EX.NO:4 **DATE:4/9/2024**

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MINIMAX ALGORITHM

AIM: To implement MiniMax Algorith using python

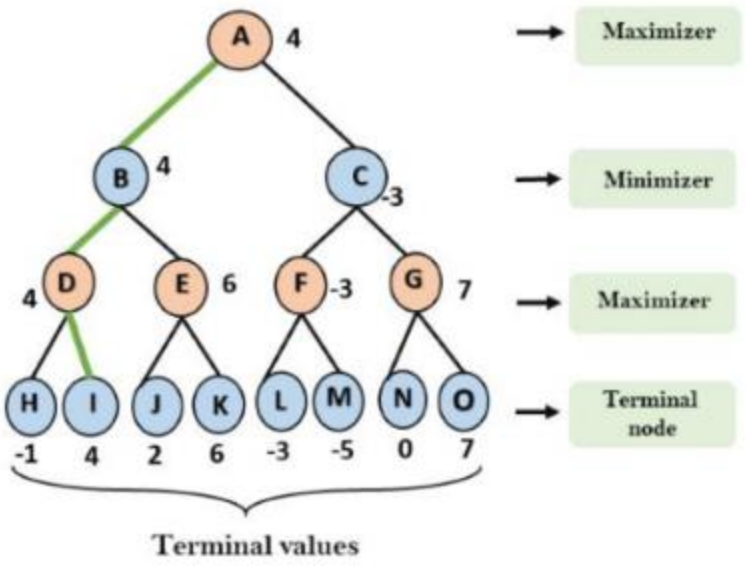
• A simple example can be used to explain how the minimax algorithm works. We've included an example of a game-tree below, which represents a two-player game.

• There are two players in this scenario, one named Maximizer and the other named Minimizer.

• Maximizer will strive for the highest possible score, while Minimizer will strive for the lowest possible score.

• Because this algorithm uses DFS, we must go all the way through the leaves to reach the terminal nodes in this game-tree.

• The terminal values are given at the terminal node, so we'll compare them and retrace the tree till we reach the original state.



CODE:

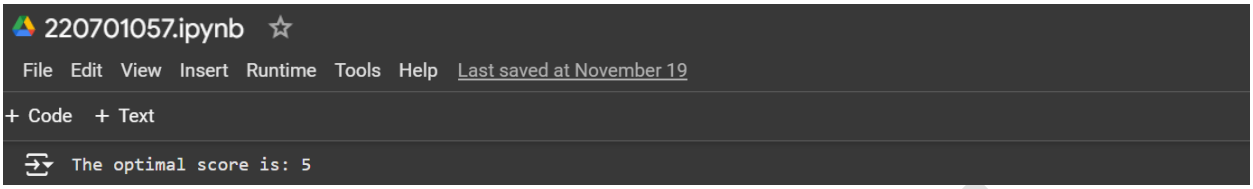
```
   import math
def minimax(depth, node_index, is_maximizer, scores, height):
    if depth == height:
        return scores[node_index]

    if is_maximizer:
        return max(minimax(depth + 1, node_index * 2, False, scores,
height),
                   minimax(depth + 1, node_index * 2 + 1, False, scores,
height))
    else:
        return min(minimax(depth + 1, node_index * 2, True, scores,
height),
                   minimax(depth + 1, node_index * 2 + 1, True, scores,
height))

def calculate_tree_height(num_leaves):
    return math.ceil(math.log2(num_leaves))

scores = [3, 5, 6, 9, 1, 2, 0, -1]
tree_height = calculate_tree_height(len(scores))
optimal_score = minimax(0, 0, True, scores, tree_height)
print(f"The optimal score is: {optimal_score}")
```

OUTPUT:


220701057.ipynb
File Edit View Insert Runtime Tools Help Last saved at November 19
+ Code + Text
The optimal score is: 5