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SPOTLIGHTS ON AMAZONS AND HANGMAN

The broadening of the *Journal*'s scope from Chess to Games has led to much more interest, substantial attention from large research institutes, and many ways to pleasure and entertain our readers. This issue is no exception. The interest for games comes from readers and authors alike. The increased attention can be seen from our successful annual meetings all over the world. At these occasions, the enjoyment of the participants of the Computer Olympiad, the World Computer-Chess Championship, and the Conferences is a stimulus to continue our policy: develop new games, recruit new talent, and aim at perfection.

At this moment the number of different games being played is still growing. If we look at the variety of possibilities within a game then we may see that a small deviation in the rules can lead to a completely new game with rich strategies, possibly requiring new, innovative computer approaches. It is fascinating to observe how the range of search techniques and knowledge representations is distributed over all games and game versions. Enhancements of a technique in one game may be adopted and adapted in another game with completely different characteristics. Yet, within our game world we know that respectable classic games, such as Chess, Go, and Shogi, have lost nothing in their attractiveness for player, spectator, and organiser.

The increasing power of current computers together with their expanding storage capacities are a great help for our techniques, bringing some games into the realm of computer perfection. In this issue we see a fine instance of such a development for the game of Hangman. First, it is shown how such a game can be played perfectly by using a brute-force strategy. Then some optimisations are proposed and two simple algorithms with almost perfect behaviour are introduced. Clearly, new light is shed on an old yet challenging game. A compliment to Charles Reams (University of Cambridge) is due for his contribution, published as a note on pp. 149-153. Paraphrasing A.E. Housman (1859 – 1936), we may state

> Perfect play to hangman's noose,
> the computer clocks will ring.
> A Game once made for other use
> is now solved and is a dead thing.

For longer games, or games with a higher complexity, an adequate heuristic is: partition the game into subgames and then solve the subgames one by one. Most games do not have a structure that allows a direct implementation of this heuristic advice. For Chess, the advice can be seen as "solve elementary endgames, solve

HUMAN VS. COMPUTER-GO COMPETITION IN FUZZ-IEEE 2009
21-22 August, 2009
Jeju, Koera

Shi-Jim Yen[1], Chang-Shing Lee[2], and Olivier Teytaud[3]

General information

Computer Go has been developing quite seriously in the past several years. In 1998, Martin Müller won despite 29 handicap stones against the computer program MANY FACES OF GO. In August 2008, the computer program MOGO won with an advantage of "only" 9 handicap stones against top-level human players in 19x19 Go, e.g., against Myung-Wan Kim, who won the 2008 US Open and is a Korean 8th Dan Pro (8P). Additionally, another computer-Go program CRAZYSTONE won with handicaps of 8 and 7 stones against Kaori Aoba, a Japanese 4th Dan Pro (4P) in December 2008. Due to the development of the Computational Intelligence, computer Go has made considerable progress over the past 10 years. Programs are currently competitive at the professional level in 9x9 Go. To strengthen computer-Go programs and advocate the research, development, and application of computer games' related fields, Taiwan hosted *the 2008 Computational Intelligence Forum and World 9x9 Computer Go Championship* " on September 25-27, 2008, and *the 2009 Invited Games for MoGo vs. Taiwan Professional Go Players (Taiwan Open 2009)* on February 10-13, 2009.

The game of Go is one of the last board games where the strongest humans are still able to win easily against a computer-Go program. But researchers have discovered new algorithms that perform well. So, the computers are catching up really fast. Taiwan Open 2009 has ended with a success: two world records were set. The Go program MOGO made these two new world records by winning (1) a 19x19 game with 7 handicap stones against the 9P professional Go player Chun-Hsun Chou and (2) a 19x19 game with 6 handicap stones against the 1P professional Go player Li-Chen Chien.

