

SOLUTION NOTES

Artificial Intelligence (Part II) 2001 Paper 9 Question 8 (WFC)

- (a) Because in most games there are many possible goal states. Choosing one (or a small group) from which to root a backward search (a) would unduly restrict openings available to the player (b) is not guaranteed to converge with the current position, and (c) involves a much higher complexity because in most games the number of goal states usually outnumbers the number of possible forward moves from the present position.
- (b) There are three lines of thought to answer this: (a) The program does not have access to the search space (if any) expanded by the opponent, so (assuming players move alternately) there is no clear advantage to re-using a known search space rooted from 2 plays previous to the present position. (b) The program will search for a goal that maximises its own position or return. The opponent has the same aim for itself, and assuming it plays rationally, might be expected to examine search spaces with some degree of overlap, so retaining search space might be useful. However, the question implies a non-machine opponent, who might be assumed to play non-rationally (i.e. not according to the same algorithm as the machine), (c) Because the search is combinatorial, the practical question of how much previous search space to retain over how many moves becomes difficult quickly. The surest way to get around this problem is to retain nothing.
- (c) (i) D.
- (ii) There are alpha cutoffs after backing up from H and beta cutoffs after backing up from N, P, and X. Therefore 6 of the nodes need not be searched: O, Q, I, T, U, and Y.