

Name : Jyoti Sharma

Class : BE-IT

Roll No : 60

Sub : IS Lab

Batch : I3

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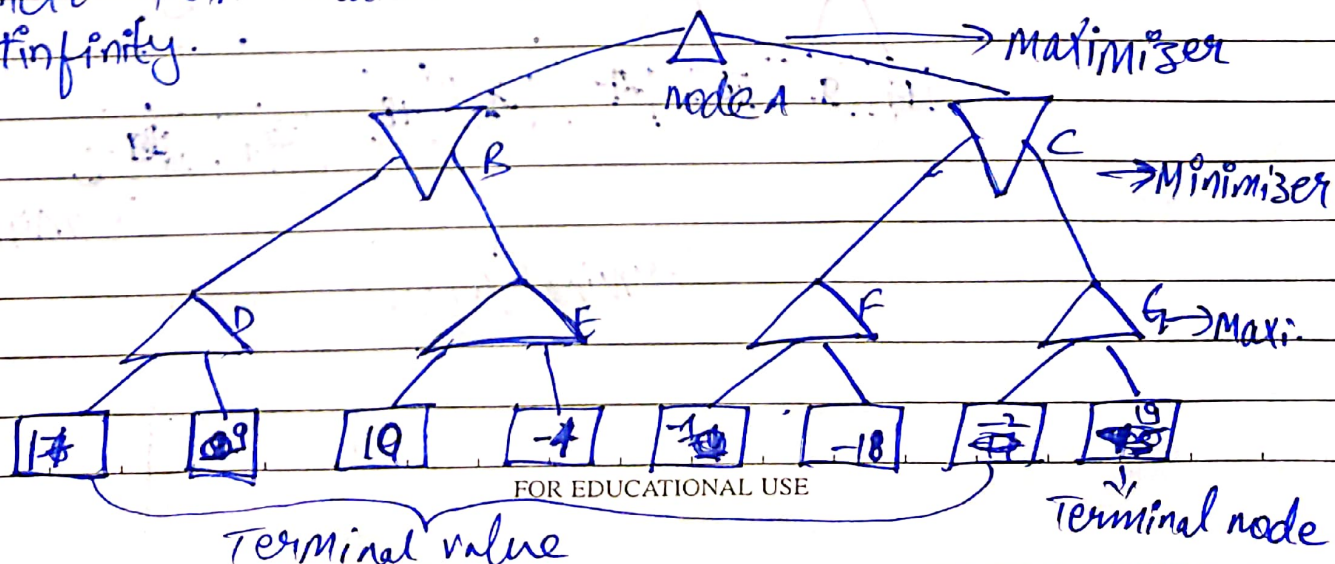
## Min-max Algorithm :

Min-max algorithm :

Min-Max algorithm is a recursive or backtracking algo which is used in decision-making and game theory. It provides an optimal move for the player, assuming that opponent is also playing optimally.

- Min-Max algo. uses recursion to search through the game tree.
- In this algo. two players play the game, one is called Max and other is called Min.
- Min-Max algo. is mostly used for game playing in AI.

Step 1: Lets take A is the initial state of the tree. Suppose maximizer takes first turn (when 04) which has worst case initial value  $-\infty$ , and minimizer will take next turn which has worst case initial value  $-\infty$ .