In order to enhance the fun in Go playing by human interaction with computer programs and to stimulate the development and research of computer-Go programs, the *FUZZ-IEEE 2009: Panel, Invited Sessions, and Human vs. Computer Go Competition* has been held at the FUZZ-IEEE 2009 and was organized by some Taiwanese academic affiliations, including the National University of Tainan (NUTN), the Taiwanese Association for Artificial Intelligence (TAAI), the Institute of Information Science (IIS) of Academia Sinica, and the National Science Council (NSC), as well as the France academic affiliation TAO, INRIA. The objective of the proposed panel and invited session is to highlight the ongoing research on Computational Intelligence approaches as well as their applications on game domains. In addition, it is also hoped that the advances in computational intelligence will make more progress in the field of computer Go than ever before in order to achieve in the near future as good results as computer programs of Western chess or Chinese chess. For more information, the reader is referred to Lee (2009).

The participants

Table 1 shows the list of human participants. Four excellent programs which performed well in Computer Olympiad in the Go competition of 2008 and 2009, were invited to join this conference, including FUEGO, MANY FACES OF GO, MOGO, and ZEN. Table 2 shows some information about the four programs.

Name	Rank	Comment
Chun-Hsun Chou	9-dan (Pro)	Winner of 2007 LG cup (The contest offering the largest reward in the world every year)
Shen-Su Chang	6-dan (amateur)	

Table 1: List of Human Participants.

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[3]TAO-Inria, France. Email: olivier.teytaud@gmail.com

Program	Country	Authors	Machine Specification
FUEGO	Canada	Markus Enzenberger, Martin Müller, Broderick Arneson, Richard Segal, Gerald Tesauro	Ten 8-core compute nodes. Each node has two quad core Xeon E5462 @ 2.80GHz processors and 32GB of mainstore. 20Gbps Infinite band network
MANY FACES OF GO	USA	David Fotland	4 nodes: 32 cores, with a total of 64 GB of RAM, Each node has 2 x quad core Intel Xeon (x5460) running at 3.16 GHz 16 GB of RAM
MOGO	France	Sylvain Gelly, Yizao Wang Olivier Teytaud, Jean-Baptiste Hoock, Guillaume Chaslot, Arpad Rimmel	Dell PowerEdge R900 machine with 16-cores Linux 64 bits, Supercomputer "Huygens" with 20 nodes of 32 cores (640 cores)
ZEN	Japan	Yamato	Mac Pro with 8 core processors (Quad-Core Intel Xeon 2.26GHz x2).

Table 2: Information of Go-program participants.

Results

The results of the matches are given in Table 3 (for 9x9 Go) and Table 4 (for 19x19 Go).

	FUEGO	MANY FACES OF GO	MOGO	ZEN
Chun-Hsun Chou (9P)	B-2.5 W+R	--	B+R W+R	--
Shen-Su Chang (6D)	--	B+6.5 W+R	W+R	B-R W-R

Table 3: The result of the 9x9 games.

	FUEGO	MANY FACES OF GO	MOGO	ZEN
Chun-Hsun Chou (9P)	--	W+R	W+R	W+R
Shen-Su Chang (6D)	W-R	--	W+R	--

Table 4: The result of the 19x19 games.

Selected Games

Below we reproduce four games. The comments are based on the discussion by Chun-Hsun Chou (9p), Ping-Chung Chou (4p) and Shi-Jim Yen (6D).

Game 1: FUEGO (White) - C-H Chou (Black)

See Figure 1. Black 3 is an interesting move. After this game, Chou believes that this move is a decisive mistake. Black 7 is too immoderate, and F3 is a normal move. White 8 is a good move. Being unable to defend the attack of the white stones, Black 9 is the only move. At that time, Chou has already predicted that the white side will win by 2.5 points at the end of the game (notation B-2.5).

Game 2: C-H Chou (White) - FUEGO (Black)

See Figure 2. Black 3 is a move out of the opening book, which is built in in many of the current Go programs. In the past, when the handicap was 6.5, this was a good move; and it often appeared in professional games, too. However, when the handicap is 7.5, Chou believes it is an ineffective move leading to a loss. When White 4 is played, Black 5 is the only move. When White 6 is played, there will be a white group on the right and left side of the board. Black cannot kill any of them. Because the handicap is heavy, it is hard for Black to win (W+R).

