

# The CMG 6<sup>th</sup> Computer Olympiad and the Computer-Games Workshop

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From August 18 to 23 the Institute for Knowledge and Agent Technology (IKAT) organised the CMG 6<sup>th</sup> Computer Olympiad at the Universiteit Maastricht (UM). Together with the Olympiad a Computer-Games workshop was organised. This event took place from August 20 to 22. Both events are described in this report.

## The Computer Olympiad

The Computer Olympiad is a multi-games event in which all of the participants are computer programs. The Olympiad is a brainchild of David Levy, who organised this tournament in 1989 (London) for the first time. The next four editions were held in 1990 (London), 1991 (Maastricht), 1992 (London) and 2000 (London). This year was the second time that the event was held in Maastricht. IKAT, under the leadership of Jaap van den Herik, was responsible for the organisation. Similar to last year, van den Herik was the tournament director. The purpose of the Olympiad is to find the strongest program for each game. The Olympiad has also grown to a social event, as the authors of the programs are not bound to silence during the play as in human tournaments. The event is a reunion as programmers meet to discuss ideas and renew acquaintances. Some teams arrive with clear goals of winning, some just to participate, some to test their new ideas under tournament conditions. The Olympiad is a truly international event. This year, participants were coming from all over the world: USA, Canada, The Caribbean, Japan, Taiwan, Israel and the European Union. The event was held under the auspices of the ICCA (International Computer Chess Association), which gave it an official status. This year, there were competitions in 6 games: Chess, Chinese Chess, Shogi, Amazons, Lines of Action (LOA) and Gipf. Below we will give a short description of each of the tournaments.

Computer chess was the main tournament of the Olympiad. The computer chess competition had the most number of participants, 18, an increase of 4 compared to last year. The computer chess tournament had a special status since it is the official 18<sup>th</sup> World Microcomputer Chess Championship (WMCC 2001). Unlike other competitions, there were several titles to gain in the computer-chess tournament. This year the organisation allowed programs running on multi-processor machines. Because this gave a clear disadvantage for the programs still running on single-processor machines, the organisation decided that there were two world-champion titles. The leading program, which executes on a single processor, was declared the *World Microcomputer Chess Champion - single processor*. The leading program executing on multiple processors was declared the *World Microcomputer Chess Champion - multiple processor*. Among the participants there were 6 commercial programs. The authors of these programs are professionals, who have the resources to fine-tune and optimise their program. Therefore, the professionals have a great advantage over the amateurs. Because the amateurs have hardly any chance of winning the tournament in practice, the title *World Microcomputer Chess Champion – amateur* exists for them. Due to the high number of participants a Swiss tournament was played

consisting of nine rounds. The games were played during the morning and the afternoon. Each day there was a press briefing given by the well-known chess master Hans Böhm. These sessions were very interesting and amusing. Although the top programs play at a higher level than him, Böhm was still able to uncover some weaknesses in those programs. After five days of tough battle JUNIOR (Ban, Israel) was the best multi-processor program and the winner of the chess tournament, SHREDDER (Meyer-Kahlen, Germany), the best single-processor program and GROMITCHESS (Skibbe, Germany), the best amateur program.

A popular new game in the AI community is Amazons. It is a simple board game of occupying and enlarging territory. The game is quite similar to Go. Because of the large branching factor, a brute-force approach, like in chess, is unfeasible in Amazons. Paradoxically, the chess programmer Johan de Koning claimed that he still could use a lot of his chess-programming experience in his program 8QP. For the second time his program won the Amazon competition with a perfect score!

After the absence of last year Chinese Chess returned as a part of the Olympiad. The Asian programs dominated the tournament. The battle for the first place was between ELP (Chen, Taiwan) and SG 8.2 (HSU, Taiwan). Those two programs playing against each other was a derby, since both belong to the same research group. In the end the program ELP won this exciting competition.

Shogi is the Japanese version of chess. The complexity of this game is higher than of Western Chess. At the moment computer Shogi tournaments are very popular in Japan. In this country Shogi is also a popular domain for AI research. Because of the travelling distance between Japan and Maastricht, there were only three programs participating. But the authors of the programs still had a lot of fun in competing at the Olympiad. The tournament was won with a perfect score by SHOTEST 5.6 (Rolasson, UK). A European program as winner of the tournament shows that this game is not exclusively a domain for Japanese researchers.

The LOA tournament was for the second time present at the Olympiad. LOA is a chess-like connection game, which is getting steadily more attention in the game-playing community. The LOA tournament was the only tournament, which needed a play-off. The LOA programs YL (Björnsson, Canada) and MIA II (Winands, The Netherlands) shared the same number of points after the regular tournament. The play-off was won after some nice tactical play by YL.

Gipf, a fairly new domain in the game-playing community, was a newcomer at the Computer Olympiad this year. The game, mostly common in Belgium, is played on a hexagonal board with the pieces being pushed from the sides. Despite Gipf's newness two quite strong Gipf programs were present at the Olympiad, GIPFED (Wentink, The Netherlands) and GF1 (Van Den Branden, Belgium). After some interesting matches it was GF1 that won the competition.

At the last day of the Olympiad a social dinner was organised for the authors of the participating programs. This was a good moment for the programmers to discuss the performance of their machines at the Olympiad with each other. During the meals the medals and prizes were handed to the winners of each tournament. At this occasion several authors thanked the organisation for the success of the Olympiad.