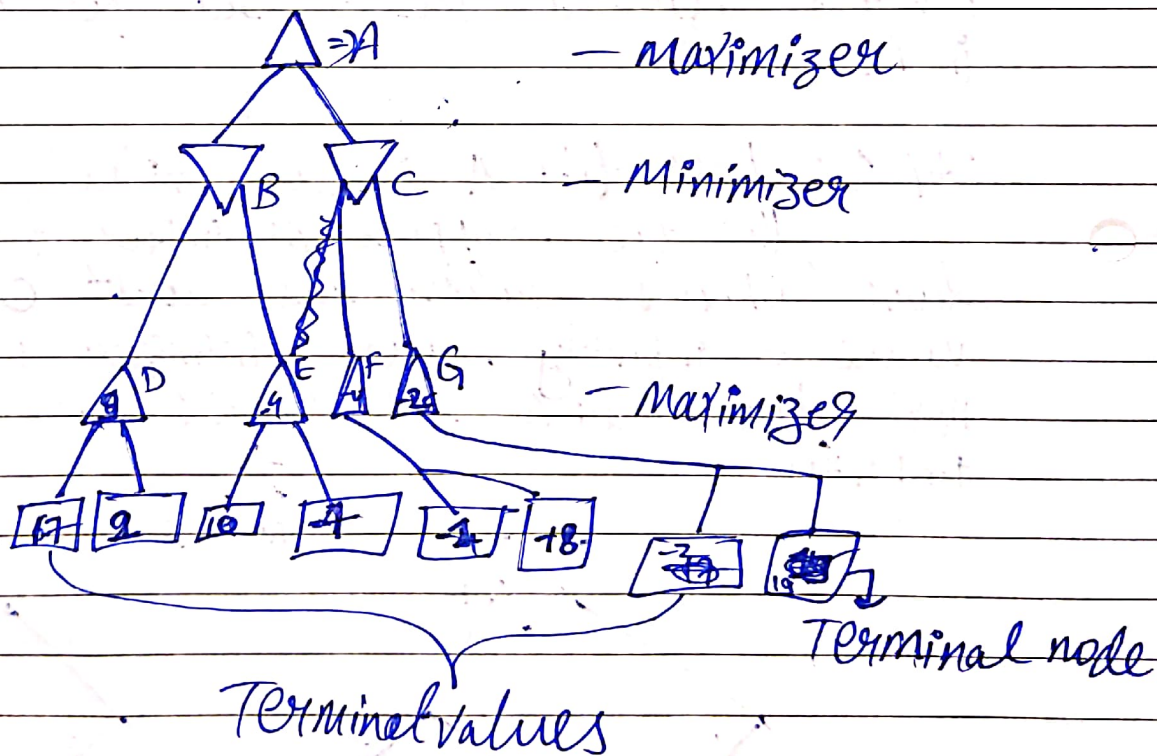
Step 2: First we find the utilities value for the maximizer, its initial value is  $-\infty$ , so we will compare each value in terminal state with initial value of maximizer and determines the higher nodes values. It will find the maximum among all.

For node D:  $\max(17, -\infty) \Rightarrow \max(17, 2) = 17$

For node E:  $\max(4, -\infty) \Rightarrow \max(4, -7) = 4$

For node F:  $\max(-4, -\infty) \Rightarrow \max(-4, -18) = -4$

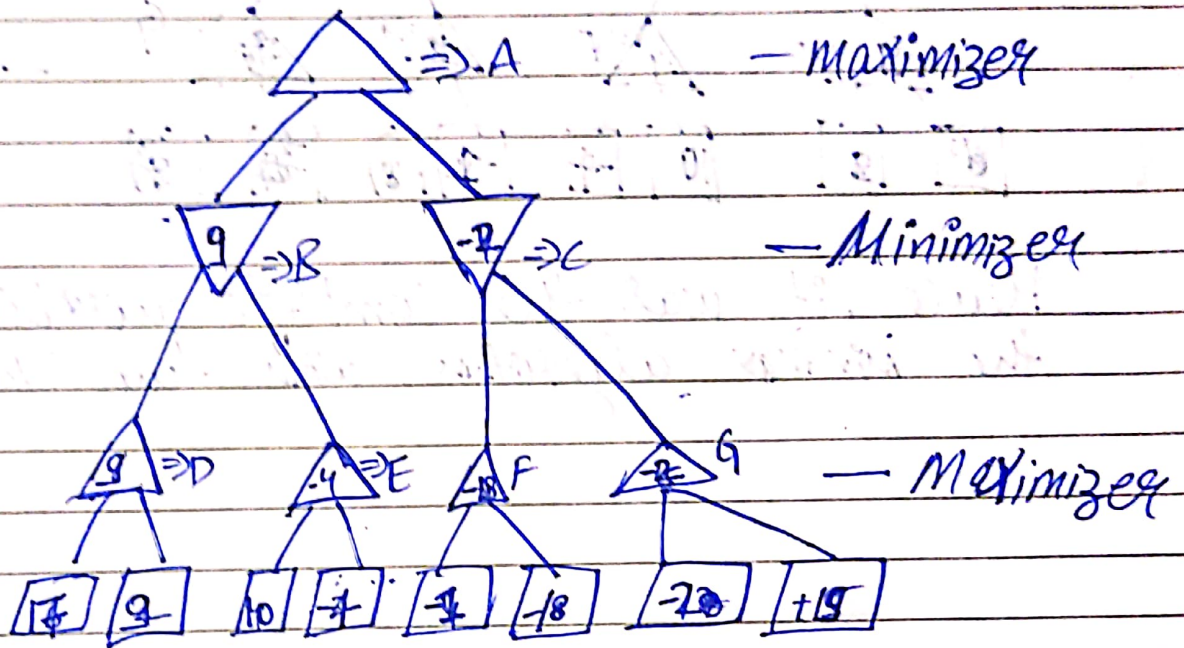
For node G:  $\max(2, -\infty) \Rightarrow \max(2, 18) = 18$



