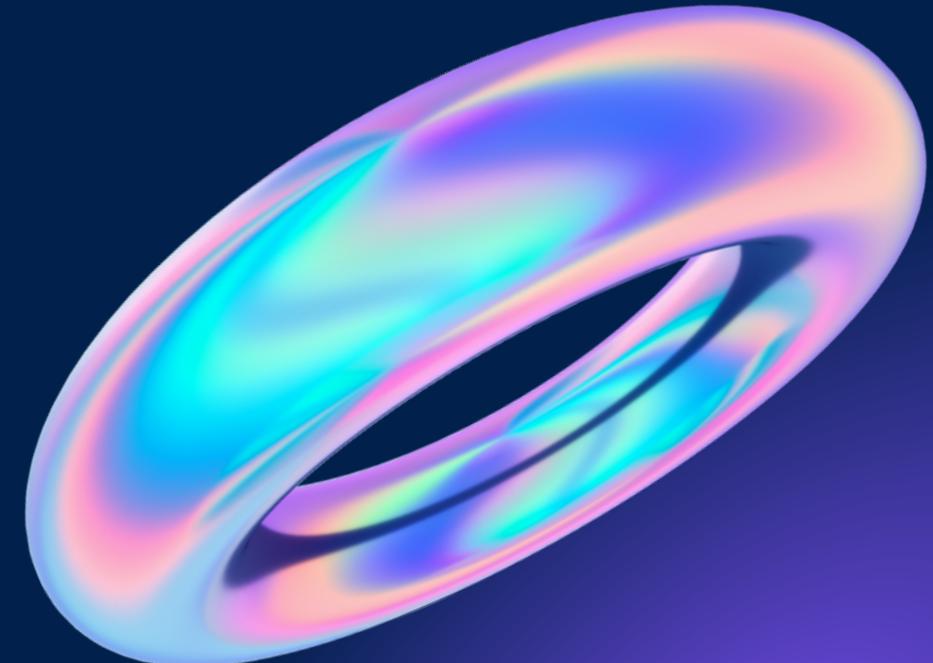




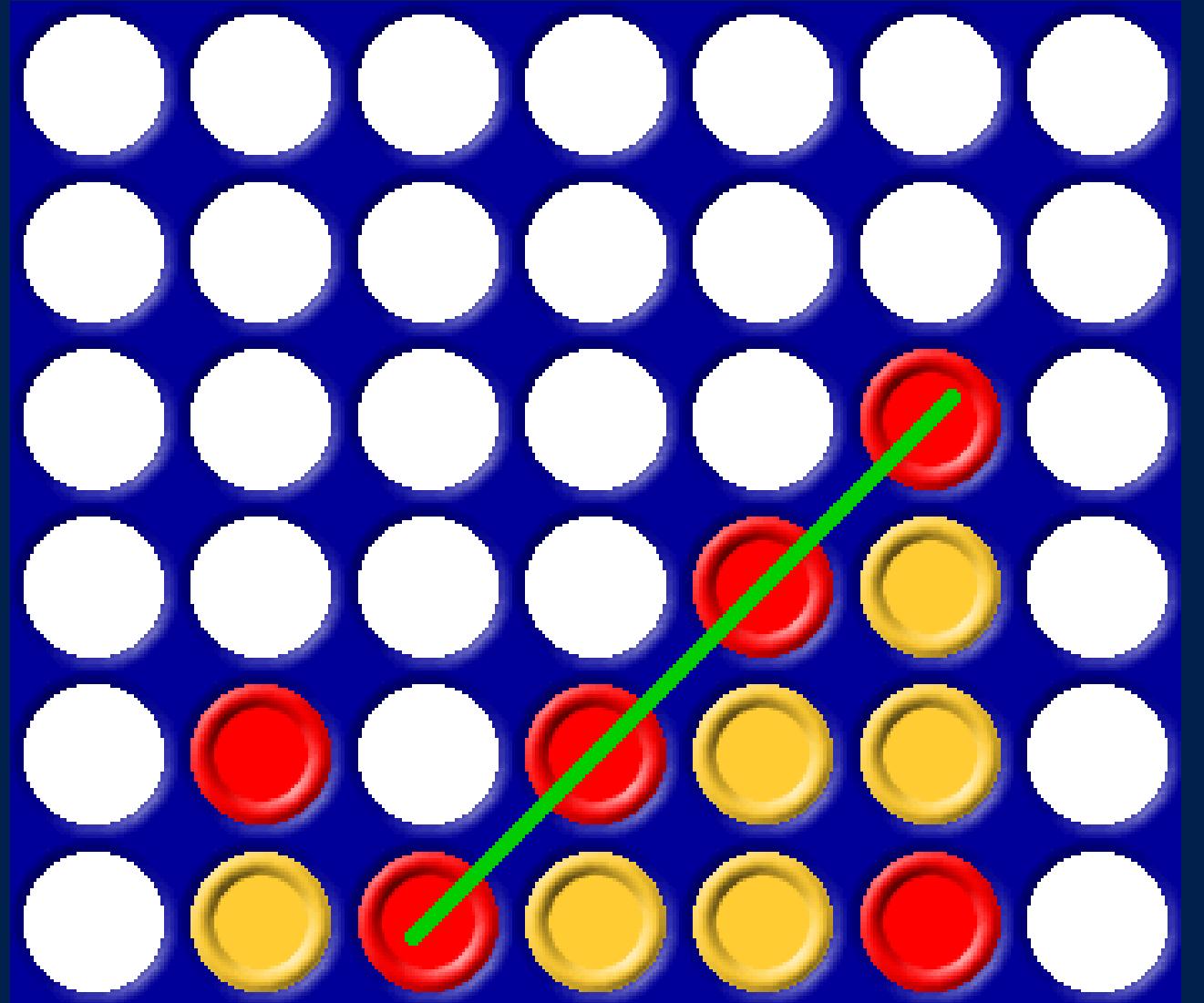
Connect-4

Team Members:
Anna Aghaloyan,
Elvina Nosrati Alamdari,
Sergo Poghosyan





Connect-4 is a two-player game. The goal of Connect-4 is to place four of your own discs on the vertically suspended grid. In this game, the players start with a specific color (usually red and yellow) and then take turns placing their discs (each having 21 discs). The first person to create a horizontal, vertical, or diagonal line on their own discs of four is declared the winner of the game.



AN EXAMPLE OF A WINNING POSITION.

Starting Connect-4 in the center column guarantees victory for the red player in 41 moves or less. Placing the first disc in the outer columns allows yellow to win, while in the adjacent columns, the game ends in a draw.

