Joong Kim felt a strong responsibility to make the synergy between the CIG community and the Korean game culture.

CIG 2011 features three keynote addresses and four tutorials from prominent experts, 46 full papers accepted for oral presentation and six competitions. Keynote speakers include Greg Ashe from Blizzard Entertainment, Nathan Sturtevant from University of Denver and Jong-Hwan Kim from KAIST. Four tutorials are provided at the first day of the conference: Bob Reynolds from Wayne State University, Daniel Ashlock from University of Guelph, Georgios Yannakakis and Julian Togelius from IT University of Copen-

hagen and Mike Preuss from Dortmund University.

In total, we received 75 papers from 27 countries that have been reviewed by at least three domain experts, resulting in 45 papers accepted (acceptance rate: 60%) for presentation and publication in the proceedings (41 regular papers and 4 competition papers). There were 95 reviewers who vetted each paper thoroughly. There were about 90 participants and nearly 65% of them are international registrants. We have six exciting competitions including the

[1] http://cilab.sejong.ac.kr/cig2011

Participants talking over a cup of coffee outside the main auditorium.

2K–BotPrize competition, an interactive Turing test realized through Unreal Tournament, the StarCraft RTS competition, the simulated car racing championship, the Super Mario level generation competition and the Ms Pac-Man competitions.

Keynotes

Greg Ashe, director of business intelligence in Blizzard Entertainment, was the first keynote speaker at the first day of conference. In this talk, he introduced their team's effort on using machine learning and data mining for Blizzard's game business. He reported the application of clustering algorithms to group play styles in World of WarCraft. Based on the play styles, they tried to estimate the player's future state using Makov models. Interestingly, they also predicted players' behavior over multiple quit-comeback cycles. Using classification models, they categorized the contacts into pre-defined buckets to improve customer service and detect fraud (account takeovers, bot and spam).

In the morning of the second day, Nathan Sturtevant presented invaluable experience of building a path-finding engine for "Dragon Age Origins" released in November 2009. Over 3 million copies of the game were shipped. Because his work is based on the commercial game, the presentation contains a lot of videos and nice animations. Although the problem is simply defined as a method to find an optimal path from starting to goal positions, the reality is much more complex. There are static and dynamic objects to be considered in the path generation and the final path should be as natural as possible. It is necessary to smooth the path and consider personal space near human characters. It is also challenging to generate character's behavior animation (walking, running, jumping, and turning) automatically given the path found. Finally, he mentioned important things leading to the success of the collaboration between industry and academia.

On the last day of conference, Jong Hwan Kim introduced cyber-physical robot systems combining software and hardware robots. The software robot has personality, emotions and intelligence to be evolvable and download-able to different types of robots. He demonstrated the concept in small-sized robots for kids (with Korea Telecom) and software robots on cellular phones (with Samsung). He defined the robot architecture to consist of several layers ranging from behavior to cognitive functions. He mentioned the possibility of using robotic systems to create new kinds of game.

Tutorials

We had four tutorials at the first day of the conference. Bob Reynolds started the tutorial day addressing the new advancement of cultural algorithms for games. The purpose of his approach is to identify the minimal social structure that can be used to solve problems and to reflect social networks to improve the interaction between the belief and population space in the algorithm. In the later part of the talk, he showed us some demonstration of the cultural algorithms applied to the games, including 3D racing game, Land Bridge, Super Mario, and StarCraft.

The second speaker, Daniel Ashlock, introduced his recent works on understanding and analyzing the evolution and their solutions. They are competitive analysis, fingerprinting, agent-case embeddings, and non-linear projection. For example, he compared five payoff matrices for IPD (Iterated Prisoner's Dilemma) game using several competitive analysis methods: mean tournament analysis, comparison of population members, and individual agent victories.

