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# Analysis of Deep Blue



Deep blue was a stepping stone in Artificial Intelligence. It was a great victory for machines to win against human in their own intelligent game. It was not intelligent though, It uses high computation(according to that era of time), and basically it was searching for a move with some search techniques. However we know that it was not a small time effort. They started building this agent from 1980. It took almost 17 years to beat the best human player in this world. There are some interesting things which I noticed when I was reading this paper-

1. In Deep Thought 1 and 2 the Evaluation function was simple. In a adversarial game we need to have a good Evaluation function. And there were some hardware problems that Hardware was not able to recognise the bishops of agent player. So they need to add some software patch that cost agent some computation power in the game.
2. There were some search problems in the designing of deep blue. First is that agent should perform non-uniform search like agent should avoid basic move that human player don't play. and the second problem was to resolve in search was "insurance" of a good move that search should go deep enough to make sure that move is good.
3. The evaluation function was really a problem, if some new feature added than time complexity would increase. So it is basically a problem in both hardware and software.
4. The other problem was hardware search, it was not flexible. And it could cause horizon effect. That is really bad for a game agent.

5. It was a massively parallel system designed to search parallel. It has 3 layer of system design. It has 30 processor, and 480 single chip to search game tree. each processor was assigned 16 chips. each was capable to compute 2 to 2.5 million position of a game tree. In this system one process was master and it searches top most levels of a game tree and then distribute it to below in second layer to remaining 29 processors, they carry out few levels of search depth and than distributes to 3rd layer, which consist of chips.

6. Deep Blue employs a system called selective extensions to examine chessboard positions. Selective extensions allow the computer to more efficiently search deeply into critical board arrangements. Instead of attempting to conduct an exhaustive "brute force" search into every possible position, Deep Blue selectively chooses distinct paths to follow, eliminating irrelevant searches in the process.