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# Broad Pattern Matching for the Opening Moves in Go

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By contrast computer programs stronger than human world champion is developed on Chess or Othello, strength of computer Go programs is weak for long years, the strength is about amateur 1d. But scene new method that called Monte-Carlo Tree Search is introduced, the strength was improved surprisingly.

In Monte-Carlo computer go, machine learning of patterns from existing game records is a well-known method to compute an evaluation function, which can then be used to prune the search tree, or a probabilistic model to improve the quality of the random playouts. The learning process is mainly done by computing the frequencies of patterns in the game records, and then deducing the corresponding weights of each pattern in the probabilistic model used for choosing the next move. To obtain a more precise evaluation function, broad patterns that cover a wide area of the board are needed, but when the size of the patterns increases, the frequencies in the game records decrease, making the learning process impossible without a huge number of game records.

In order to attack this problem, we propose a new pattern matching method that only retain the main picture of the board by reducing the board size. The process of board size reduction consists of three parts: calculation of influence distribution of stones on the board, size reduction of influence distribution by splitting the distribution into tiles and calculation of average of each tile, digitization into 4 values by using a threshold.

When execute pattern matching to a intersection on the board, instead of using stone positions on the board, 3x3 area surrounding corresponding intersection on the reduced board.

Because of performance of our method depends on way to split, We also propose extended method: To prepare several size reduced boards made by different splitting, then execute pattern matching on each board and combine them.

As a result of study performance and self-waging war comparing with the conventional method as a quality assessment using the proposed method, the significance of the proposed method was shown. And our extended method showed better performance than our basic method.