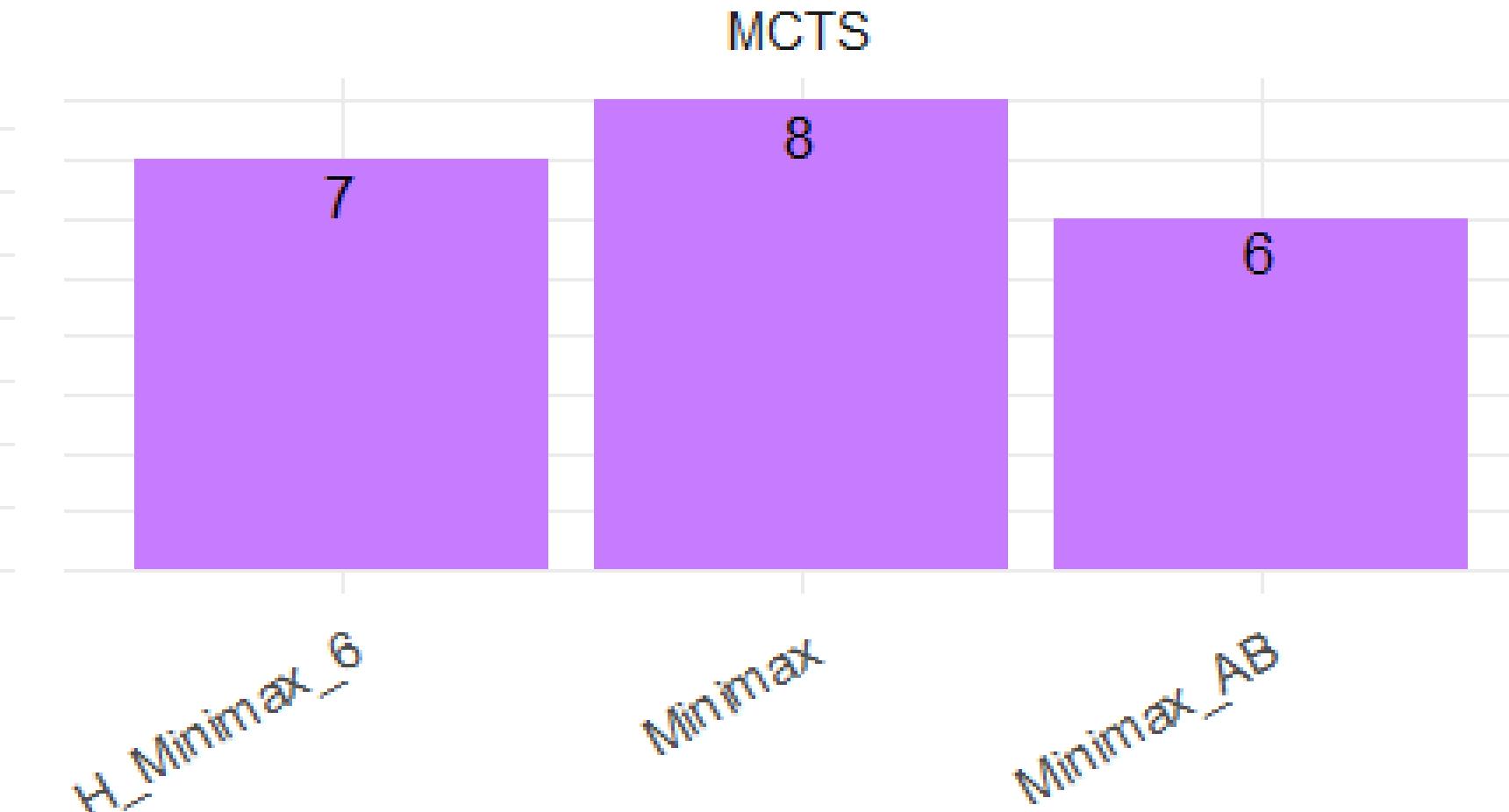
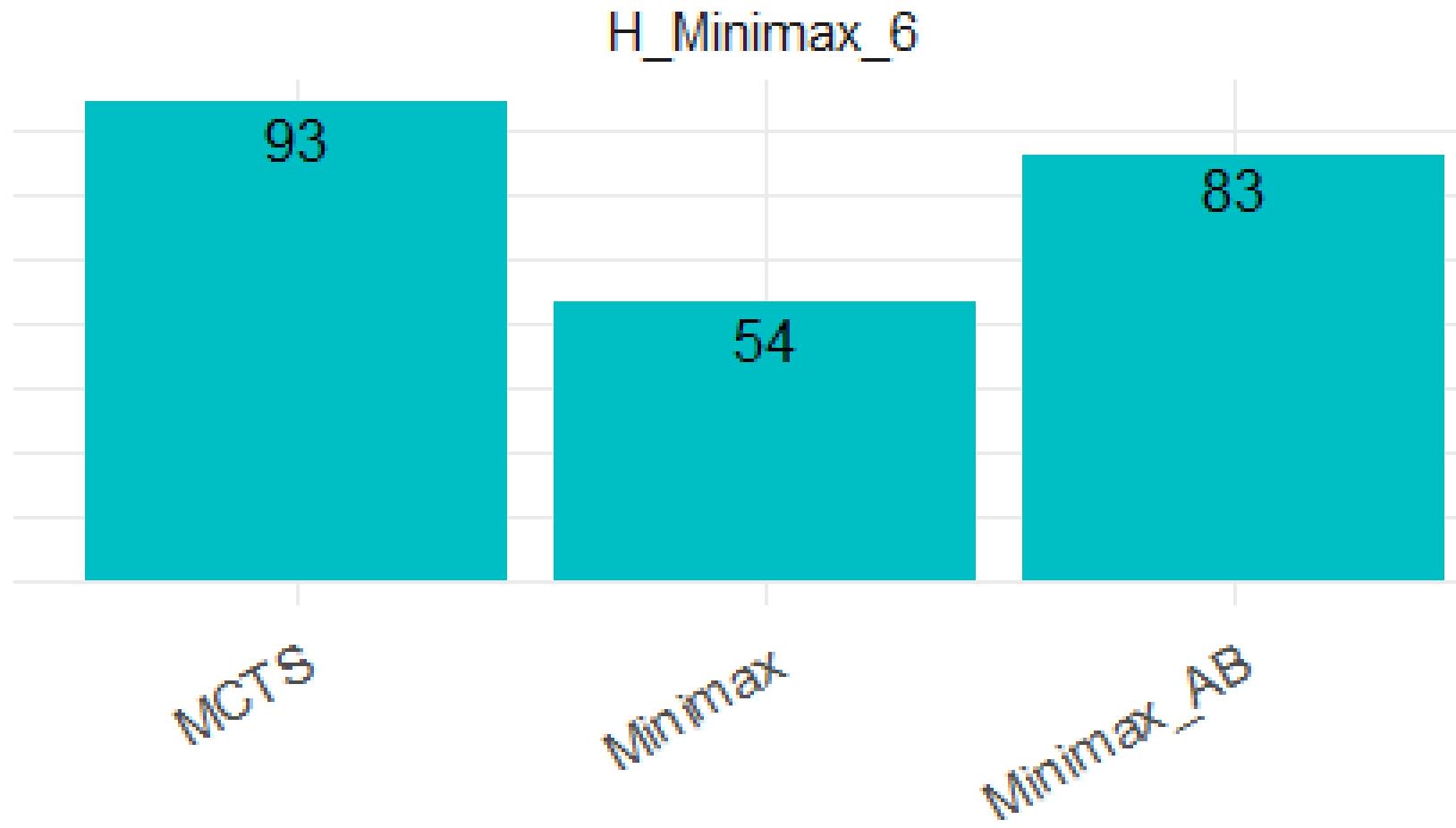
