THE FIFTH WORLD COMPUTER-CHESS CHAMPIONSHIP

As reported
by Helmut Horacek
Research Unit for
Information Science and Artificial Intelligence
University of Hamburg

This was clearly the most exciting finish of a World Computer-Chess Championship I have ever seen. In the last round four programs still had chances to become champion and three of them actually were tipped for champion in the last hours. In the end, four programs tied for first place and Cray Blitz maintained its title due to the Buchholz system. It was the agreed opinion of the audience that it was Hitech which had played the best chess in this tournament. The best microcomputer program and also the best European program was Rebel, the greatest surprise in Cologne. At a certain moment in the last round it even seemed the World Champion to be.

Several companies have sponsored this tournament. Compaq computer provided the terminals and Deutsche Mailbox GmbH took care of the communication facilities. Further sponsors were Hegener & Glaser and Deutsche Messe AG. The organizing committee was formed by Frederic Friedel, David Levy, Tony Marsland, Monty Newborn and Dieter Steinwender. Horst Lynsche took care of the computer-communication links. The games took place at the Cologne Messe, as part of the annual computer exhibition. Mike Valvo was the Tournament Director as he had been for the last five years at ACM tournaments. He also commented the games for the audience with the support of the Grandmasters Vlastimil Hort and dr. Helmut Pfleger. Participants in this tournament came from Canada, Germany, Great Britain, Hungary, the Netherlands, Sweden and the United States. Unfortunately the program from Hungary could not be installed completely on the machine available and it only played a few moves. A complete record of the games can be found somewhere else in this Journal.

The overall strength of the programs differed very much, which was proved by the absence of draws in the first two rounds. I feel that the average strength was below that of the last championship in New York and especially below that of the last ACM tournaments. This was mainly due to the fact that some of the top programs were missing: the former World Champions Belle (1980) and Nuchess (as a successor of the World Champion Chess 4.7 from 1977) and the vice world champion of 1980, Chaos. That the games were scheduled during the working hours caused the absence of some European programs that rely on mainframes (Chess 0.5X and Merlin were certainly among them). Others were not able to exploit their machines fully as they were not the only users.

Chess quality

The most convincing play was shown by Hitech, although some weak moves in the last round versus Cray Blitz caused its decisive defeat. The fast special-purpose hardware, coupled with the admittedly simple but extremely relevant knowledge has led to a very strong program. Especially the mating sequence against Schach 2.7 was a real nugget, that even Grandmaster Hort did not believe when Hitech had announced it. The positional play of Cray Blitz clearly was the weakness of this tactically very strong program. It also was rather fortunate that the game versus Schach 2.7 had to be adjudicated according to the rules of the tournament. Although the final position was actually won, the winning line is extremely difficult to find for a program. Bebe played most of its games rather solidly, but it sometimes was very careless about the protection of its King. This defect caused material loss against Cray Blitz and also against Rebel. But, nevertheless it had won the latter game from a very dynamic position, which was sufficient to reach the third place. After the first-round defeat (which was caused by a

program bug according to its author) Phoenix has played four solid games, but the opponents were not as strong as those of the other programs that tied for the first place. The play of Rebel was very sound in all its games. The mistakes the program has made occurred in positions that are very hard to play for a program. Furthermore, it had the highest Buchholz score of all programs. Bobby succeeded in beating the World Champion in a beautiful, positional game. Theoretically, it could also become World Champion by a win against Phoenix in the last round, but it never had a favourable position in this game. It actually lost due to a trapped piece. Plymate found a beautiful many-ply mate against Lachex, which preferred not only in this game to centralize its King in the middle game. Mephisto lost two games with uneven material of about the same value, which is a situation that all the programs usually have difficulties with. Schach 2.7 is clearly stronger than its score indicates, it was the only program to play Cray Blitz and Hitech as well. BCP and Awit have some interesting features but these programs proved to unbalanced for the whole game of chess and scored only few points.

