Computer Games and Intelligence Workshop

Keio University
Yokohama, Japan
15, August, 2013
16:00-20:00

Organized by
ICGA

Co-organized by
IPSJ-SIG-GI

Chairs

Dr. Takeshi Ito (The University of Electro-Communications, Japan)
Dr. Kristian Spoerer (Japan Advanced Institute of Science and Technology, Japan)
Prof. Dr. Hitoshi Matsubara (Future University Hakodate, Japan)

Special thanks

Hiroyuki Iida (Japan Advanced Institute of Science and Technology, Japan)

Committee

Prof. Dr. Takenobu Takizawa (Waseda University, Japan)
Prof. Dr. Reijer Grimbergen (Tokyo University of Technology, Japan)
Prof. Dr. Masato Shinoda (Nara Women's University, Japan)
Dr. Tetsuro Tanaka (The University of Tokyo, Japan)
Dr. Kokolo Ikeda (Japan Advanced Institute of Science and Technology, Japan)
Dr. Yoshimasa Tsuruoka (The University of Tokyo, Japan)
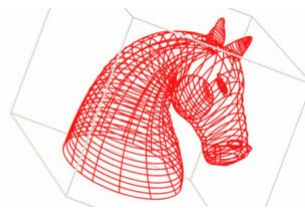Dr. Kunihito Hoki (The University of Electro-Communications, Japan)
Dr. Kazuki Yoshizoe (Japan Science and Technology Agency, Japan)
Prof. Dr. Ingo Althoffer (Friedrich-Schiller-Universität Jena, Germany)
Dr. Junji Nishino (The University of Electro-Communications, Japan)

Schedule

<Session 1> Chair:Junji Nishino (100min)

16:00 – 16:20	Synchronized Combinatorial Games *Alessandro Cincotti and Hiroyuki Iida*
16:20 – 16:40	Random Lego(TM) Structures and Analog Monte Carlo Procedures *Ingo Althöfer*
16:40 – 17:00	The Classic board game history, Asian Modern Game "Sakoku" problem and its countermeasures *Xiong Shuo*
17:00 – 17:20	Enhancing the Efficiency of Parallel Game Tree Search in Desktop Grid Federations *Lung-Ping Chen I-Chen Wu, Chih-Wei Hsieh, Yuan-Yao Chang, and Hung-Hsuan Lin*
17:20 – 17:40	Chance Node Sensitivity of Daihimin *Junji Nishino and Tetsuro Nishino*

17:40 – 18:40 Break Time

<Session 2> Chair:Takenobu Takizawa (80min)

18:40 – 19:00	Contemporary Computer Shogi (2013) *Takenobu TAKIZAWA*
19:00 – 19:20	Shape-Keeping Heuristics *Taichi Ishitobi, Alessandro Cincotti, Hiroyuki Iida*
19:20 – 19:40	Cognitive Science Evaluation of Proposed Method for using Machine Learning to Regulate the Competency Level of a shogi Computer Program *Takafumi Nakamichi and Takeshi Ito*
19:40 – 20:00	An Analysis of Consultation Algorithm with Random Numbers *Yuichiro Sato, Alessandro Cincotti, and Hiroyuki Iida*

Synchronized Combinatorial Games
Alessandro Cincotti and Hiroyuki Iida

*Abstract:*In synchronized games players make their moves simultaneously rather than alternately. The results presented in this paper show the concrete possibility to develop a theory to classify and analyze synchronized combinatorial games. An analysis of Synchronized Childish Blue-Red Hackenbush Strings is also presented.

Random Lego(TM) Structures and Analog Monte Carlo Procedures
Ingo Althöfer

*Abstract:*Recently we discovered a phenomenon: When filled with many single Lego bricks, a washing machine generates random complexes. This analog generation process may be used in Monte Carlo-based procedures for building new Lego structures and for interactive "generative design". Our work and also this report are preliminary and tentative.

The Classic board game history, Asian Modern Game "Sakoku" problem and its countermeasures
Xiong Shuo

*Abstract:*In ancient times, the classics board game had successfully spread over the all world, such as Chaturanga became into Shogi, Chess and Xiangqi. However, in recent years, the game industry is developing fast in many countries, Japanese Game and Chinese Game are all have some opportunity and problems. Both Japan and China the most serious problem is the "Seclusion From the Outside World" (鎖国), but the reason is different. Now the Chinese game industry is being the development period and the Japanese game industry is being the heyday period, if the SFOW problem would not to be solved, the Japanese game industry would decline and fall behind that of Western, some Japanese genius game designers such as Kojima Hideo [1] and Inafune Keji [6] have realized that, also the Chinese of that would lose the best chance to improve game industry then stop developing in the future.