Step 3: In the next step, its a turn for minimize, so it will compare all nodes values with two, and will find the 3rd layer node value.

For node B -  $\min(8, -4) = -4$

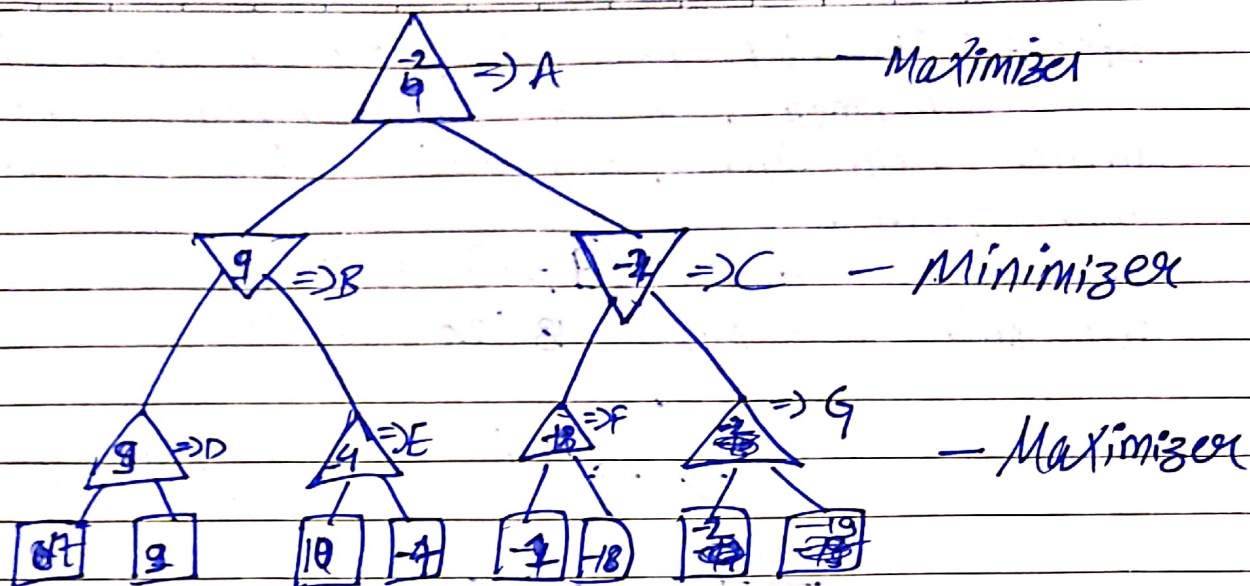
For node C -  $\min(-18, -20) = -18$



Step 4: Now its a turn for maximizer, and it will again choose the maximum of all nodes values and find the maximum value for the root node.

For node A :  $\max(9, -18) = 9$





Hence, it was the complete workflow of the minimax algorithm with two player game.