In the next tutorial, Georgios Yanna-kakis and Julian Togelius presented the importance of capturing players' experi-ence and their use in procedural content generation. They reported several ways to measure the experience level objec-tively using eye tracking and head-pose detection. Once you have the player's experience model, it is possible to use it in the procedural content generation. They showed a lot of examples for the games of Super Mario, Tomb Raider: Underworld, Simulated Car Racing, StarCraft, FPS game, and physical inter-active games.

In the last tutorial, Mike Preuss addressed the importance of experimen-tation (empiricism) in the CI-based game research to give strong real-world influences. Because of the complexity of the games (for example, RTS game), it is hard to develop theories and algorithms for the game without experimentations. During the talk, he provided well-sum-marized information on the design, eval-uation and visualization of experiments.

Competitions

In this year, we have six game AI com-petitions: Simulated car racing champi-onship, Mario AI championship, StarCraft competition, Ms Pac-Man screen capture competition, Ms Pac-Man vs. Ghost-Team competition, and 2K BotPrize competition. In the simu-lated car racing competition, organizers introduced the use of interactive evolu-tion to generate the new test tracks which were unknown to the partici-pants before the event. It shows that automatic content creation approach can be beneficial to the competition-based AI research. In the StarCraft com-petition, ten bots are registered for the full game track which is the same con-ditions to the human's matches. All the high-level rankers from 1st to 4th chose Protoss as their race. Although the best players show impressive performance, there are still remaining challenges to be solved. For example, most players use the pre-defined strategy regardless of other player's strategy and ignore the importance of scouting.

In the Ms Pac-Man screen-capture competition, the software agent world record had been 30,100 scored by ICE Pambush team since 2009. In this CIG,

the record was broken by Nozomu Ike-hata and Takeshi Ito. They used MCTS (Monte-Carlo Tree Search) and scored 36,280. In addition to the screen-capture competition, Ms Pac-Man versus Ghost Team competition was organized and gained popularity. 33 controllers were submitted from a total of 21 competitors from 10 different countries[2]. The organizers provided with a nice web-based interface where the competitor easily submit their own controllers and evaluate the goodness of entries. In the website, you can see the game replays and hall of fame. Unlike other competitions, the goal of 2K BotPrize is to make a controller that plays like humans for Unreal Tournament 2004. The ICE-CIG2011 from Ritsumeikan University won this year's competition but they failed to get the major prize of A$7,000 cash (indistinguishable from a human player).

For more information on the games-based competition, please drop by the games portal at http://dasan.sejong.ac.kr/~kimkj/cim/index.html.

Special Events
In this CIG, we focused on the events that are useful to reduce the gap between academia and industry in the game AI research. Unlike previous year's CIGs', the conference venue was at a big convention center COEX close to game companies. For example, NCSoft, one of the biggest online-game companies in Korea, decided to support this event and the AI task force team attended the whole conference and shared their views with other registrants. On the second day, NCSoft organized a special session entitled "NCSoft, connecting the world with entertainment" to introduce their games and include a session for question and answers.

Game broadcasting channels, professional gamers, and their teams sponsored by big companies (for example, Samsung) show very special gaming culture of Korea. Companies invest money to hire famous professional gamers in their team and the player wears suits with

[2] http://www.pacman-vs-ghosts.net/cig11results/

Special event with a professional gamer.

A traditional Korean performance at the Banquet place.

logos of the sponsor. On the first day of CIG, we invited a professional StarCraft gamer, Ji Hoon Seo (CJ Entus) who had won the prize of World Cyber Games 2004. He was called as "Perfect Terran." Now, he is a playing coach and active professional StarCraft gamer sponsored by CJ corporation. During the event, we organized a 1 vs 3 match (three participants play against Ji Hoon) and a question and answer session. Gabirel Synnaeve, Peter Cowling and one guy (we failed to identify his name) formed a team on the day. The game resulted in a draw. At the question and answer session he was questioned on the way to improve his skills and the effect of psychological effects on the games.

On the night of the third day, we had the conference banquet at Korea House (http://www.kangkoku.or.kr/eng/index.html), which feasts on Korean royal cuisine from the period of Joseon Dynasty, and provides traditional arts performances by top artists (Intangible Cultural Properties). After a long journey in the metropolitan rush hour, the delegates enjoyed the traditional Korean meals and performances.

