

Research Review of Deep Blue by the IBM Watson Team

Goal:

The goal of this research is to build the best chess machine in the world that can defeat human pro.

There was a series of machines that led up to Deep Blue; ChipTest and Deep Thought, Deep Thought 2, Deep Blue I. Deep Blue is a massively parallel system designed for carrying out chess game tree searches. The system is composed of 30 processors and 480 single-chip chess search engines. The chess chips in Deep Blue are each capable of searching 2 to 2.5 million chess positions per second. Deep Blue is organized in three layers. One of the SP processors is designed as the master, and the remainder as workers. The master searches the top levels of the chess games tree, and then distributes "leaf" positions to the workers for further examination. Deep Blue relies on many of the ideas developed in earlier chess programs, including quiescence search, iterative deepening, transposition tables, and NagaScout.

There are some characteristics for Deep Blue to win the game.

- * It has a large searching capacity: the search is highly non-uniform and it provides "insurance" against simple errors. A minute of search in Deep Blue would reach a full-width depth of 12.2 on average.
- * It has an evaluation function in Hardware to perform faster because a "better" evaluation function takes too long time to execute in Software. Time to execute the evaluation function is a fixed constant.
- * Its search combines a software search with hardware search. The software search is extremely flexible, and can be changed as needed. The hardware search is parameterized.
- * It is a massively parallel system. it is composed of 500 processors which are available to participate in the game tree search.

Results:

Deep Blue became the first chess machine that defeated World Chess Champion Garry Kasparov in a six-game in 1997. Deep Blue Team explains there were many factors that contributed the success of the Deep Blue. The large searching capability, non-uniform search, and complex evaluation function were critical.

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Campbell, Murray, A.joseph Hoane, and Feng-Hsiung Hsu. "Deep Blue." Artificial Intelligence 134.1-2 (2002): 57-83. Web.