DA221 : INTRODUCTION TO ARTIFICIAL INTELLIGENCE

**EXPERIMENTING WITH MINIMAX AND ALPHA-BETA PRUNING**

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# Introduction :

The objective of this experiment was to explore and analyze the performance of Minimax and Alpha-Beta Pruning algorithms in the context of game theory. Both algorithms are widely used in decision-making processes for games with perfect information, such as chess and tic-tac-toe.

# Minimax Algorithm :

The Minimax algorithm is a decision-making strategy that aims to minimize the possible loss for a worst-case scenario. It operates on a game tree, where nodes represent different game states and edges represent possible moves. The algorithm recursively explores the tree, evaluating the utility of each node until it reaches the terminal nodes (end states of the game).

# Alpha-Beta Pruning :

Alpha-Beta Pruning is an optimization technique applied to the Minimax algorithm. It reduces the number of nodes evaluated by stopping the search in certain branches when it is determined that they will not affect the final decision. This optimization significantly improves the efficiency of the algorithm.

# Conclusion :

In conclusion, the experiment highlighted the effectiveness of Alpha-Beta Pruning as an optimization technique for the Minimax algorithm. The combination of these two algorithms is crucial for enhancing the performance of decision-making processes in game theory. This study contributes to the understanding of algorithmic strategies in game-playing scenarios, providing valuable insights for future research in artificial intelligence and decision-making systems.