Research review of Deep Blue

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Achievements

Deep Blue is an AI chess player there in 1997 achieve to win over the world champion over a 6 round chess game, Garry Kasparov.

Techniques

Deep Blue main structure was an Alpha-Beta min-max algorithm to predict moves ahead.

But the branching factor of chess is big, around 35, so the team behind Deep Blue had to implement a number of techniques to make a move within a given timeframe.

- They have a big database of start and end games to make limit the amount of space the algorithm has to search.

- Min-max is easy to get to work on multiple threads/computers, (compared to e.g. a neural network), the system was composed of 30 nodes with a search capacity of 2-2.5 million chess positions per second.

- The used a dynamic interactive deepening implementation there search deeper in a giving branch if the score varied enough, and allowed the process to use more time under certain circumstances. They also used quiescence search which is a time-cheap technique for the search for danger at a level deeper than the normal min-max algorithm.

Another impressive working of deep blue was their evaluation function there was made up of 9000 hand-tuned parameters.

A part of the evaluation function was hardcoded into a custom chip, this made the search fast, but had the drawback of it was impossible to tune the hyperparameters used in the chip.