

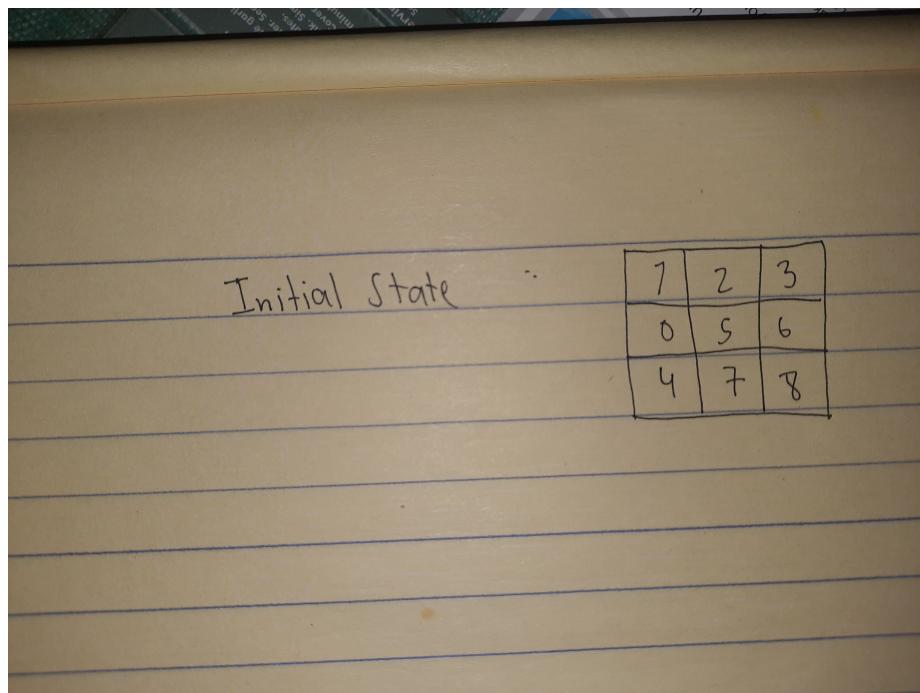
# Comparison Of BFS, DFS and A\* Search Algorithms in Solving the 8-Puzzle Game

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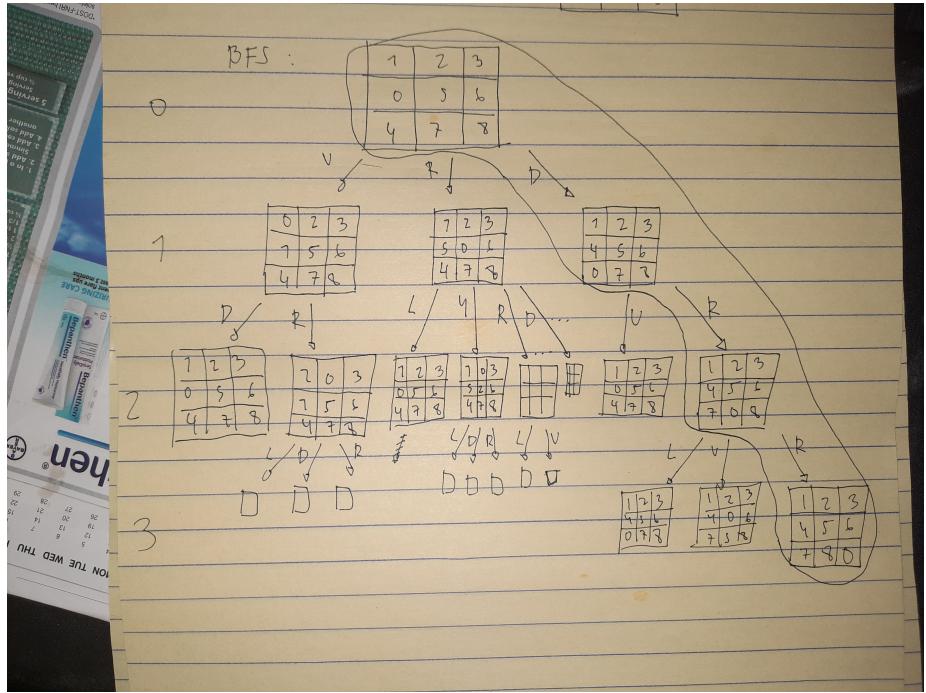
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## 1 Comparison of the Algorithms