Game 3. C-H Chou (White) - MOGO (Black)

See Figure 3. Chou personally believes that MOGO is a Go program which plays best in the 19x19 game. On the board, Black 17 should be played on P15. From White 18 to White 46, great losses happened to Black. Black 77 is an ineffective move. It should be played on the position K4. Black still has a chance to win. It is supposed that the black side believes that the position is good for its side, so it makes an extra move to reinforce itself. In fact, however, though the position is better for the black side, the difference of the strength in both sides is handicap 7. When the program is doing an MCT simulation, the difference of the strength in both sides is not considered, this is something where computer programs can be improved. After White 78 is played, there is no chance for Black to win (W+R).

Game 4. C-H Chou (White) - ZEN (Black)

See Figure 4. Zen won the championship of the 19x19 Go competition in the Computer Olympiad 2009 held in Pamplona. In this game, Black plays very well on every corner. Black 35, however, is an ineffective move owing to the excessive optimistic evaluation of the MCTS function. White 38 breaks into the territory of Black after strengthening the two white groups which are located above and below the territory. Black 63 plays an astonishing nice move by finding a Ko. When Black 65 plays at an exchange, the position becomes excellent for Black. After White 66, the white stones are forced to battle, then wrong moves are played by Black, one after another. For example, Black 67 should be played on D3 to strengthen the corner, and Black 69, 71, and 73 should all be played on the corner to make themselves alive. The direction of Black 79 and 81 is not correct. Black should attack White near K7. Thus, after White 98, Black is going to lose (W+R).

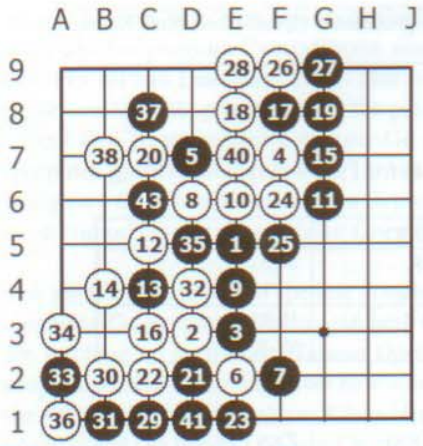

Figure 1: FUEGO - Chou, 39=A2, 42=A1, 44=A2.

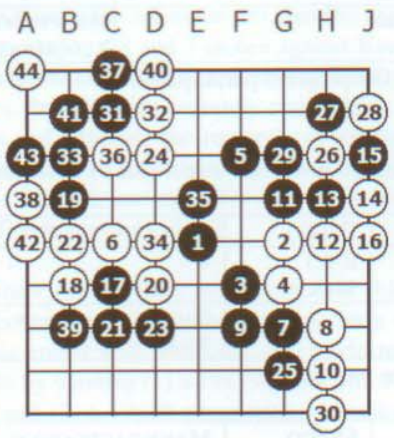

Figure 2: Chou - FUEGO.