Theorectical aspects

Some of the theoretical aspects were discussed in the conference on computer chess which was moderated by Prof. Ben Mittman. In the tradition of the past championships, this time Prof. De Groot was invited as an honoured guest. He presented a keynote lecture on 'Intuition in Chess'. He pointed out that human chess-players fill in the gaps in a causal chain by their intuition, which is basically an unconscious process. Humans are also much stronger in the process of perception and Prof. De Groot expressed his opinion that this capability should suffice for the best humans to play better chess than the best machines, at least until the end of this century. Next, Don Beal gave a presentation about 'Selective Search Without Tears'. He showed the benefits of a null-move analysis in tactical middle-game positions, supporting selectivity at a high level. Thereafter I represented the Merlin team by comparing 'Selective Search versus Brute Force'. Particularly, I have tried to point out the importance of the search paradigm (depth-first or best-first) used by a selective search. After a short break Thomas Nitsche sketched out his approach to 'Selective Search on a Parallel Machine'. Finally, David Levy speculated about 'When Will Brute-Force Programs Beat Kasparov? which will take place between four and about a hundred years from now, in his opinion.

Evaluation

As a final remark, I guess that a chess-player unfamiliar with computer chess will find the uneven capabilities of the programs very striking. On the one hand, a program's play can be very convincing if it discovers the essential issues in a position. For instance, Grandmaser Hort was very impressed by the mating sequence Hitech had found. In an other situation, Hort had announced three different mate threats in the game Vax Chess against Lachex with no adequate defense against any of them. However, there existed a move warding off all mate threats by sacrifycing a piece whlch would restore the material equilibrium. On the other hand, many tactical (some of them due to the well-known horizon effect) and considerable positional errors occurred in which the usual heuristics showed themselves somewhat inadequate. I am very curious to know how, and to what extent, this deficiency will be overcome in the near future. This is necessary if the programs are to compete successfully on the grandmaster level.

PARTICIPANTS OF THE FIFTH WORLD COMPUTER-CHESS CHAMPIONSHIP

- ADVANCE 68 - 68000 system
  Dave Wilson
  43 First Avenue / Colney Hatch Lane / London N11 2NE / Great Britain
- AWIT - Amdahl 5860 at University of Alberta
  Tony A. Marsland
  Dept. of Computing Science / Universty of Alberta
  Edmonton / Alberta T6G 2H1 / Canada
- BCP - Z8000 system
  Don Beal
  Dept. of Computer Science / Queen Mary College
  London Universty / Mile End Road / London E1 4NS / Great Britain
- BEBE - Sys-10 Chess Engine
  Tony and Linda Scherzer
  2111 Stonington / Hoffman Estates / Illinois 60195 / U.S.A.
- BOBBY - Amdahl 470 V7B at the TU in Brauschweig
  Hans-Joachim Kraas, Günther Schrüfer
  Holzwiesenweg 9 / 3320 Salzgitter 1 / West Germany
- CHAT - Cyber 175
  Wolfgang Delmare
  Nümmenerstrasse 99 / 5650 Solingen / West Germany
- CRAY BLITZ - Cray XMP-48 in Mendota Hights, Minnesota
  Robert Hyatt, Al Gower, Harry Nelson
  (RH) University of Alabama / 1020 Gordon Woods Drive
  Birmingham / Alabama 35244 / U.S.A.
- CYRUS-68K - IBM PC with 68020 card
  Mark Taylor, David Levy, Kevin O'Connell
  Intelligent Chess Software Ltd.
  11 Loudoun Road / London NW8 9UP / Great Britain
- DUTCH - GOULD in Maarssenbroek (GOULD Nederland)
  Jaap van den Herik, Roger Hünen, Harry Nefkens,
  (JvdH) Faculty of Mathematics and Informatics
  Delft University of Technology / Room 2.115
  Julianalaan 132 / 2628 BL Delft / The Netherlands
- ENTERPRISE - 6502-based commercial machine
  Kaare Danielsen
  Parcelvej 28 A / DK-2804 Holte / Denmark
- HITECH - SUN + special chess hardware at CMU in Pittsburgh
  Hans Berliner et al.
  Computer Science Department / Carnegie-Mellon-University
  Shenley Park / Pittsburgh / Pennsylvania 15213 / U.S.A.

