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CSC3002F

Assignment 3 – Answers to questions

Question 2.2:

$F(n) = 6 \wedge n$.

Explanation: The number of (not necessarily distinct) states that can be generated in n moves is 6 ^ n, as there are 6 possible rotations per move (positive and negative X-rotation, positive and negative Y-rotation, and positive and negative Z-rotation).

Question 3.2:

Memory usage drastically increases with shuffles of more than 6 moves, and processing speed drastically slows. This is because as n increases, the number of possible states reachable from a starting state in n moves (e.g. in genStates) becomes exponentially larger. If n is 6, the number is 46656. However, if n is 7, this number drastically increases to 279936 (a full 6 times larger). This drastic increase in the number of possible states requires significantly more computation, thus increasing the demands on the processor, slowing processing speed. This drastic increase also leads to more memory needed to store intermediate calls of the genStates function and their resulting lists.

Question 4:

Reducing the number of immediate successor states from 6 to 5 would reduce the computational cost of solving the world by the time taken to calculate $6^n – 5^n$ (i.e. $6^{10} – 5^{10}$) number of immediate successor states [60466176 – 9765625 = 50700551 successor states].