**8-puzzle**

**Initial State:**

[(1, 2, 4), (3, 0, 5), (7,6,8)]

**Possible actions:**

Swap up, down, left and right

**Transition model:**

[(1, 2, 4), (3, 0, 5), (7,6,8)] Swap top => [(1, 0, 4), (3, 2, 5), (7,6,8)]

[(1, 0, 4), (3, 2, 5), (7,6,8)] Swap left => [(0, 1, 4), (3, 2, 5), (7,6,8)]

**Goal Test:**

[(1, 2, 3), (4, 5, 6), (7,8,0)]

**Path Cost:**

Number of moves

**Vacuum World Problem**

**Initial State:**

([0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 1])

**Possible actions:**

Move up, down, left and right

**Transition model:**

([0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 1])

Move left to =>

([0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 1, 1])

Move top to =>

([0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 1, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 1, 1])

Move down to =>

([0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 0, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 1, 0],

[0, 0, 0, 0, 0, 0, 0, 0, 2, 1])

**Goal Test:**

([1,1,1,1,1,1,1,1,1,1],

[1,1,1,1,1,1,1,1,1,1],

[1,1,1,1,1,1,1,1,1,1],

[1,1,1,1,1,1,1,1,1,1],

[1,1,1,1,1,1,1,1,1,1],

[1,1,1,1,1,1,1,1,1,1],

[1,1,1,1,1,1,1,1,1,1],

[1,1,1,1,1,1,1,1,1,1],

[1,1,1,1,1,1,1,1,1,1],

[1,1,1,1,1,1,1,1,1,1])

**Path Cost:**

Lowest number of steps to move to all points.

Lowest number of occurrence to move to places the agent been to.

**Touring Problems**

**Initial State:**

Paths = [(1,2), (1,3),(2,3), (3,4), (4,5)]

CurrentPosition=1

**Possible actions:**

Move to the next possible path.

1 -> 2

1 -> 3

2 -> 3

3 -> 4

4 -> 5

**Transition model:**

Move CurrentPosition from 1 to 3.

Move CurrentPosition from 3 to 4.

Move CurrentPosition from 4 to 5.

**Goal Test:**

CurrentPosition = 5

**Path Cost:**

Number of moves taken to reach 5.