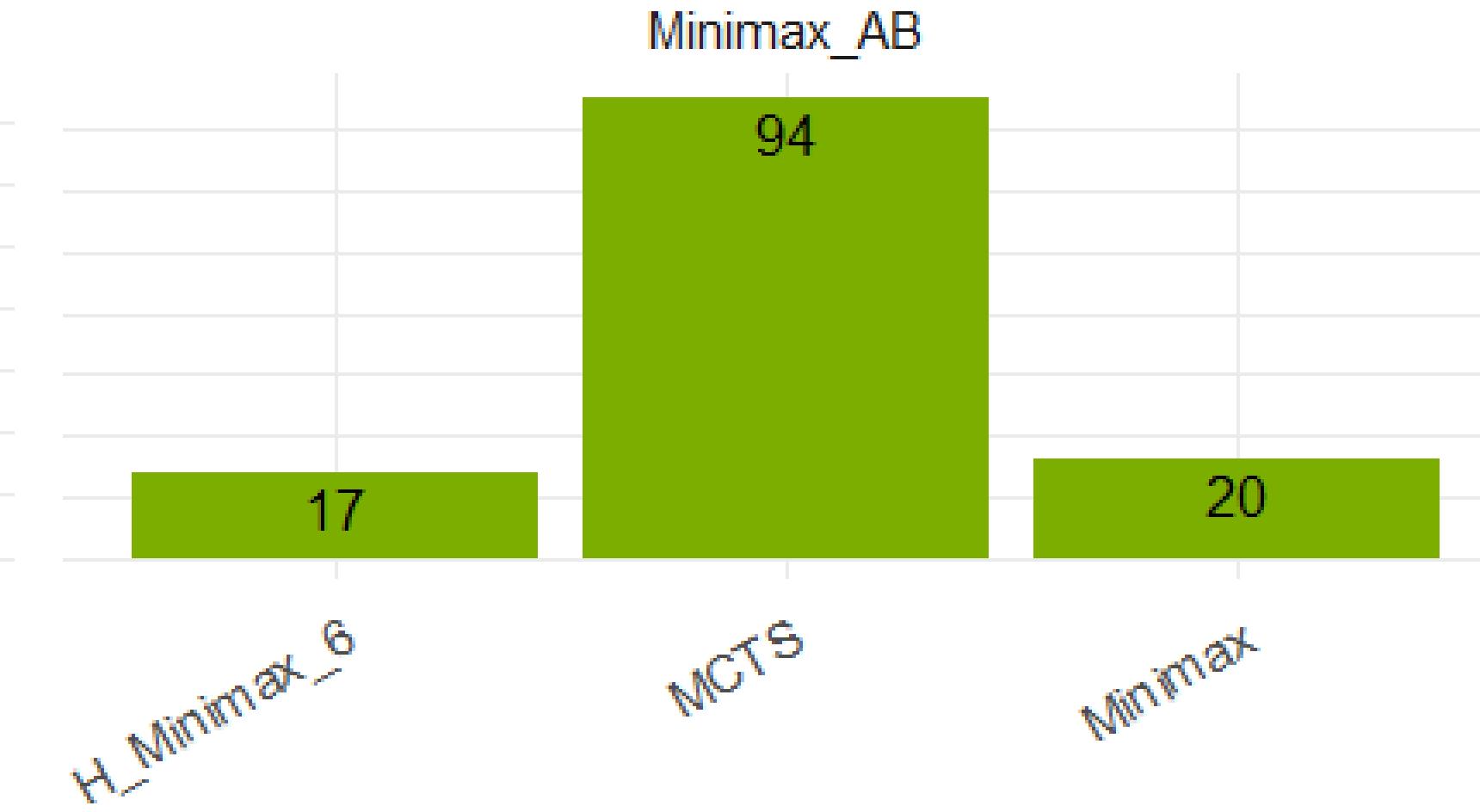
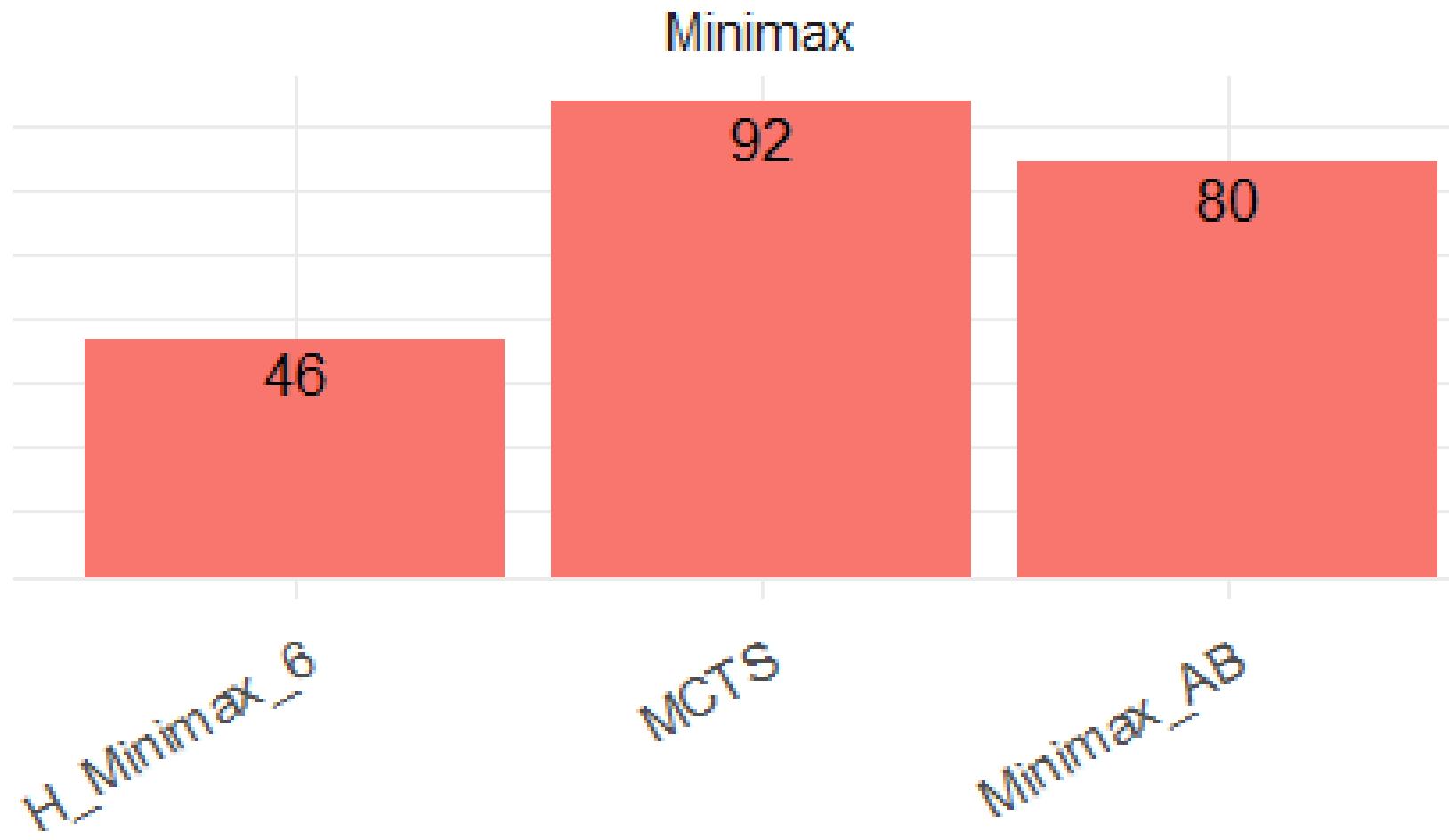


