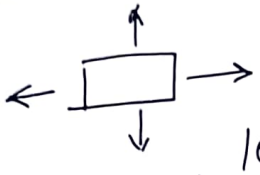
15 puzzle problem

1	2	3	4
5	6		8
9	10	7	11
13	14	15	12

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	

16 blocks with 15 numbers arranged randomly & we need to achieve the goal arrangement with min^m no of shifts.

Blank column can be shifted in any directions



check the node with ~~less error~~ less cost is branced & other nodes will be bounded.

Example :

1	2

cost of node

$$\hat{c}(x) = f(x) + \hat{g}(x)$$

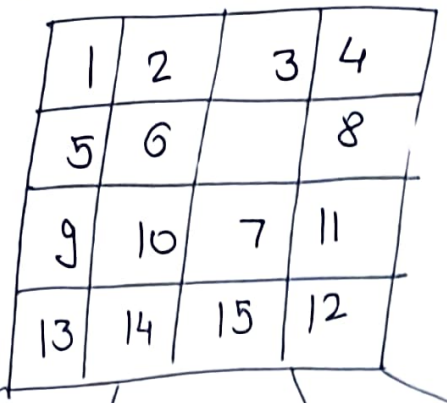
where

$\hat{c}(x)$ = Is the estimated min cost to reach the goal node

$f(x)$ = No of move from initial state

$\hat{g}(x)$ = No of non-blank that are not in their goal position.

State space tree

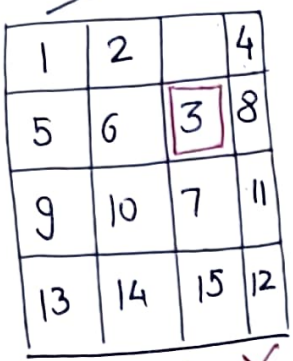


$\hat{c}(1) = 0 + 3$

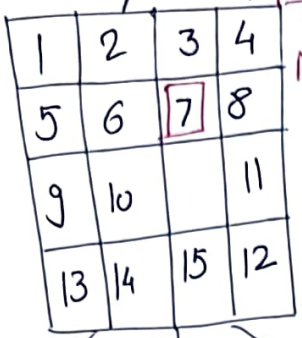
↑ no moves ↑ no. s which are not at their place

$\hat{c}(1) = 3$

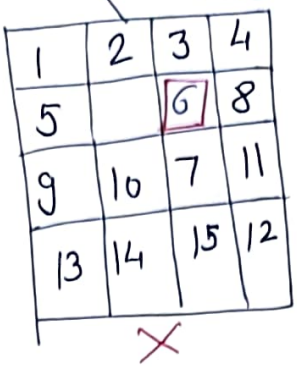
Up | Down | Left | Right



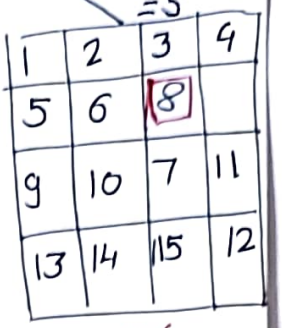
$\hat{c}(2) = 1 + 4 = 5$ ✗



$\hat{c}(3) = 1 + 2 = 3$ ← Min^m



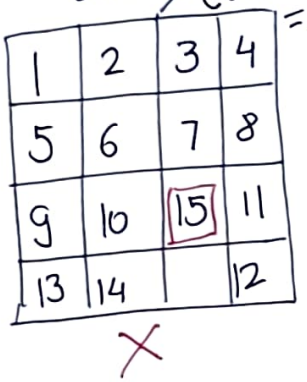
$\hat{c}(4) = 1 + 4 = 5$ ✗



$\hat{c}(5) = 1 + 4 = 5$ ✗

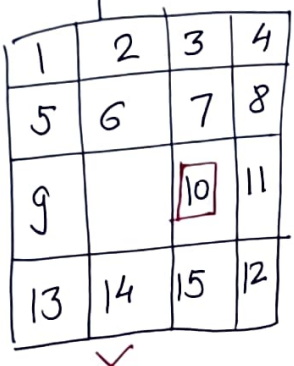
7 should not move

Down $\hat{c}(6) = 2 + 3 = 5$



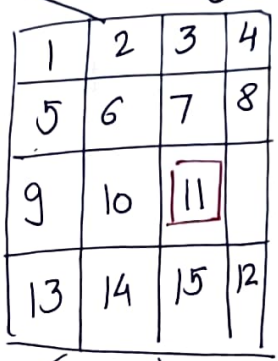
✗

Left $\hat{c}(7) = 2 + 3 = 5$



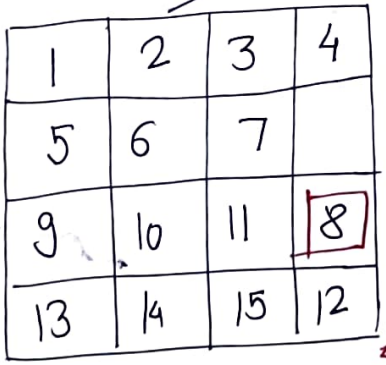
✗

Right $\hat{c}(8) = 2 + 1 = 3$ ← min



~~7~~ 11 should not move Down

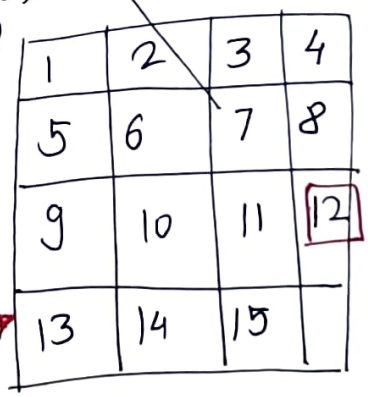
Up



$\hat{c}(9) = 3 + 2 = 5$

$g(x) = 0$ goal position achieved

$\hat{c}(10) = 3 + 0 = 3$



Soln →