Awards
The best paper award was decided through the organizing committee members' vote. The papers with the highest peer-review scores were chosen as candidates and their presentations were evaluated by the members. The final decision was made after all the conference sessions closed. While all the candidate papers were excellent, the winner of the best paper award was Jacob Schrum and Risto Miikkulainen from University of Texas, Austin for their paper "Evolving Multimodal Networks for Multitask Games." The paper presents the two approaches (multitask learning and mode mutation) to evolve multimodal networks for two multitask games, Front/Back Ramming and Predator/Prey. It is challenging to evolve behaviors in multitask domains, where separate tasks have their own dynamics and objectives. They carefully analyzed the characteristics of the two approaches by evolving neural networks for multitask games.

In addition, to encourage the young researchers, the best student paper award was given to Noor Shaker at IT

> **It is challenging to evolve behaviors in multitask domains, where separate tasks have their own dynamics.**

University of Copenhagen for the paper "Feature Analysis for Modeling Game Content Quality" authored by Noor Shaker, Georgios N. Yannakakis and Julian Togelius. These awards were presented to the recipients at the closing session of the last day.

Concluding Remarks

We would like to thank all the people who made this conference possible. First of all we would like to thank the organizing committee: program chairs Simon Lucas and Philip Hingston; competitions chair Julian Togelius; proceedings chair Mike Preuss; publicity chair Clare Bates Congdon; special sessions and tutorials chair Georgios Yannakakis; and the local chairs Kyu-Baek Hwang and Eun-Youn Kim. They shared their wisdom and experience of running this conference before, and their tireless efforts made this conference possible.

We also want to thank our sponsors: Our main sponsor the IEEE Computational Intelligence Society, NCsoft, Global Education Center for Engineers, National Institute for Mathematical Sciences, Seoul MetroPolitan Government, and the BK21 Project Research Group, Dept. of Computer Science, Yonsei University. Furthermore, we would like to thank our keynote and tutorial speakers, who generously gave their time to come here and share their knowledge.

Last but certainly not least, we would like to thank the people that made this conference possible. All the delegates who worked hard to research what is presented at this conference, those that chose to submit the papers here, and those that came all the way to Seoul to spend four days together talking about computational intelligence and games. We cannot forget the passionate discussions in the COEX during the day, as well as in the street bars on sleepless nights. We also want to acknowledge the helpful oversight of Gary Fogel, VP of CIS Conferences, and the support of Gary Yen, President of the IEEE CIS.

We look forward to seeing you in the IEEE CIG 2012, which will take place in Granada, Spain, from 12 September to 15 September 2012. ☏

Editor's Remarks

making its way into our everyday life. Service robots that function in our human environment are greatly enhanced with the use of CI in natural human-robot interface to make them easier to communicate with, especially for non-expert users.

In this issue's *Book Review*, Robert John looks at the latest publication on *Fuzzy Networks for Complex Systems: A Modular Rule Base Approach* by Alexander Gegov. In the *Career Profile*, the new IEEE CIS President, Marios M. Polycarpou, shares his journey to success as well as his plans and priorities for CIS in the coming year through an exclusive interview with *CIM*. We also feature a report by the Social Media Subcommittee (SMS) of CIS which was set up to promote CIS membership and activities as well as to leverage its online presence. In this issue, we also bring you reports from three CIS sponsored and/or co-sponsored conferences, including IEEE CEC 2011, IJCNN 2011, and IEEE CIG 2011.

The *CIM* is continually exploring new initiatives to better serve the needs of our membership. I am pleased that starting from this issue, the digital edition of *CIM* will be delivered to CIS members via email, which allows readers to access or view the contents of *CIM* conveniently. I hope this issue has inspired you in applied computational intelligence and I look forward to hearing about your researches and learning made as we forge ahead in 2012 together!

K. C. Tan

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