The game Connect-4 is considered to be a zero-sum game since its advantage for one player is a disadvantage for the other player. Moreover, it is finite as the game has a finite number of states. The game is played on a seven vertical slots board, each having six positions. Its state space is 4.5×10^{12} board positions.

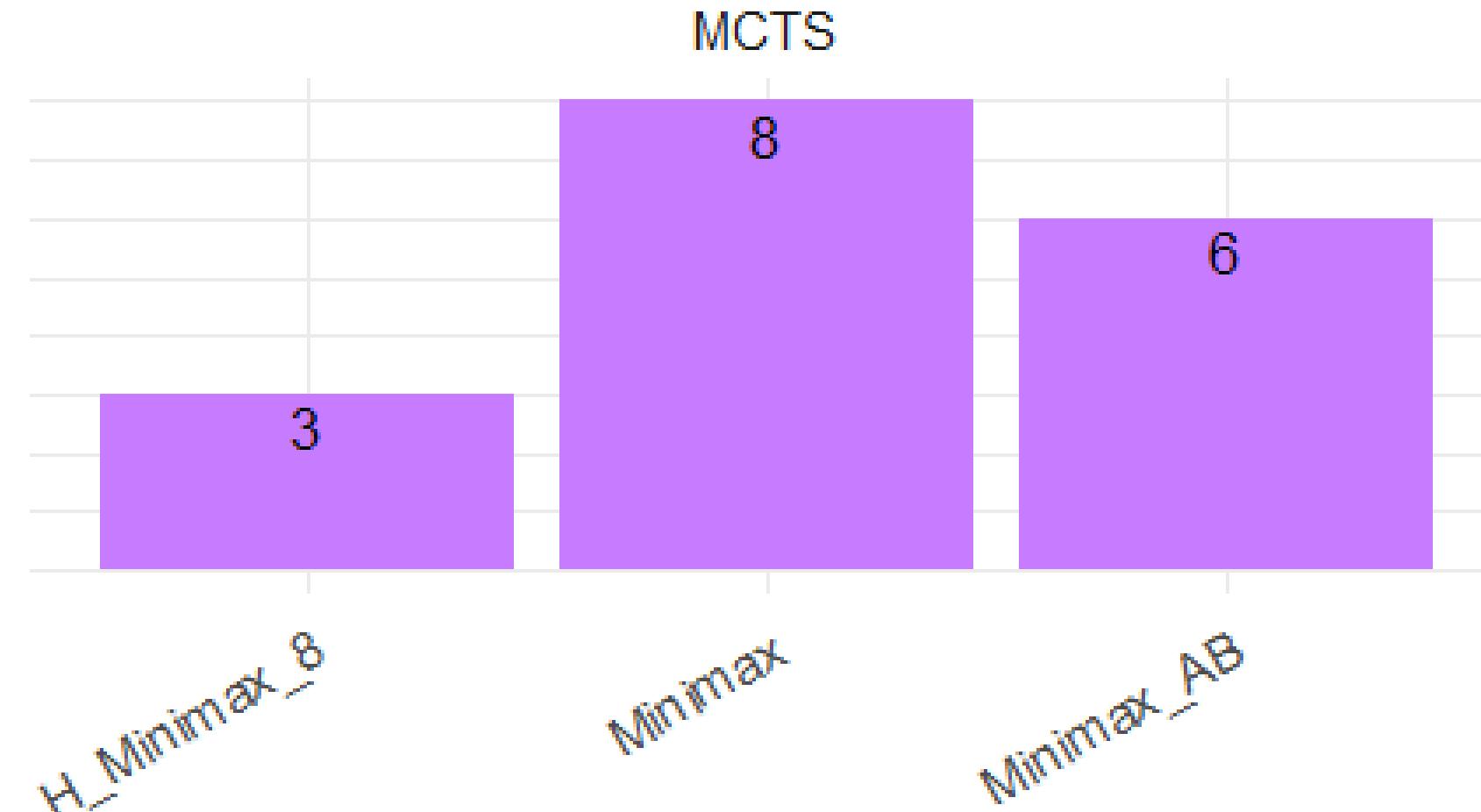
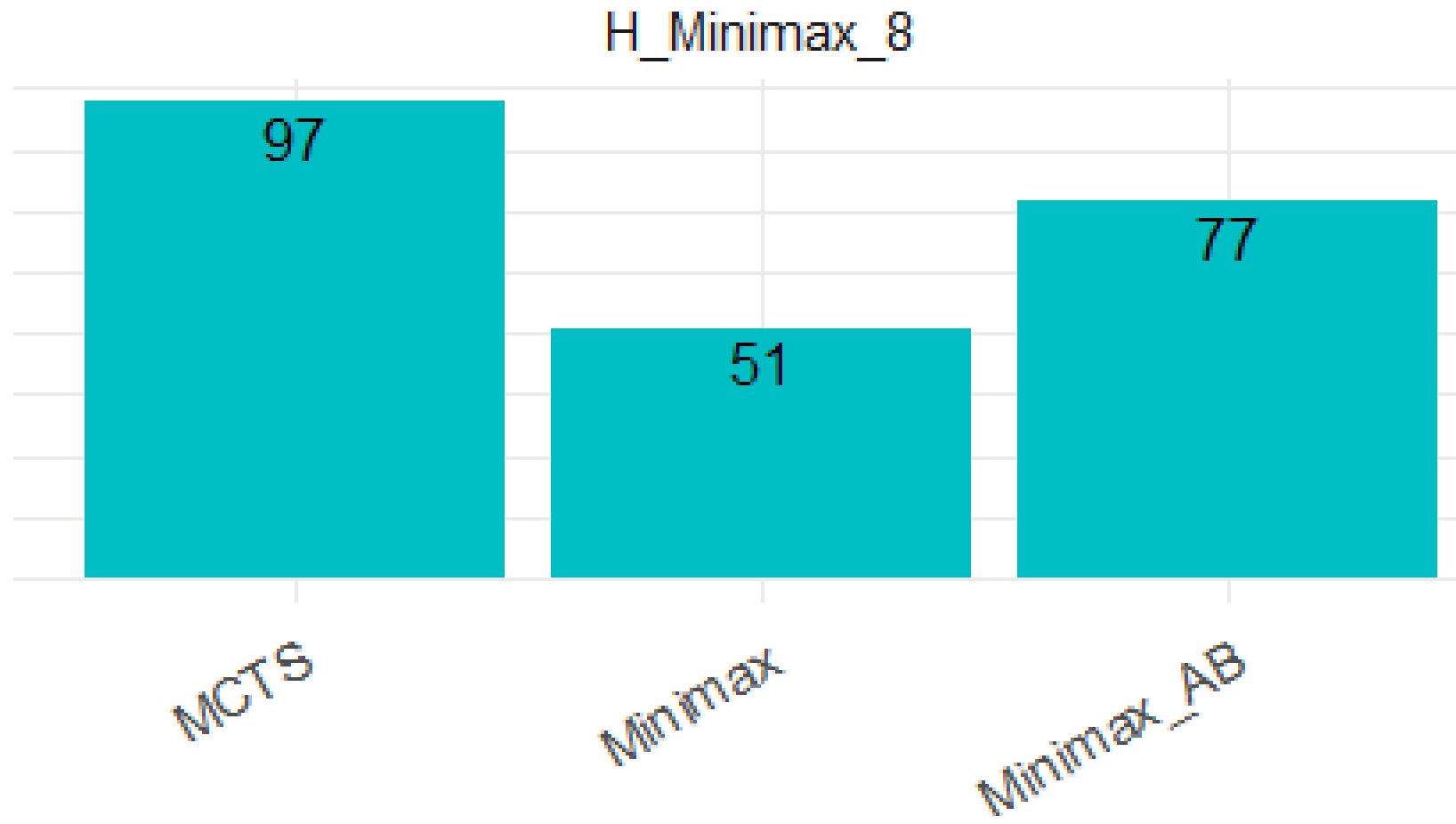
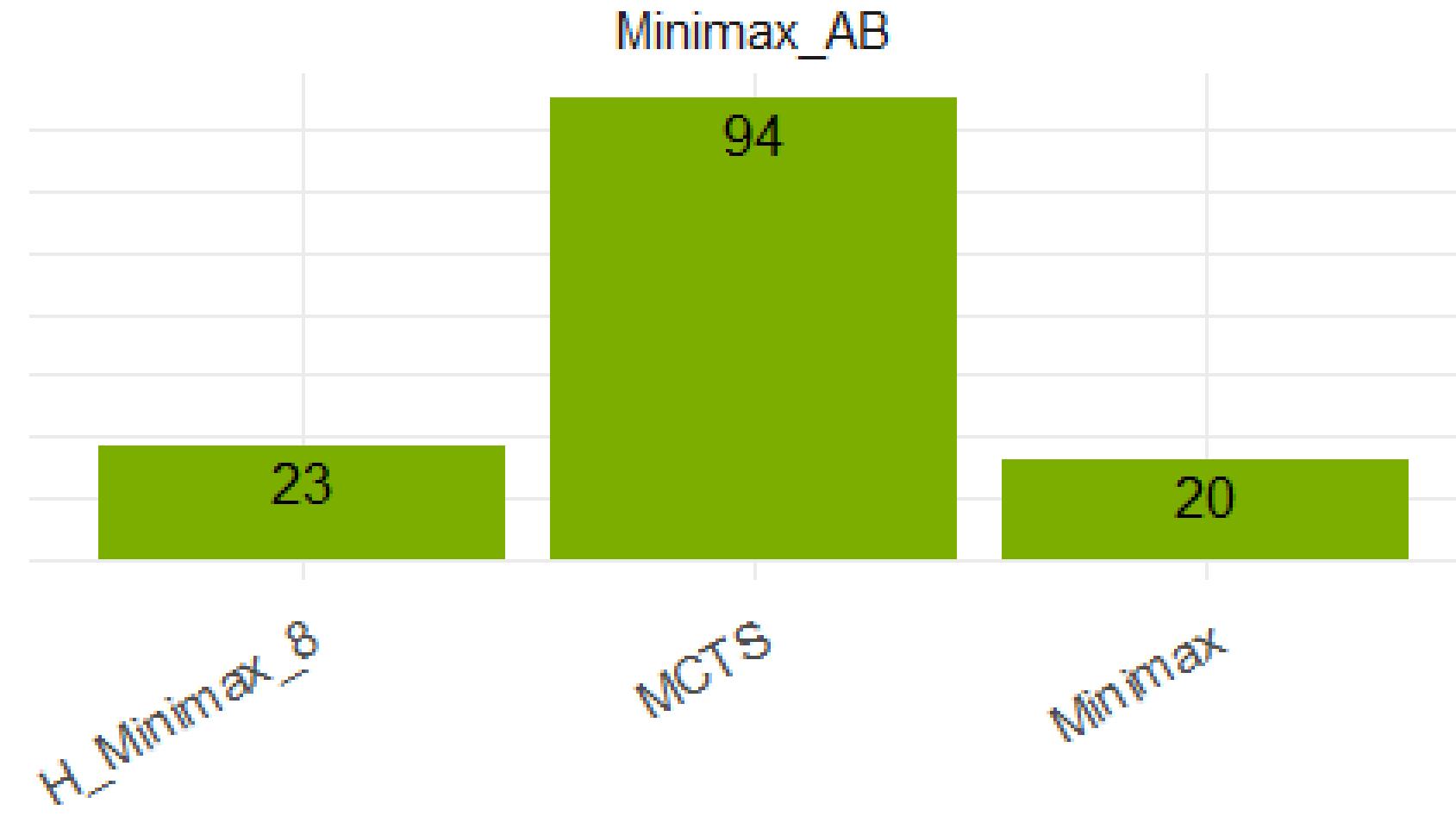
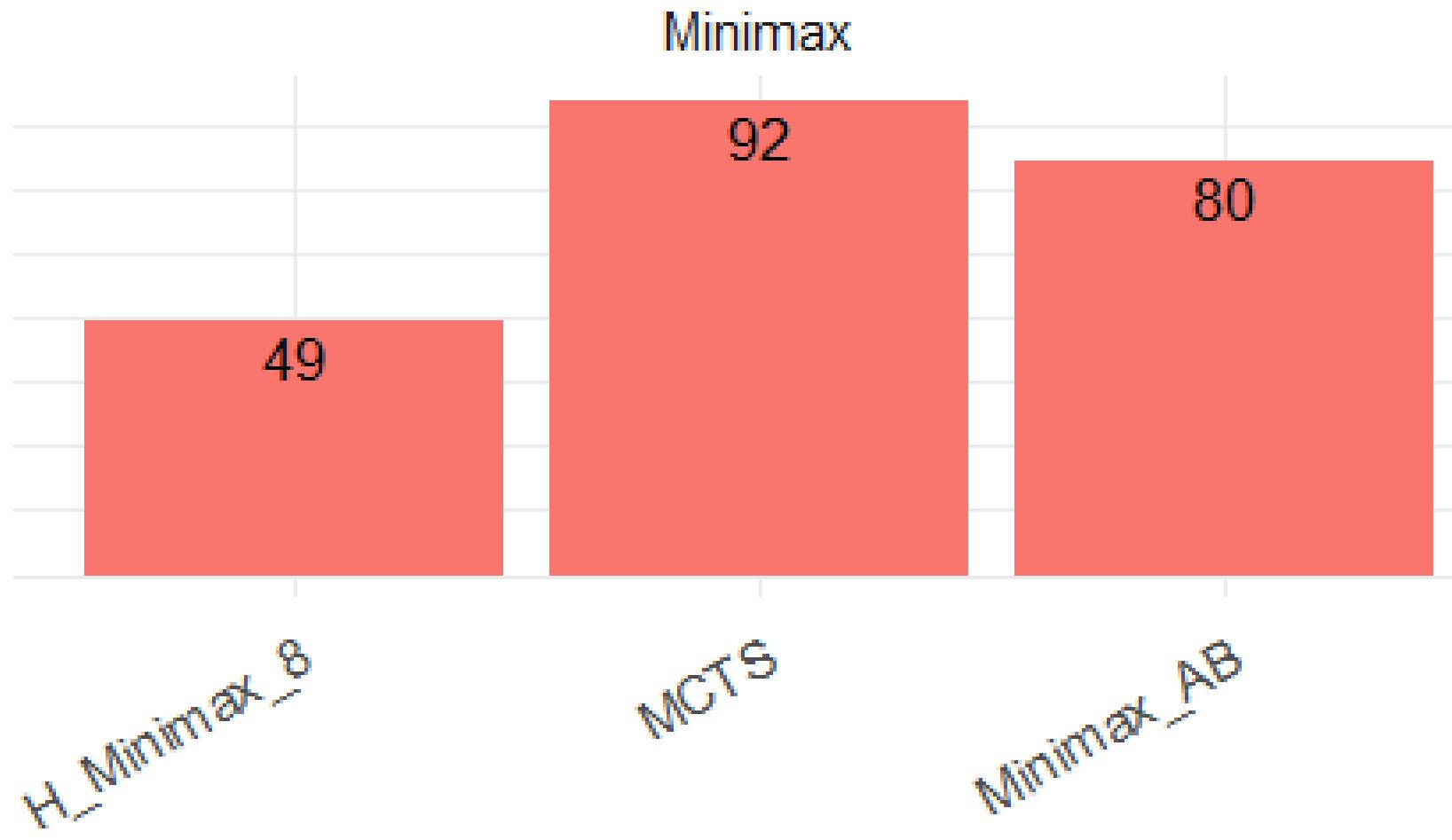
EXISTING ALGORITHMS TO SOLVE

