

Tilburg University

Two decades

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Published in:
ICCA Journal

Publication date:
1997

[Link to publication in Tilburg University Research Portal](#)

Citation for published version (APA):
van den Herik, H. J. (1997). Two decades: Editorial. *ICCA Journal*, 20(4), 213-214.

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TWO DECADES

It is some two decades ago that we saw the first commercially available chess program. The files were numbered and the ranks were lettered. So the normal opening move e2-e4 had to be input as b5-d5. It was a first sign that talented chess programmers do not have to be strong chess-players; the world of computer chess was far from the world of chess. The chess-players were laughing, the computer play was horrible. Nevertheless, the 1977 chess computers were much stronger than their predecessor of two decades earlier (i.e., Bernstein's program), and even of one decade before (e.g., MAC HACK VI).

Let us take the commercial program as a starting point for our review of the increase in playing strength. This starting point coincides with the birth of the *ICCA Newsletter*. Owing to this medium and its successor, the *ICCA Journal*, we now have ample publications to see how stormy this development has been. Starting from a novice level, computer-chess programs have achieved Grandmaster level, and one of them, DEEP BLUE, even succeeded in defeating the World Champion in a six-game match. Many a human would be proud of such an improvement in performance over 20 years.

Having looked back over a period of two decades (and also of twice two decades), we might now wonder what will happen if we look forward the same amounts of time. To the layperson there is only one step: from being better than the World Champion to being perfect, i.e., solving the game. After the successes achieved in Qubic, Connect Four, Go Moku, Nine Men's Morris, and (recently) in 8×8 Domineering, people are waiting for the final verdict in games such as Awari, Checkers, and Chess.

However, the royal game of Chess seems to be pretty secure, and not only for the next four decades. In order to abandon the perennially-returning question about whether the game of chess can be solved, we offer a thumbnail calculation.

Assume the number of reachable positions to be 10^{46} , the outcome of Chinchalkar's calculation in the *ICCA Journal* (Vol. 19, No. 3). The α - β algorithm with its enhancements reduces the number of positions in the tree to its square root, leaving 10^{23} positions. Moreover, assume that we have 1000 processors working in parallel, each searching 10^9 positions per second (instead of the current 10^6). This means that we assume that future processors will be one thousand times faster than the current ones. These assumptions result in a solution time of 10^{11} seconds. Let us further assume that a century contains $100 \times 365 \times 24 \times 60 \times 60 \approx 10^9$ seconds. Then the time to solve the game of chess is in the order of 100 centuries, give or take a week.

So, the challenging question is: where do we go from here with computer-chess research? New goals should be formulated. According to David Levy (see also Daniel Dennett in this issue) the first such a goal is to produce \$50 chess computers which are stronger than the World Champion. They could be used, when watching a human World Title match, for easy comment: "Hi, see the World Champion overlooked the move 42. Bb7." Will that be within a single decade? And what then will be the goal of the second decade? Maybe, the production of 7-piece endgame databases? And thereafter? Maybe, explaining the computer strategies in human-understandable concepts?

Having seen the big difference between good (very good) and perfect, we may ask ourselves whether we can measure the error rate of the human World Champion. Is one out of ten decisions a mistake in a game-theoretical sense? Is it more, or is it less?

Next to these rough estimations and calculations we still have to face the question about artificial-intelligence techniques used in strong computer-chess programs. In this issue Richard Korf provides a clear answer: Yes, DEEP BLUE used AI techniques. Some of Korf's opponents may argue that all the AI techniques used are so-called weak techniques, since they only deal with a few knowledge issues and learning is not used at all. This might be true, but it does not do away with Korf's arguments. Incorporation of machine-learning techniques in competitive chess programs must be considered as the next major challenge for computer-chess research.

Finally, this is the place to thank Professor Ben Mittman who, two decades ago, took up the challenge of starting a *Newsletter* for his beloved group of ICCA enthusiasts. He did a very good job and I am proud to have been given the opportunity to succeed him.

Two decades ago, one needed courage to start a serious Newsletter on computer-chess programs that produced laughable results. This is even more clear when we consider the number of soccer fans and the researchers' attempts to mimic the players' performances in the RoboCup. Despite the huge number of fans there is no Computer-Football Newsletter. Furthermore, an intriguing question is: Will there be a Roboteam playing Real Madrid within two decades from now? If not, the reason might be that they failed to develop a Computer-Football Journal.

Jaap van den Herik

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