Research Review

Deep Blue

This paper goes over the history and characteristics of the Deep Blue computer chess system, focusing on Deep Blue II, that was developed by IBM in the mid-1990s and ended up being the first computer to defeat Gary Kasparov in 1990s. The paper goes the over the machines that came before the Deep Blue systems: Chip Test, Deep Thought and Deep Thoughts 2, which showed early successes in chess championships, and the improvements that were made culminating the in the Deep Blue II system and its victory over Kasparov.

The article the goes to describe Deep Blue's hardware, in particular the IBM RS/6000 SP computer and it's 480 single chip chess engines, which are capable of search 2 to 2.5 millions chess positions per second each and their organization, and on average delivered 126 millions searches per second sustained over 1 minute.

Deep Blue's key characteristics architecture are:

- It's very large search capacity
- The fact that the evaluation function is implemented in hardware
- It's hybrid software/hardware search
- And it's ability to do massively parallel search.

The article then goes on giving an overview of the chess chip, the software search (introducing the "dual credit with delayed extension" search whose mechanisms are described in the paper), the hardware search and the parallel search.

The evaluation function is then described as essentially the sum of the values of features evaluated for the current game state, with the chess chip recognizing ~8000 features and each is assigned a value.

Lastly the paper describes the databases of opening positions, the extended book and the endgame positions, which were used for both the design of the chess chips but also the evaluation of game states at various stages of the game.

The deep blue program was a seminal effort that gave tremendous international visibility to AI research as it beat Gary Kasparov and allowed the field to progress both through advances in the large search capabilities, non-uniform search as well as complex evaluation functions. The author encourages the readers of the paper to continue exploring the possibilities of the field and to try out alternatives that were left unexplored.