

## The Emotionless Champion

In 1886, Wilhelm Steinitz became the first world champion in chess history. Since then, for more than a hundred years the brightest minds have been played brilliant games in order to reside on top of the world, to be the number one, the champion. They discovered exceptional moves, developed smart tactics and discussed which opening turns out to be the most successful one.

Roughly fifty years after Steinitz's triumph, Alan Turing declared that "one day computers have the same intelligence as humans". He proposed an experiment: a human tester should ask a computer and a human random questions. If the tester cannot differentiate who the human is then the computer actually achieves "the same intelligence", i.e., its Artificial Intelligence (AI) reaches or even gets ahead of its programmer's level. Up to now, the experiments always failed with just a single exception: chess.

What is so special about chess ? Why did Gary Kasparov, an excellent world champion for about fifteen years and still the strongest player alive, fail to defeat Deeper Blue in May 1997 ? Chess is a so-called "game of perfect information": both players know all the information specific to the game; there is neither secrecy nor chance. Both players are acquainted with all moves, hence, chess is basically a purely intellectual game – an ideal playground for testing and improving AI. At most thirty-two figures (sixteen white and sixteen black) can be moved across the sixty-four squares, however, not all moves are legal. In the average case, a chess player has to choose among about forty to fifty allowed moves. Current software, such as Fritz 8 written by the German company ChessBase GmbH, analyzes approximately one million positions per second on a standard personal computer, whereas the dedicated multi-processor system Deeper Blue achieved a stunning throughput of about 200 million positions per second. Thus, the software not only predicts its own next move – instead it tries to figure out the opponent's ideas and infer his future actions. These programs evaluate a sequence of up to twelve successive moves in advance by using some clever techniques, known as heuristics, that reliably allow to avoid a senseless and foolish behavior like losing an important figure.

Nevertheless, a human player who does not examine as many moves as the computer has some significant advantages: he is capable of applying a strategy to the whole game. For example, he might aim to attack on the left side of the chess board and therefore chooses an appropriate opening, forces a suitable constellation in mid-game and finally starts a (hopefully) winning attack on the left side. The second key to success for a human player might sound not very logical: recognizing patterns. Most moves are not worth to be analyzed in detail: usually only three to six moves – a small fraction indeed – actually lead to acceptable or preferred situations. However, the ability to instinctively distinguish between "good" and "bad" moves has been developed over years, most players cannot even explain why they rate a position the way they do. While a human examines approximately two moves per second (0.000001% of Deeper Blue's speed !), he may reach an even higher depth due to his broad experience and knowledge of suitable rules of thumb: it is not uncommon to analyze interesting positions up to sixteen consecutive moves in advance.

Indeed, sometimes a "bad" move turns out to be successful in the long run, so it provides a big surprise to the opponent. In my opinion, these astonishing moments are the foundation that chess is a game full of energy, life and fun; they give me reason to believe in the beauty of chess. Software cannot be capable of being creative, of playing innovative, of showing emotions. It is just a matter of time when software dominates the world's chess elite and I am confident that within the next five years the champion will be a machine, though. A computer without a heart, without a soul: an truly emotionless champion.

words: 671

chars: 3400