- KEMPELEN ATARI - Atari 520 ST
  Attila Kowacs
  Rakosszeg u. 18b / 1142 Budapest XIV / Hungary
- LACHEX - Cray XMP 4/16 in Chippen Falls, Wisconson
  Burton Wendroff, Tony Warnock
  MS B284 / Los Alamos National Laboratory
  New Mexico 87545 / USA
- MEPHISTO COLOGNE - Mephisto S 68000 hardware
  Richard Lang
  21 Orchard Drive / Charleywood / Bucks WD3 SQN / Great Britain
- NONA - Mephisto Mondial 65C02 system
  Frans Morsch
  Poptahof Zuid 590 / 2624 SL Delft / The Netherlands
- OSTRICH - Multiprocessing system with 8 DG computers in Montreal
  Monroe Newborn
  School of Computer Science / McGill University
  805 Sherbrooke St. West / Montreal / Quebec H3A 2K6 / Canada
- PLYMATE - 6502-based commercial machine
  Ulf Rathsman
  Eric Tegelsvag 18 A / 16357 Spanga / Sweden
- REBEL - special 8-bit hardware
  Ed Schröder, Jan Louwman
  (ES) Merel 10 / 7423 EH Deventer / The Netherlands
- REX - Tandy 3000
  Don Dailey, Sam Sloan
  Berkeley Computer Chess Inc.
  917 Old Trents Ferry Road / Lynchburg / Virginia 24503 / U.S.A.
- SCHACH 2.7 - B 7800 in the Bundeswehrhochschule Neubiberg
  Mathias Engelbach
  Rheinischer Ring 19 / 5210 Troisdorf / West Germany
- SHESS - Microvax II at site
  Ard van Bergen
  Th. à Kempisweg 92 / 3532 CD Utrecht / The Netherlands
- SUN PHOENIX - 20 SUN computers in California
  Jonathan Schaeffer
  Department of Computing Science / University of Alberta
  Edmonton / Alberta T6G 2H1 / Canada
- VAXCHESS - Microvax
  Tony Guilfoyle, Richard Hooker
  (TG) 13 Walgrove Road / Hitchen Herts / Great Britain

The Competitors of the Fifth WCCC

Program	Computer	Language	Size	Open	Nodes/sec
Cray Blitz	Cray XMP	Fortran/CAl	100K	5,000	100,000
Hitech	VLSI-Sys	C	600K	5,800	175,000
Be-Be	Chess Eng.	Assembler	16K	4,000	45,000
Sun Phoenix	20 * Sun	C	250K	3,000	n.a.
Rebel	home-built	Assembler	20K	5,000	500
Bobby	Amdahl	Pascal	500K	5,000	400
Plymate	65C02S	Assembler	40K	2,500	2,500
Mephisto	68020	Assembler	48K	20,000	2,000
Dutch	Gould	C	350K	5,000	1,000
Nona	65C02	Assembler	32K	7,000	800
Advance 68K	68000	Assembler	60K	4,500	100
Lachex	Cray XMP	Fortran/Ass.	1160K	20,000	40,000
Ostrich	8 * DG	Assembler	16K	1,000	2,000
Schach 2.7	B 7800	Algol	4M	10,000	1,500
Cyrus 68K	68020	Assembler	32K	16,000	3,000
Vaxchess	Microvax	Assembler	40K	13,000	800
Chat	Cyber 175	Pascal	22K	4,500	500
BCP	Z8000	Assembler	64K	1,000	5,000
Enterprise	HD 6301 Y	Assembler	16K	6,000	500
Awit	Amdahl	Algol-W	750K	10,000	8
Rex	IBM XT	Pascal	48K	100	n.a.
Shess	Vax	Fortran/Ass.	70K	1,000	400
Kempelen	Atari St	C/Assembler	720K	65,000	n.a.