Experiment 1 A* algorithm

1. Experimental Purpose:

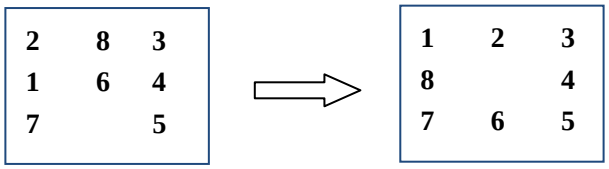
1) Be familiar with and master the definition of heuristic search, evaluation function and algorithm process.
2) Use A* algorithm to solve N-number problems, understand the solution process and search order.
3) Master related functions of numpy library.

2. Experimental Principles:

A* algorithm is a heuristic graph search algorithm, which is characterized by the definition of valuation function. For general heuristic graph search, the node with the lowest value of the valuation function F is always selected as the extension node. Therefore, f estimates nodes according to the view that a minimum cost path needs to be found. Therefore, the evaluation function value of each node n can be considered as two components: the actual cost from the starting node to the node n and the estimated cost from the node n to the target node.

3. Experimental Content:

1) Take 8 digital problem as an example to realize the solver of A* algorithm.



Evaluation function f(n) = g(n) + h(n)

g (n)=d(n) -- the depth of node n in the search tree

H(n) can choose h1(n) -- the number of misplaced tiles or

h2 (n)= P (n)= the sum of the misplaced distances

2) Students with ability can set the same initial state and target state in the A* algorithm program for solving the 8 digital problem, obtain the solution of the problem for different evaluation functions, and compare their influence on the performance of the search algorithm, including the number of extended nodes, the number of generated nodes, etc.
3) Write the experiment report and draw the block diagram of A* algorithm.