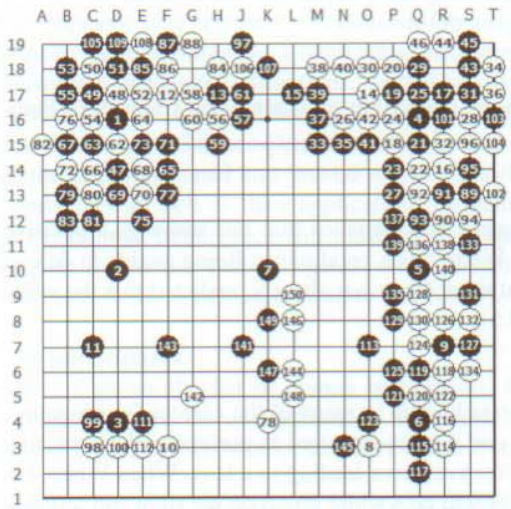

Figure 3: Chou - MOGO, 74=D16, 110=F19

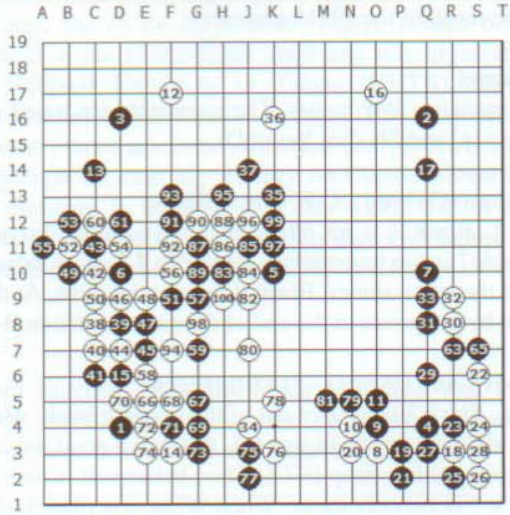

Figure 4: Chou - ZEN, 62=B11, 64=C11.

Conclusions

A Go-community meeting was held after the game on August 22. The members of this meeting include the professional Go players and the designers of the Go programs. Here are six conclusions of this meeting and what the participants had experienced.

1. First ever victory of a computer against a top pro in 9x9 Go with komi 7.5 as White.
2. Handicap 7 is not a sufficiently strong handicap against top pro players (cf. other lost games with H7 against 9p); MOGO was lucky of winning one such a game in the past. Moreover, after becoming acquainted with the behaviour of the programs, humans can allow a larger handicap for the computer; the computer-Go designer Professor Yen (6d) beat FUEGO by Handicap 6 in this test.
3. The white side is advantaged by a komi 7.5, but the black side is advantaged by komi 6.5. It is estimated that 9x9 Go komi should be probably 6.5 or 7.5.

4. A 9x9 Go opening book highly depends on the komi side, such as is to be seen in the opening of E5 E3 D4 of Game 2. In komi 6.5, D4 is a brilliant solid move. But in komi 7.5, D4 is an ineffective move almost leading to being the losing move.
5. A 9x9 Go opening book could easily be made stronger with the help of high-level players.
6. There is too little variation in 9x9 Go board. After a thorough study of openings, 9x9 Go will become too monotonous. Therefore, it is to be considered to replace 9x9 Go by 13x13 Go in the future computer-Go tournaments and to do only the continuous research on the smaller board.

Reference

Lee, C.S. (2009). http://oase.nutn.edu.tw/FUZZ_IEEE_2009/short_description.htm, Computer centre of the National University of Tainan, Taiwan.

Fltr: Shi-Jim Yen, Chun-Hsun Chou, Shen-Su Chang, Shun-Chin Hsu, Chang-Shing Lee, Chang-Rong Tsai, and Olivier Teytaud.

CALENDAR OF COMPUTER-GAMES EVENTS IN 2009-2010

September 26-27, 2009
IOPCCC, Computer Department of the Technical University of Lodz, Poland. More information: Maciej Szmit, email: maciej.szmit@gmail.com. Http://mpps.64pola.pt.

October 16-18, 2009
The Open Dutch Computer-Chess Championship, Leiden, The Netherlands.

March 2021, 2010
The 3rd Chess Programmer's Tournament 2010, Hoogstraten-Wortel, Belgium. Information: Richard Pijl, email: Richard.pijl@telenet.be

August 4-6, 2010
The LivingstonChess960 computer World Championship, Mainz, Germany. Information: Eric van Reem. Email: EricvReem@aol.com

September 24 – October 2, 2010
The 18th World Computer Chess Championship, The World Chess Software Championship, the World Computer Chess Blitz Championship, the JAIST Computer Olympiad, and the International Conference on Computers and Games 2010 (CG2010). JAIST, Kanazawa, Japan. More information: info@icga.org, iida@jaist.ac.j