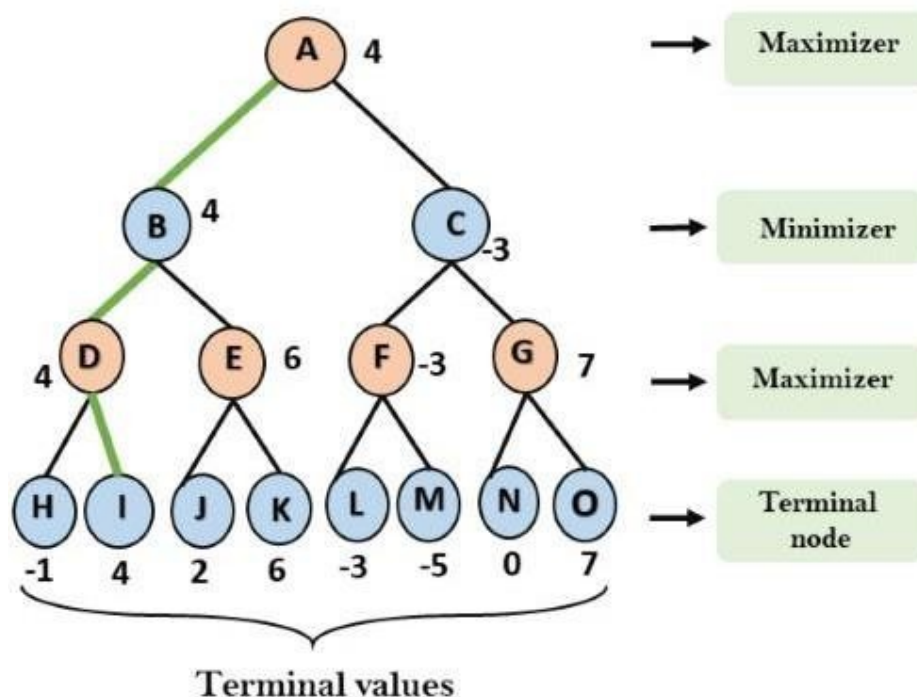


MINIMAX ALGORITHM

- 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.



AIM:

To implement minimax algorithm using python

CODE:

```
import math

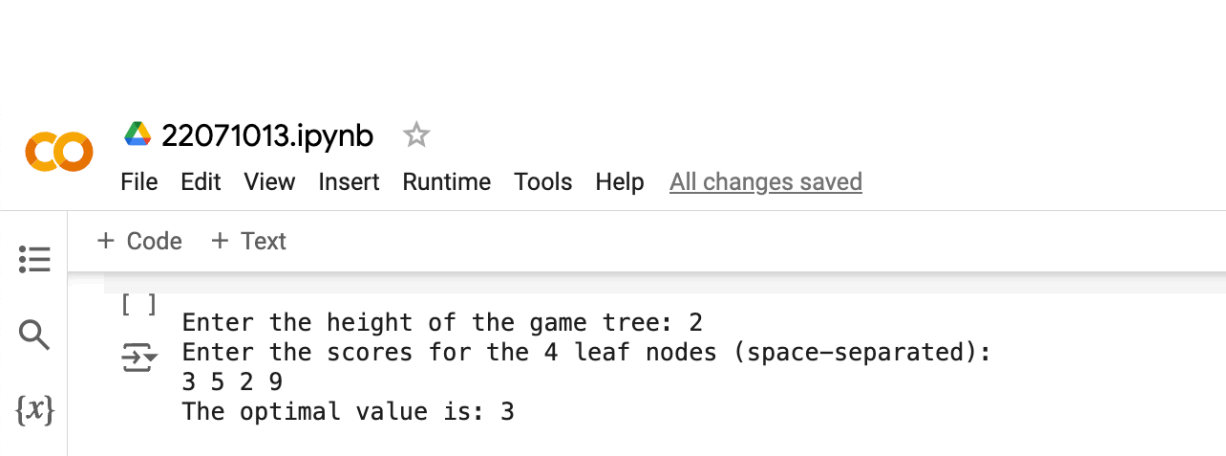
def minimax(depth, node_index, is_maximizer, scores, height):
    if depth == height:
        return scores[node_index]

    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:



The screenshot shows a Jupyter Notebook interface. At the top, there is a header bar with the Colab logo, the file name '22071013.ipynb', and a star icon. Below this is a menu bar with options: File, Edit, View, Insert, Runtime, Tools, Help, and a link 'All changes saved'. The main area of the notebook is divided into two sections: a left sidebar with icons for file management and a right pane for code and output. The right pane contains a code cell with the following text: 'Enter the height of the game tree: 2', 'Enter the scores for the 4 leaf nodes (space-separated):', '3 5 2 9', and 'The optimal value is: 3'.

```
[ ] Enter the height of the game tree: 2
[ ] Enter the scores for the 4 leaf nodes (space-separated):
[ ] 3 5 2 9
[ ] The optimal value is: 3
```

RESULT:

Thus, the minimax algorithm has been implemented successfully.