Computers are well known to be weak at positional play, the intricate manoeuvring for a small advantage, such as a well-placed Knight. However, they also have problems with tactical play, even with what seems like the simple task of finding forced checkmates in positions where they are known to exist.

Look at figure 1. This is an example of a “White to play and mate in two moves” problem of the kind often found in newspapers and magazines.

The first point to note here is that the specification for White to mate in two moves has no practical value. Chess problems are not game positions but artistic compositions on the 64 squares of the chessboard.

Solving a chess problem is not a matter of examining every possible sequence, but of identifying the composers' theme in setting the problem.

The use of a computerised “mate in two” program using exhaustive analysis easily undercuts the aesthetic experience of problem solution.

Simply by considering every possible legal combination of two moves for White and one for Black, the program inevitably reveals the winning move. (The reader is left to discover the solution for figure 1 using either a computer or a human brain, as preferred.)

In finding checkmating sequences in positions that arise in practical play, very different methods need to be applied.

The longest variation in a checkmating sequence arising from play can easily be 1 or 8 moves, and the depth, so examining every possible combination as a general solving method if completely out of the question.

On the positive side, the moves in a checkmating sequence from play are usually fairly obvious ones of a forcing nature, such as checks and captures (or sacrifices of material) whereas those in composed problems are frequently “quiet” or unlikely moves, such as a Bishop move one square further away from the scene of battle, which are difficult to perceive even for strong over-the-board players.

The MATER program of George Bukovatz and Herbert Simon, which appeared in the mid-sixties was an early pioneering attempt aimed at finding forced checkmates in game positions, given that they are known to exist, of necessity employing “Artificial Intelligence” rather than “brute-force” means.

Figure 2 is a fairly straightforward example of the positions solved by the first version of the program, MATER 1.

This is how MATER solves the position in figure 2.

1. Generate all White checking moves.
2. C-B6ch and has two legal replies. 1. N-K6ch has 3 and 1. B-B7ch and 1. B-K7ch each have two inactive.
3. Choose, 1. B-K7ch (arbitrarily) from the last two for analysis, on the basis of minimizing Black’s replies.
4. Generate Black’s forced reply
   1. . . . NxB.
5. Generate all White’s checking moves.
6. N-K6ch is the only one and Black has three legal replies.
   a. 1. B-K7ch so the previously played moves (1. B-K7ch, NxB) are retracted and 1. B-B7ch is played instead from the original position.
   b. Black’s move is again forced, 1. . . . NxN.
   c. Generate White’s checking moves. 2. N-K6ch (four legal replies) and 2. Q-B6ch (two replies).
   d. Choose a move to consider next, from 3. 1. B-B6ch (two replies), 1. N-K6ch (three replies), 2. N-K6ch (four replies) and 2. Q-B6ch (two replies).
   e. Since 1. B-B6ch was generated first, it is chosen in preference to 2. B-B6ch (both with two legal replies). So 1. B-B6ch is now placed in the original position.
   f. Black now has a choice of two replies
      1. . . . NxB is tried first.
   g. Generate White’s legal moves; these include 2. B-K7 mate, which has no legal replies and is accordingly chosen to look at next.
   h. Since 1. . . . NxB was unsuccessful, Black’s only other legal reply to 1. Q-B6ch is tried, namely 1. . . . N-K2.
   i. Generates White’s legal moves; these include 2. BxN which has no legal reply and is considered to look at.
   j. Since it has now been found that neither 1. . . . NxQ or 1. . . . N-K2 avoids checkmate, White’s winning first move 1. Q-B6ch is established.

Although figure 2 is quite a simple position and one that, in isolation, could have been solved by an exhaustive “mate in two” program, the same method emboldened to consider other forcing moves as well as checks for White can solve many other problems for which an exhaustive search method would be completely inadequate in any reasonable amount of time.

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