1. Random Walk Algorithm
2. Minimax Algorithm
3. Minimax w/ alpha beta pruning
4. Heuristic Minimax With Depth limits
5. Monte Carlo Tree Search

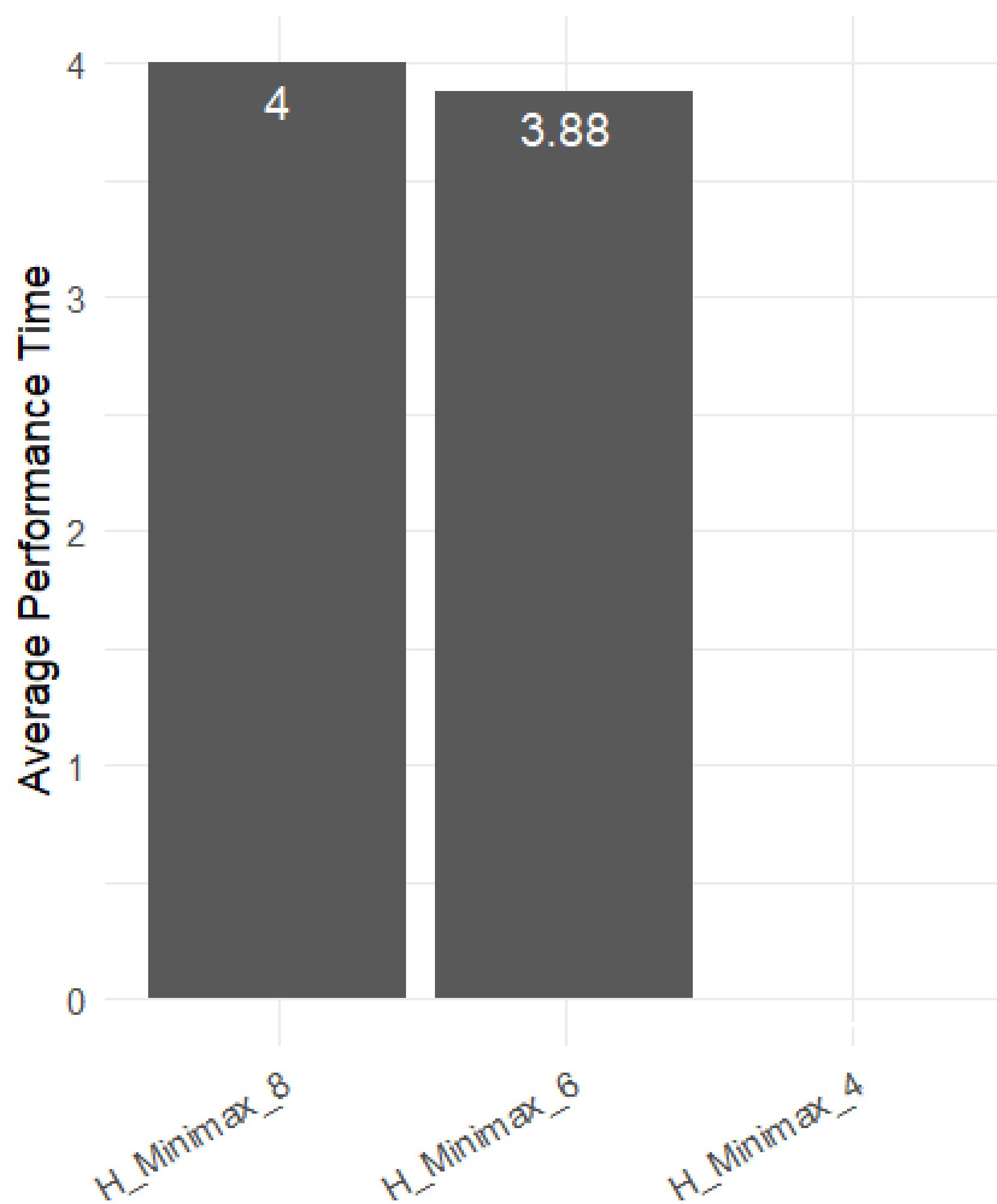
Algorithm Comparison Against Each Other After 100 iterations



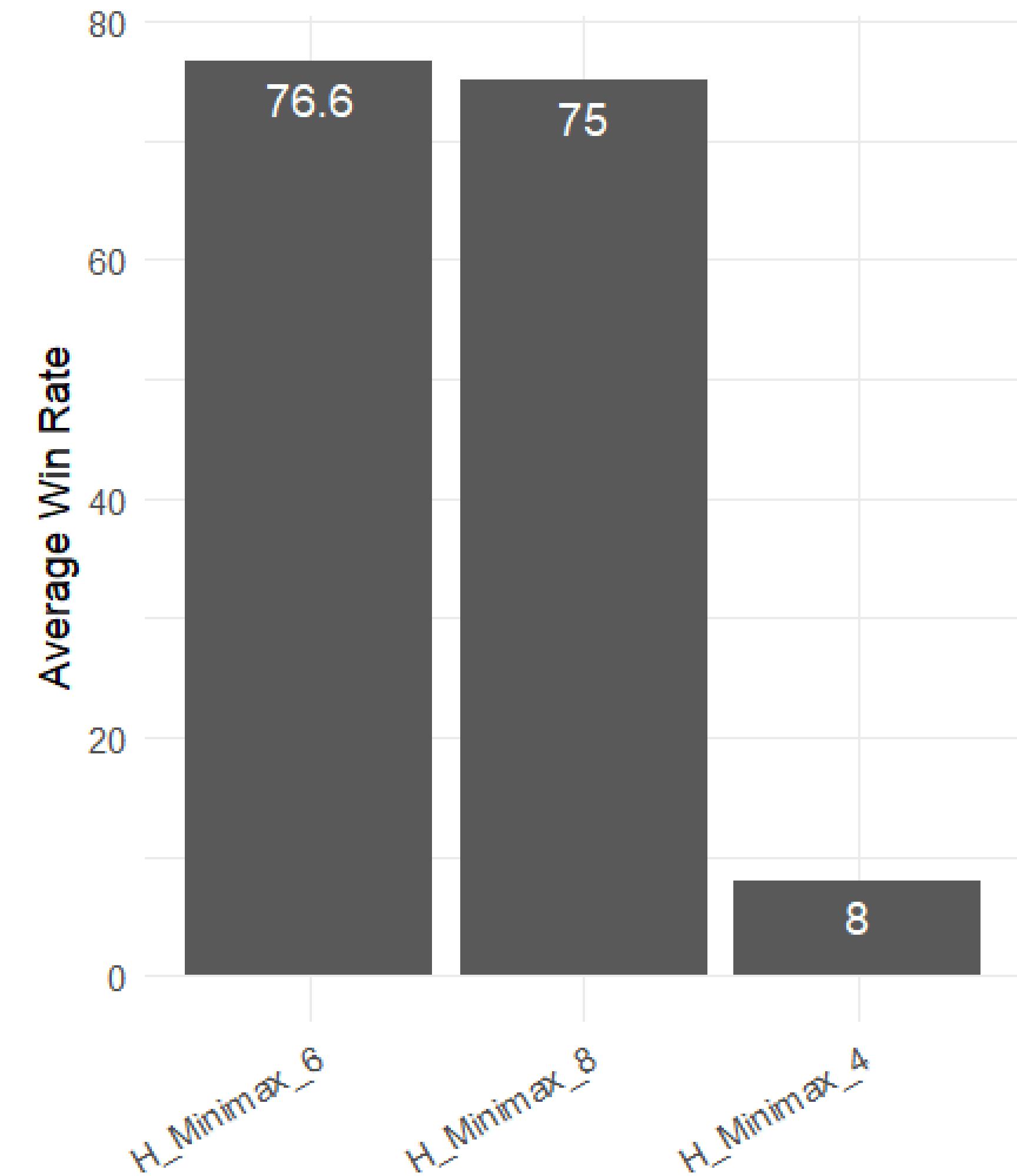
Algorithm Comparison Against Each Other After 100 iterations



