Finding heuristics for move selection in chess

Aditya Desai
Sutanu Gayen

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- Man lacks the understanding of how his mind works. He solves problems without actually knowing how he came up with solutions. Trying to create a machine that responds to a particular situation and takes decision on a level par that of a human is parallel to understanding how mind actually works. Let us look at constructing digital computers that play chess. Chess is an excellent game providing a situation complex enough so that neither of the players can hope to understand it completely but at the same time each one can plan and analyse the game enough to outwit the opponent. With the complexity as that of the game of chess the exponential search tree is so large that one can never hope to span it completely to take decisions. At the same time a machine that bases its results on the scrutiny of the entire search space, especially when space is large, is far from how humans behave.

- Shanon gave a basic framework for thinking about the chess programs. He observed that though being extremely complex, chess still is a a game with finite possibilities. Thus a finite 'game tree' can be constructed and theoretically we can determine the best possible alternative to choose from by *minimaxing*. Obviously, A person capable of observing entire game tree and minmaxing efficiently can play the best chess. However this is not possible in practise. So the basic framework provided by shanon is about answering questions of 'which alternatives to consider','to what depth the continuations are explored', 'how to statically evaluate the position',etc. Following the basic framework many chess machines have been built varying in success depending on the answers each one provide to the above mentioned questions. Newell, Shaw, Simon came up with a goal based move generators which probably seem more closer to how human mind works.

- One of the important observation of how human play chess is high selectivity. Chess players only explore a few alternatives while choosing a particular move. This can be viewed as quick pruning of the game tree to end up with a handful of alternatives. Another way to think is human perception of the state of chess board maps to a small set of possible actions (we may relate it in some way to dimensionality reduction). The question of what exactly a chess player sees when he sees the board and which goal (material balance, king defence, development) is the immediate need of the state and how to recognise them remains intriguing question. Coming up with the proper criterion for the selection of alternatives is very close to understanding how we play chess and is the basis for the success of the heuristic programs.

In our project we would like to explore the various heuristics that have been established for move selection in the game of chess and eventually coming up with new heuristics. We would like to explore the new approach presented in the paper on 'Active symbols' by Linhares.