

PROBLEM REDUCTION METHOD

AND-OR graphs

AND-OR graph (or tree) is useful for representing the solution of problems that can be solved by decomposing them into a set of smaller problems, all of which must then be solved.



Fig: AND / OR Graph

Problem Reduction algorithm:

1. Initialize the graph to the starting node.

2. Loop until the starting node is labelled SOLVED or until its cost goes above FUTILITY:

(i) Traverse the graph, starting at the initial node and following the current best path and accumulate the set of nodes that are on that path and have not yet been expanded.

(ii) Pick one of these unexpanded nodes and expand it. If there are no successors, assign FUTILITY as the value of this node. Otherwise, add its successors to the graph and for each of them compute $f'(n)$. If $f'(n)$ of any node is 0, mark that node as SOLVED.

(iii) Change the $f'(n)$ estimate of the newly expanded node to reflect the new information provided by its successors. Propagate this change backwards through the graph. If any node contains a successor arc whose descendants are all solved, label the node itself as SOLVED.