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Program 1 :

8-puzzle program using A* algorithm
using Heuristic function.

$H \rightarrow$ heuristic value

Estimated value from current state to goal
State.

$$f(n) = h(n) + g(n)$$

In 8-puzzle

$h(n)$ - Number of misplaced tiles by comparing
the current state & goal state

$g(n)$ - [Given cost] remain as number of
nodes traversed from a start node to get to
the current node.

Time complexity : exponential $O(b^d)$

b - branching factor

d - depth

$$|h(n) - h'(n)| \leq O(\log(h'(n)))$$

$h(n)$ - estimated

$h'(n)$ - optimum path

a

(Recall)

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Implementation of algorithm :

1. To calculate manhattan Distance

```
def h(state, target)
```

2. A* search algorithm

```
def astar(src, target)
```

3. To find all possible moves of empty tile

```
def possible_moves(state, visited_states):
```

4. To move up, down, left and right

```
def gen(state, direction, b):
```

5. To print the required state.

```
def print_grid(src):
```