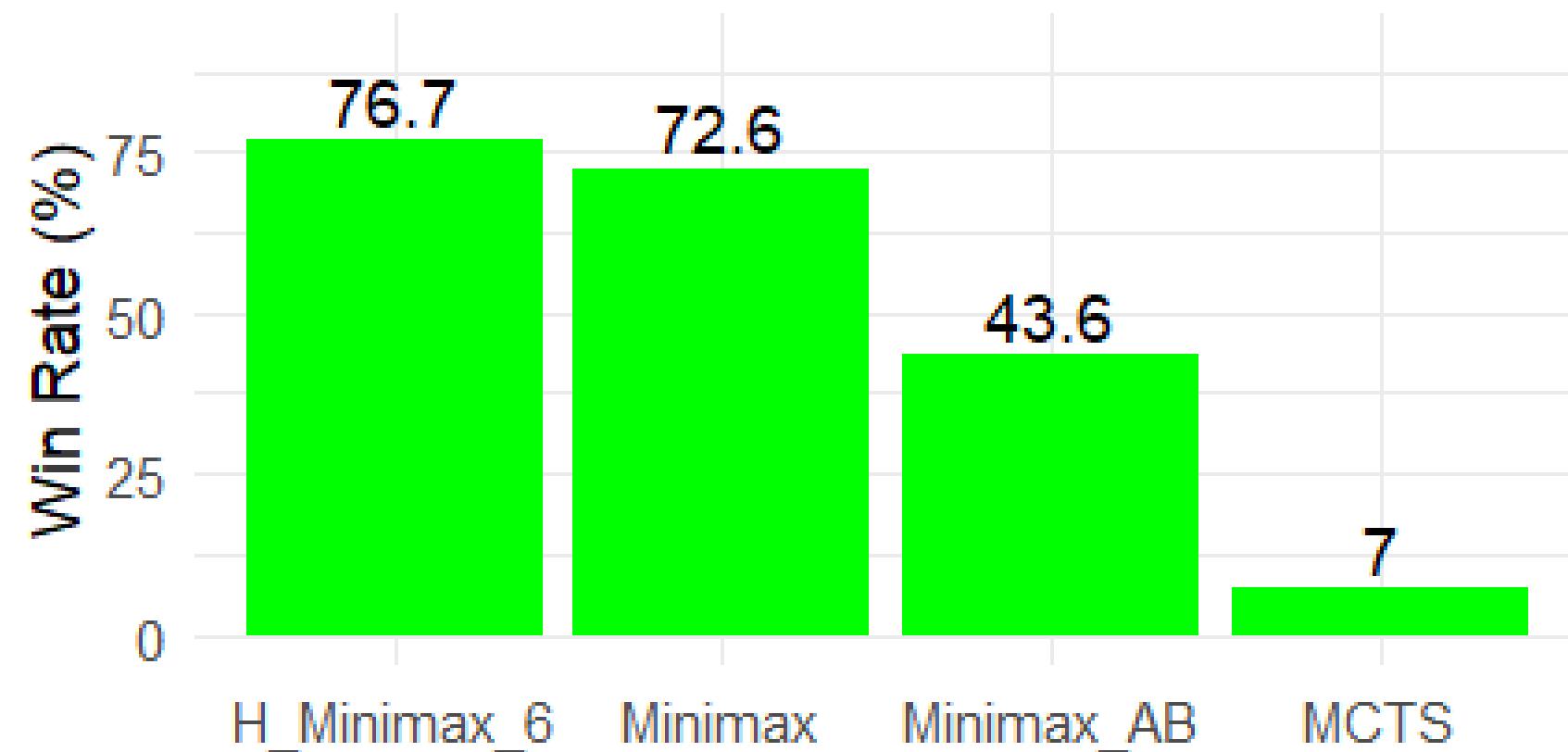
Average Performance Time for Algorithms



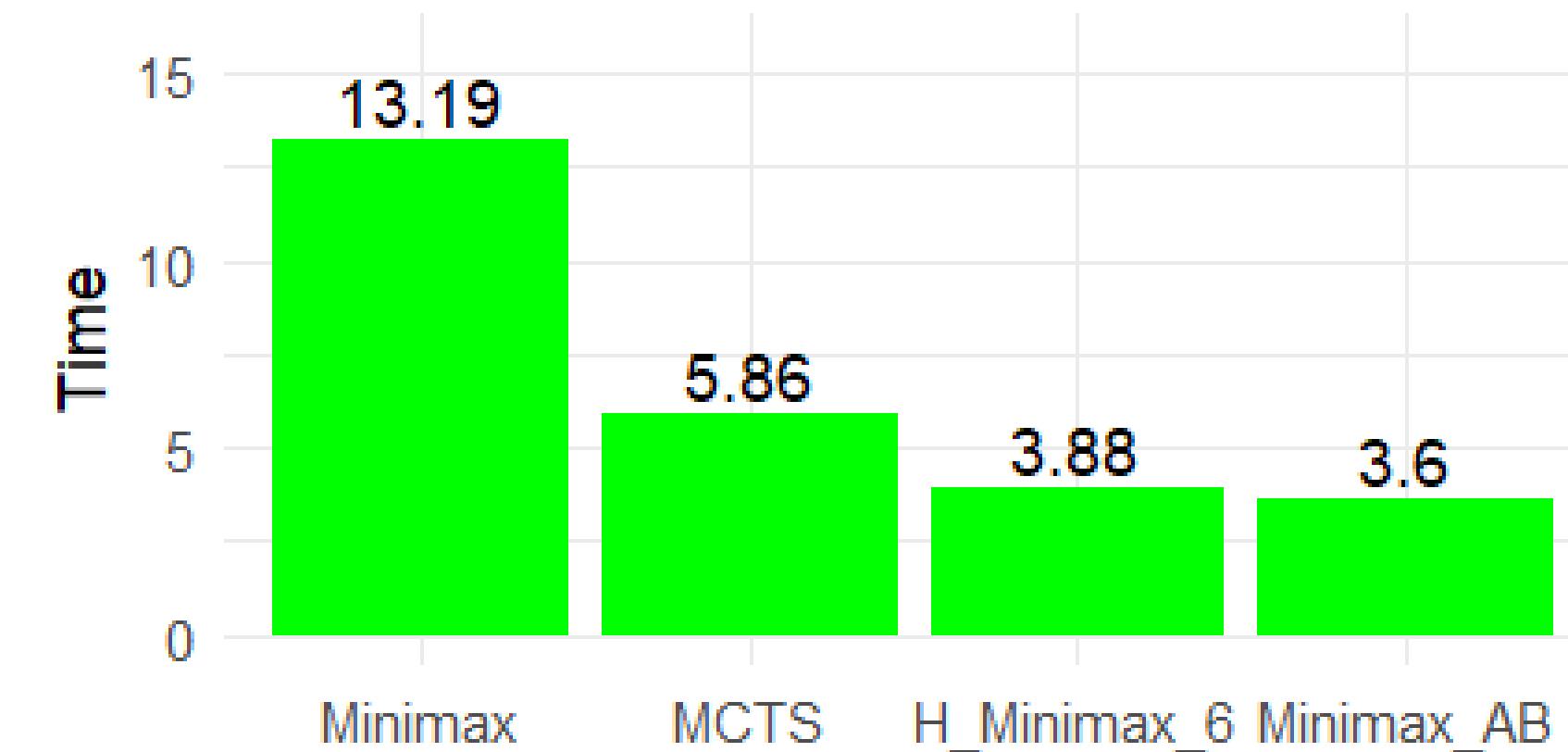
Average Win Rate for Algorithms



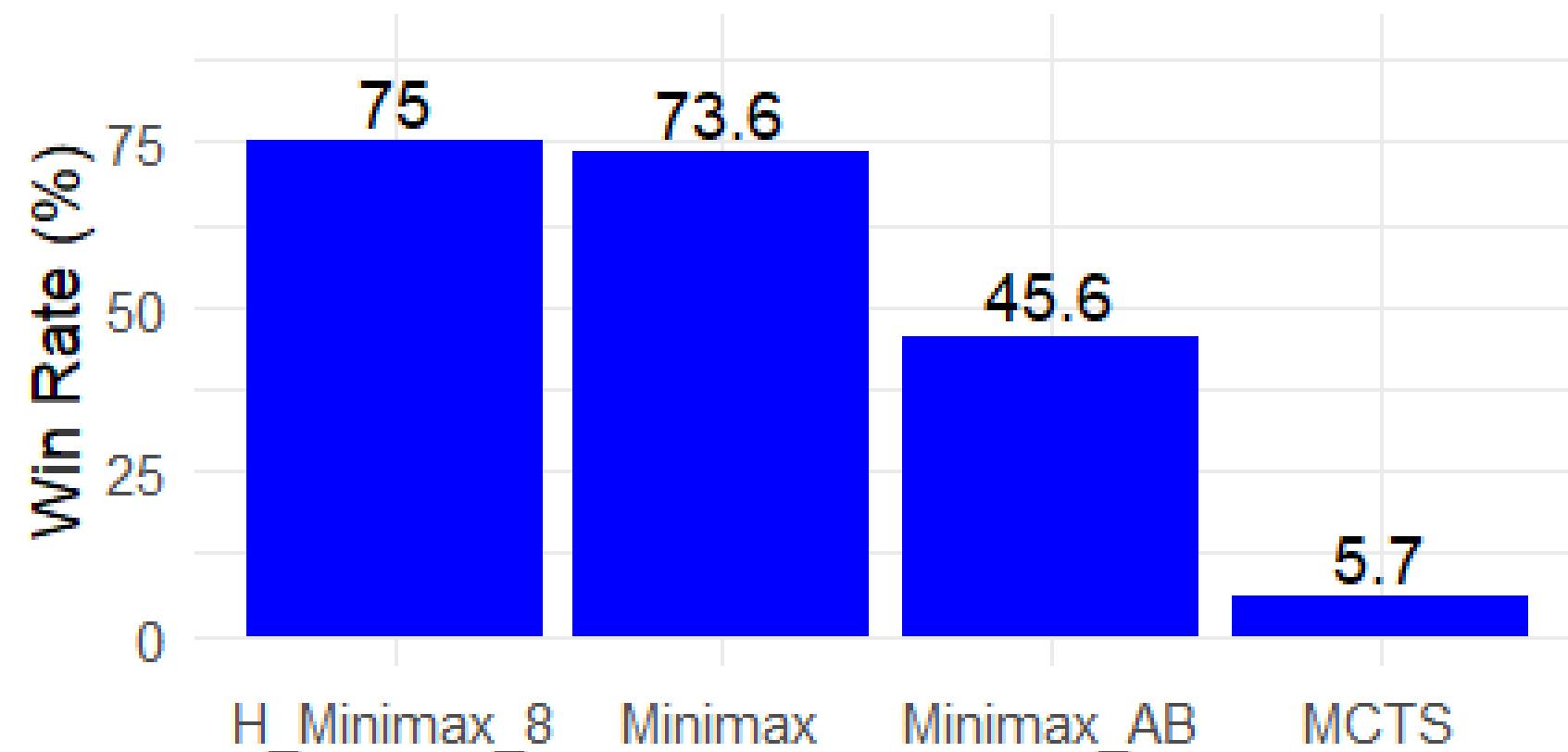
