Introduction to Artificial Intelligence 6: Adversarial Games / α-β Pruning

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 α - β Pruning

White moves first



First path explored leads to the node 3. The MIN node B has at most "3". MIN updates Beta:

 $\beta = \min(\infty, 3) = 3$





 α - β Pruning



Next leaf has value 12. Since 3 < 12, B has a better option and keeps the previous beta. Update: $\beta = \min(3, 12) = 3$



 α - β Pruning



Next leaf has value 8. All children of B are now explored.

In B, MIN chooses the value 3 so now the value at the Root is al least 3. Root is a MAX node so we update $\alpha = \max(-\infty,3)=3$

 α - β Pruning



A new path leads to 2 and β is updated. NOTE: β was again re-initialized to $-\infty$ for the new path!

BUT:

we know that B=3, so MAX will never choose C!

The next 2 nodes will not be explored. (PRUNING)





 α - β Pruning



Now MAX found a "better" node (14>3) therefore the algorithm must keep exploring more leaves.

Now we have bounds on all successors of the Root (B, C, D) and therefore the Root value is at most 14.

Root update: $\beta = \min(14, +\infty)$

 α - β Pruning



Note for 2: alpha is set to 2 because it is the chosen value for this node by MIN and $\alpha = \max(-\infty, 2) = 2$. This is evaluated only at the end of MIN decision.

After we find 5, we have to keep exploring arriving finally at 2. [2, 2] D This implies for the MIN node D=2. β at the Root is updated with 3 5 2 14



 α - β Pruning



Final decided path

Introduction to AI