Enhancing the Efficiency of Parallel Game Tree Search in Desktop Grid Federations
Lung-Ping Chen I-Chen Wu, Chih-Wei Hsieh, Yuan-Yao Chang, and Hung-Hsuan Lin

*Abstract:*A desktop grid federation enables organizations to solve large-scale applications via resource sharing. To ensure fairness, there is a resource broker controls resource consumption of each organization, usually proportional to user credits. This paper studies this type of computing platform for game tree search applications. Due to the resource competition as well as dynamic task generation and pruning of tree search tasks, the credits may fluctuate dramatically and thus the resource allocation has a tendency to be altered frequently. This paper demonstrates that a stable processor allocation policy leads to higher efficiency for the parallel tasks. We develop a new brokering algorithm that ensures fairness and stable resource allocation to enhance the total efficiency of the federation. Using this broker, we construct an efficient platform on which users can easily deploy and manage complex game tree search tasks.

Chance Node Sensitivity of Daihimin
Junji Nishino and Tetsuro Nishino

*Abstract:*In this paper we introduce a Chance Node Sensitivity (CNS) that is a novel index for imperfect information games, and show experimental results on computer Daihinmin card game. There are very few knowledge on multi-player imperfect information games, because we investigate new index that show a game nature. CNS is defined as a standard deviation of node gain expectations over possible situations. Simulation experimental results show that Japanese famous card game Daihinmin has low CNS. These result suggests that we don't need to estimate opponents hands so seriously when the CNS is low.

Contemporary Computer Shogi (2013)
Takenobu TAKIZAWA

Abstract:Computer shogi was first developed by the author and a research group in late 1974. It has been steadily improved by researchers and commercial programmers using game-tree making and pruning methods, opening and middle game databases, and feedback from research into tsume-shogi (mating) problems. It has now reached professional level. In this paper, the author discusses contemporary computer shogi, especially how programs behaved at the 23rd World Computer Shogi Championship, held in May 2013, where 48 teams applied, 39 of which actually entered the competition.

Shape-Keeping Heuristics
Taichi Ishitobi, Alessandro Cincotti, Hiroyuki Iida

*Abstract:*The checkmate problem in shogi (Japanese chess) is a puzzle within the game itself. These puzzles have enjoyed a long play and have been the subject of centuries of analysis. The subject of this research is defining the aesthetic criteria of great shogi problems, and finding new methods for composing interesting checkmate problems in shogi. First we examine the results of previous studies of aesthetics in shogi checkmate problems. For this purpose, we focus on Proof Number Search algorithm and record the data while solving checkmate problem. We analyze these data and we calculate the proof number related to the evaluation of checkmate problem. Good checkmate problems have large proof numbers.
Next, we present a new heuristics for automatic composition of checkmate problems in shogi. This heuristics uses already existing checkmate problem in shogi and develops them further. Finally, we can compose new checkmate problems which have bigger proof numbers than original ones. It is promising.

Cognitive Science Evaluation of Proposed Method for using Machine Learning to Regulate the Competency Level of a shogi Computer Program
Takafumi Nakamichi and Takeshi Ito

*Abstract:*This paper proposes a machine learning evaluation function for intentionally weakening the competency level of an AI program based on the game records of amateur players. By regulating the evaluation function, it is possible to intentionally weaken the AI relative to existing methods in an equivalent search space. In addition, a subjective evaluation of naturalness was conducted, using a panel of experts to rate the proposed AI technique against conventional AI techniques at equivalent levels of weakness. The analysis revealed elements of "humanness" present in shogi game records and identified key similarities and differences between amateur and professional players.

An Analysis of Consultation Algorithm with Random Numbers
Yuichiro Sato, Alessandro Cincotti, and Hiroyuki Iida

Abstract:Multiple choice systems in the domain of games, for example 3-Hirn and consultation algorithm, have been researched and their advantages have been reported. However, little is known about the reason why these systems work well. In this paper, we introduce a mathematical representation of multiple choice systems and the probability that consultation algorithm works well. Our results include more detail of the structure of consultation algorithm.