Average Win Rate (DL=6)



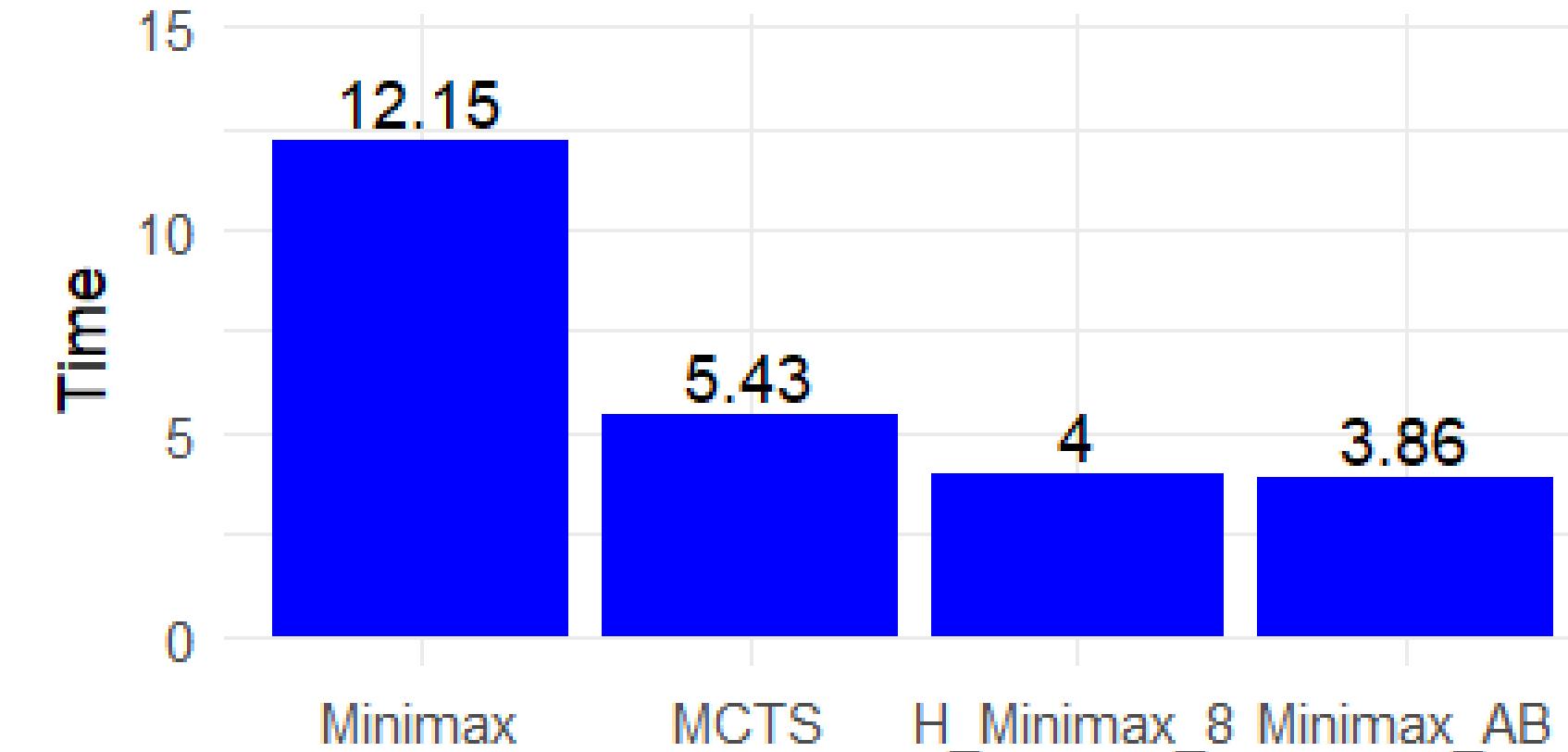
Average Performance Time (DL=6)



Average Win Rate (DL=8)



Average Performance Time (DL=8)





Thank
you!

