

We are living at a very exciting time, a time when we are observing unprecedented growth in the field of Artificial Intelligence. Just like the tremendous changes in lifestyle that we experienced with inventions like the light bulb, the automobile, the airplane and the internet, we are poised for a quantum leap in the way we live our lives over the next few years. But how did we get to this point? How can we benefit from the lessons learned? Gleaning from key events of AI's past can be just as fascinating and enlightening as our endeavors for future accomplishments, and we would be remiss to omit Deep Blue from that AI treasure trove.

Two decades ago, a computer named Deep Blue II won the chess battle against Garry Kasparov, the best chess player in the world at that time. While predecessors of Deep Blue had experienced some success up until that point by winning games against other Grandmasters, the feat of beating the best in the world had been unmatched. Significant software and hardware improvements were made to Deep Blue I, the system that had lost to Kasparov the year before, to give it the edge it needed to flip the outcome.

One of the main improvements between Deep Blue I and II was a vastly improved chess chip that was faster and could therefore search through more game positions per second. Deep Blue II also had more than twice the number of chess chips than Deep Blue I which translated to a far greater degree of parallelism in game tree searches. There were 30 nodes each with 16 chess chips for a total of 480 chess chips. Search in Deep Blue II was implemented in both hardware and software with the master node controlling search activity distribution. Hardware search was used primarily to explore the game tree near the leaves and software search for nodes close to the root. The evaluation function was implemented in hardware which resulted in predictable execution time. It was an aggregate of over 8000 features which was 25% more than its predecessor. Dynamic scaling and abstraction techniques were employed to manage the increased complexity.

Several specialized strategies also contributed to Deep Blue II's superior performance. Among these were the ability to generate moves to check the opponent or to avoid being checked by the opponent and ordering moves so that the best moves were considered first. For instance, capturing moves ranked higher than non-capturing moves and capturing high-valued pieces ranked higher than capturing low-valued pieces. Other strategies included extending forcing/forced pair of moves when a certain threshold was exceeded, searching some moves more deeply than others (if there were only a few and they were significantly better than the others) and playing good moves earlier instead of later. Deep Blue II also had at its disposal, databases of "great" moves for each stage of the game – opening, mid-game and end-game. These moves had been compiled by Grandmasters and collected from hundreds of thousands of games over the years.

The success of the Deep Blue II project was a result of multiple years of hard work. It was not an accident or a miracle but a combination of many brilliant ideas and strategies that had to work in concert and undergo multiple iterations before it could dethrone the world chess champion. This is the type of perseverance that will be needed for similar breakthroughs in the years ahead. But there is good news! We can leverage the learnings of our past to build a much better future!