1BM22CS241

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Implement Alpha-Beta Pruning.

Code:

```
import math

def minimax(node, depth, is_maximizing):
    """
    Implement the Minimax algorithm to solve the decision tree.

    Parameters:
    node (dict): The current node in the decision tree, with the following structure:
      {
          'value': int,
          'left': dict or None,
          'right': dict or None
      }
    depth (int): The current depth in the decision tree.
    is_maximizing (bool): Flag to indicate whether the current player is the maximizing player.

    Returns:
    int: The utility value of the current node.
    """
    # Base case: Leaf node
    if node['left'] is None and node['right'] is None:
        return node['value']

    # Recursive case
```

```
    if is_maximizing:
        best_value = -math.inf
        if node['left']:
            best_value = max(best_value, minimax(node['left'], depth + 1, False))
        if node['right']:
            best_value = max(best_value, minimax(node['right'], depth + 1, False))
        return best_value
    else:
        best_value = math.inf
        if node['left']:
            best_value = min(best_value, minimax(node['left'], depth + 1, True))
        if node['right']:
            best_value = min(best_value, minimax(node['right'], depth + 1, True))
        return best_value

# Example usage
decision_tree = {
    'value': 5,
    'left': {
        'value': 6,
        'left': {
            'value': 7,



            'left': {
                'value': 4,
                'left': None,
```

```
            'right': None
        },
        'right': {
            'value': 5,
            'left': None,
            'right': None
        }
    },
    'right': {
        'value': 3,
        'left': {
            'value': 6,
            'left': None,
            'right': None
        },
        'right': {
            'value': 9,
            'left': None,
            'right': None
        }
    }
},
'right': {
    'value': 8,
    'left': {
        'value': 7,
        'left': {
```

```
            'value': 6,
            'left': None,
            'right': None
        },
        'right': {
            'value': 9,
            'left': None,
            'right': None
        }
    },
    'right': {
        'value': 8,
        'left': {
            'value': 6,
            'left': None,
            'right': None
        },
'right': None
}
}
}
# Find the best move for the maximizing player
best_value = minimax(decision_tree, 0, True)
print(f"The best value for the maximizing player is: {best_value}")
```

Output:

The best value for the maximizing player is: 6