Wenifredo L. Suarez Jr

AIND Project 2: Research Review

Deep Blue Research Review

Deep Blue is a chess machine that defeated Gary Kasparov in 1997 with a score of 3.5 - 2.5. This research describes the reasoning and techniques behind Deep Blue.

Deep Blue, also known as Deep Blue II, is a culmination of improvements and ideas from Belle, Deep Thought I and II, to Deep Blue I into a world-class chess machine. After Kasparov defeated Deep Blue I in 1996, series of improvements were made to Deep Blue such as but not limited to: Enhanced chess chips which redesigned evaluation function (from 6400 features to 8000), Increased per chip speed (to 2-2.5 million positions per second), Doubled the number of chess chips (from 216 to 480) and Added development tools for debugging and match preparation.

Consequently, it was a massively parallel system and organized in 3 layers: Master, Workers and Chess Chips. The Master node searches the top level of the game tree, Workers search few additional level and the Chess chips search last few level of the tree. Similar to its predecessors, it also supported Quiescense Search, Iterative Deepening, Transposition Tables and NegaScout. Moreover, Deep Blue combined hardware search for speed and software search for efficiency and complexity.

In addition, Deep Blue used several guides to help drive its moves. The Opening Book consisted of 4000 positions of complex and positional opening moves. Extended Book is based from large database of chess moves. Lastly, End Game Database is used with 5 or less pieces on the board.

Deep Blue success is not caused by single improvement but multiple as mentioned above. During the development process, choices have to be made thus, not all of the alternatives were explored that may or may not improve Deep Blue. This paper gives us an overview on how complex it is to build a world-class machine and the evolution of improvements it went thru to achieve a feat one could only imagine.