## The Computer-Games Workshop

As a successor of last year's Computer-Games Workshop at the Fifth Computer Olympiad in London, Jos Uiterwijk (IKAT) again organised a three-day workshop in the evening, from August 20 to 22. The workshop focused on the latest developments in games programming. Each evening, the workshop attracted an audience of some 25 to 30 people, from all over the world. The event consisted of three invited lectures, thanks to a grant from NWO, and ten regular presentations. Each day started with an invited lecture (45 minutes) followed by three or four presentations (25 minutes each). Summaries below were adapted from Jos Uiterwijk's more extensive report in the ICGA journal (Vol. 24, No 3).

The first invited lecture of the workshop was given by Ernst Heinz (MIT, USA) and was entitled *Selected Goodies of DARKTHOUGHT*. In this lecture he revealed many so far unpublished details about his chess program DARKTHOUGHT, mainly concerning search extensions, transposition tables and material signatures. This lecture was inspiring for those building competitive game programs. Next, Jeroen Donkers (UM, The Netherlands) presented a talk entitled *Learning Opponent-type Probabilities for PrOM Search*. He explained the PrOM (for Probabilistic OM)-search algorithm, which is an extension of plain OM (Opponent-Model) search. Subsequently, Don Beal (University of London, UK) talked about *Learning to Play Well from Observing Bad Play*. He illustrated how  $TD(\lambda)$ , the most best-known algorithm for self-learning in games, deteriorates when a program tries to learn from games of a lower quality than the program itself, but that an enhanced algorithm does much better. Then, Levente Kocsis (UM, The Netherlands) gave the presentation named *Learning Move Ordering in Chess*. He showed how neural networks can be applied to order the moves in the alpha-beta search. Finally, this day saw an inserted (light) talk by Henk van Haeringen (The Netherlands). He explained the rules of a chess variant invented by him, called *SuperChess*. The main difference with standard chess is the addition of extra types of pieces.

At the second day, Hiroyuki Iida (Shizuoka University, Japan), discussing the *Advances of AND/OR-Tree Search Algorithms in Shogi Mating Search*, presented the second invited lecture of the workshop. He gave characteristics of a family of AND/OR tree-search algorithms, mainly proof-number (PN) variants (PN\*, PDS and DF-PN). Most of them are depth-first algorithms, some of which only make use of proof numbers, whereas others use both proof and disproof numbers. Although the exact details of all these algorithms are not yet clear their foresights are very promising in Shogi. Next, Diederik Wentink (UM, The Netherlands) went into some details of his *Analysis and Implementation of the Game of Gipf*. He explained the rules and the game properties of Gipf. Then Bruno Bouzy (Université Paris 5, France) explained *Go Patterns Generated by Retrograde Analysis*. He calculated all pattern game values for small boards up to 3×3, and for open boards (i.e., without edge constraints) up to 4×4. The last talk of the day was by Erik van der Werf (UM, The Netherlands), presenting his experiments on *Visual Learning in Go*. He presented his neural-network architecture, called ERNA, which learned to determine connectedness from raw board representations and second, to count the number of liberties of stones.

The invited lecture of the final day was given by Christian Posthoff (The University of The West Indies, Trinidad and Tobago), who entrusted to the audience his thoughts on *Computer Chess and*

*Artificial Intelligence from an Academic Perspective*. He covered a period of some thirty years, in which he was personally involved in the field. Particularly, his revelations on the work done in the early sixties in the former GDR were interesting. Then Mark Winands (UM, The Netherlands) showed results of his experiments with  $PN$ ,  $PN^2$  and  $PN^*$  in *Lines of Action*. All these three proof-number-search variants turned out to be quite useful in the endgame of LOA in finding deep forced wins. Next, Michael Buro (NEC Research Institute, USA) gave *An Overview of NECI's Generic Game Server* and its accompanying client software. The system is more flexible and has a larger set of rich features than the traditional game servers. At the moment the system offers services for the following games: Amazons, Checkers, Chess, Hex, Go, Othello and Phutball. Due to the absence of Guy Haworth (UK), Ernst Heinz presented the lecture *Four Notes on Chess Endgames*. In these notes Haworth gave some recent reflections on such notions as the “discarding-like-pieces” guideline and the “depth-by-the-rule” metric.

## **Final Remarks**

The participants who I spoke were all very positive about this Olympiad. Most of them promised to come back next year. A few of them even promised to participate in other games too. The future of the event is prosperous. The major sponsor, CMG, promised to support the event for at least three more years. Next year the Olympiad will be probably held in Maastricht again. Moreover, the workshop was well received by the participants. It was an interesting workshop, where many refreshing ideas were exposed.

The detailed results and game scores of the several competitions can be found at the website. Regarding the workshop, there are proceedings consisting of 7 full papers and 5 abstracts. The workshop proceedings can be obtained from Joke Hellemons via [hellemon@cs.unimaas.nl](mailto:hellemon@cs.unimaas.nl). All the workshop presentations available in PowerPoint format can be seen or downloaded from the website.

I look forward to the next Computer Olympiad and Computer-Games Workshop!

Olympiad website:

<http://www.cs.unimaas.nl/olympiad/>