

Deep Blue by IBM

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Deep Blue was a chess-playing computer developed by IBM. Deep Blue played with Chess Grand master Gary Kasparov in one of the most famous AI spectacles of the 20th century.

Goals

The goals of the Deep Blue machine, was to build an artificial grand master of chess that can defeat any human chess grand master. The project started in 1980's and finally phased out in 1998 after defeating Grand Chess Master Garry Kasparov.

Architecture of Deep Blue

Deep Blue machine was a series of multiple parallel system designed for carrying out chess game tree searches. The system was composed over 30 processors and 480 single chips that increased search speed to ~2.5 Millions per second.

Deep Blue is organized in three layers, The master layer and two worker layers. The master layer searches the top level of the chess game tree and then distributes leaf positions to the workers for further examinations. Then workers carry out a few levels of additional searches, and finally distribute their leaf positions to the chess chips, which search the last few levels of tree.

In terms of Software search techniques, Deep Blue used following principles:

1. Extend forcing/forced pairs of moves
2. Forced moves are expectation dependent
3. Fractional extensions
4. Delayed extensions
5. Dual credit
6. Preserve the search envelope

Results

Deep Blue won a tournament of chess game played against Garry Kasparov in May 1997. Deep Blue won game six, therefore winning the six-game rematch $3\frac{1}{2}-2\frac{1}{2}$ and becoming the first computer system to defeat a reigning world champion in a match under standard chess tournament time controls. According to Deep Blue researches there were many factors that contributed to the success of deep blue, including:

- a single-chip chess search engine
- a massively parallel system with multiple levels of parallelism,
- a strong emphasis on search extensions,
- a complex evaluation function, and
- effective use of a Grandmaster game database.