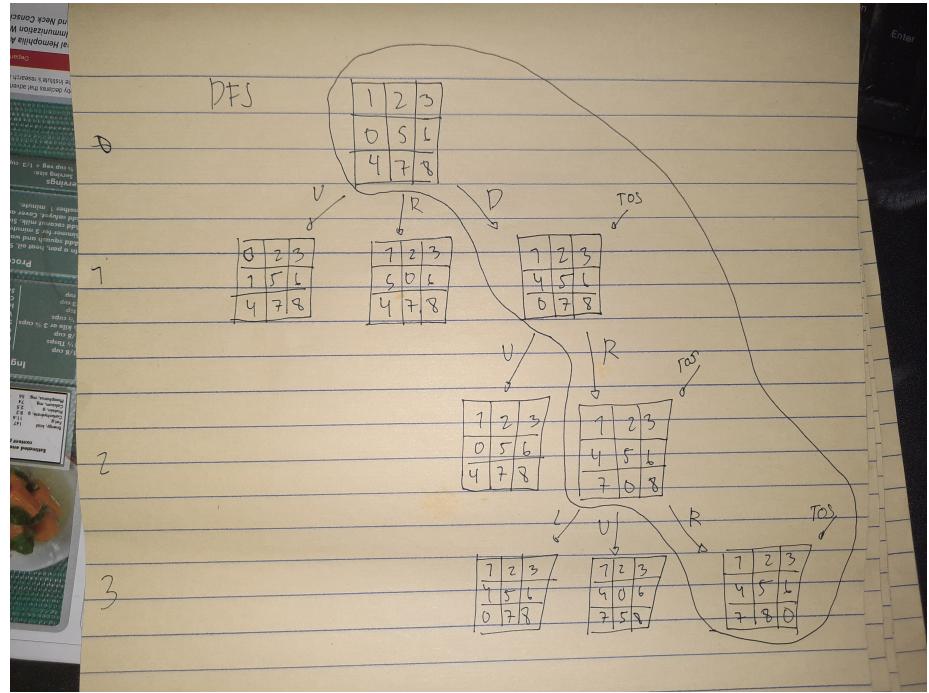
These are the graphs comparison of the performance of the three algorithms:



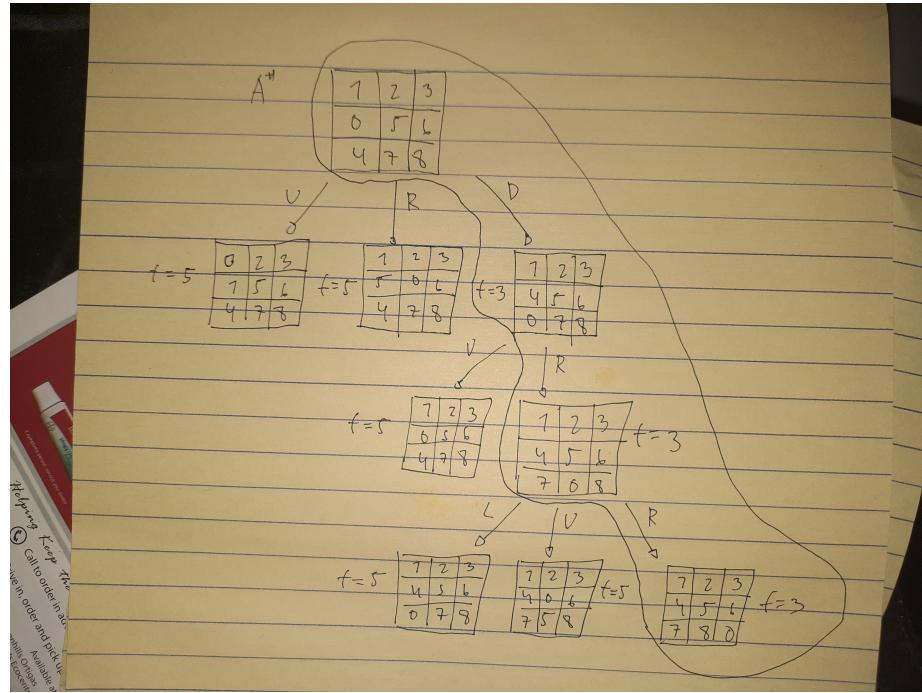
Firstly, I used this initial state and compared the actions per algorithm



This is the resulting graph if I use the BFS algorithm. BFS tries to search for the solution by traversing each level one by one and its corresponding child per action



This is the resulting graph if I use the DFS algorithm. Unlike BFS, DFS tends to search and look for the path from the node in the TOS until it finds the solution



This is the resulting graph if I use the A\* Search algorithm. A\* Search is an informed search so that means that it tries to solve for the most efficient path (the node that has the smallest  $f(n)$ ) then goes on from there. It is the most efficient algorithm for the 8 Puzzle Game among the 3 algorithms

## 2 The Most Appropriate Algorithm

I find that the most appropriate algorithm among the 3 in solving the 8 Puzzle game is the A\* Search. That is because in A\* Search, you first go to the node which has the smallest  $f(n)$  which determines if it is the correct path and the algorithm has an idea if it is getting closer to the goal state unlike the BFS and DFS algorithms. It is also a good fit because 8 Puzzle has a fully visible environment and with an informed search like the A\*, you can take full advantage of that

## 3 The Least Appropriate Algorithm

I find that the least appropriate algorithm for the 8 word puzzle among the 3 is the DFS or also known as the Depth First Search.

Because of the nature of the DFS that it pops the most recently added node in the frontier, what happens is that the code tends to go further and further away from the nearest answer, because instead of it going level by level of the tree and expanding the search path from there, it does the opposite, that is why the answers that you get in DFS are really inefficient and it takes too long to find the answer (if it does not find it in the first few trees)

## 4 Difference of Informed and Uninformed Search

Uninformed search algorithms are algorithms like BFS and DFS that searches for an answer without having any other additional information like cost of path and distance of the current node from goal state other than the goal state that it needs to reach and the initial state. On the other hand, Informed Search algorithms are algorithms like the A\* that takes advantage of it knowing the cost of the path it will traverse and estimated distance from goal state, while finding the steps to find the solution. That is why Informed search algorithms are generally faster and more efficient than uninformed search algorithms