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8-Puzzle problem using A* search Algorithm
Enter the Current State
1 2 3
7 4 5
6 8 0
Enter the Goal State
1 2 3
8 6 4
7 5 0
Enter the heuristic number that you want to proceed with
1. Manhattan
2. Misplaced Tiles
2
-----------------------------------------------------------
Level 0 - [[1,2,3][7,4,5][6,8,0]]
-----------------------------------------------------------
Node Chosen for Level 1 - [[1,2,3][7,4,5][6,8,0]]

Generated Nodes :
-----------------
[[1,2,3][7,4,0][6,8,5]] - f(n) =  1 + 5 = 6
[[1,2,3][7,4,5][6,0,8]] - f(n) =  1 + 5 = 6
-----------------------------------------------------------
Node Chosen for Level 2 - [[1,2,3][7,4,0][6,8,5]]

Generated Nodes :
-----------------
[[1,2,0][7,4,3][6,8,5]] - f(n) =  2 + 6 = 8
[[1,2,3][7,0,4][6,8,5]] - f(n) =  2 + 4 = 6
[[1,2,3][7,4,5][6,8,0]] - Already visited Node!
-----------------------------------------------------------
Node Chosen for Level 2 - [[1,2,3][7,4,5][6,0,8]]

Generated Nodes :
-----------------
[[1,2,3][7,0,5][6,4,8]] - f(n) =  2 + 5 = 7
[[1,2,3][7,4,5][6,8,0]] - Already visited Node!
[[1,2,3][7,4,5][0,6,8]] - f(n) =  2 + 5 = 7
-----------------------------------------------------------
Node Chosen for Level 3 - [[1,2,3][7,0,4][6,8,5]]

Generated Nodes :
-----------------
[[1,0,3][7,2,4][6,8,5]] - f(n) =  3 + 5 = 8
[[1,2,3][7,4,0][6,8,5]] - Already visited Node!
[[1,2,3][0,7,4][6,8,5]] - f(n) =  3 + 4 = 7
[[1,2,3][7,8,4][6,0,5]] - f(n) =  3 + 4 = 7
-----------------------------------------------------------
Node Chosen for Level 3 - [[1,2,3][7,0,5][6,4,8]]

Generated Nodes :
-----------------
[[1,0,3][7,2,5][6,4,8]] - f(n) =  3 + 6 = 9
[[1,2,3][7,5,0][6,4,8]] - f(n) =  3 + 5 = 8
[[1,2,3][0,7,5][6,4,8]] - f(n) =  3 + 5 = 8
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[[1,2,3][7,4,5][6,0,8]] - Already visited Node!
---------------------------------------------------------
Node Chosen for Level 3 - [[1,2,3][7,4,5][0,6,8]]

Generated Nodes :
-----------------
[[1,2,3][0,4,5][7,6,8]] - f(n) =  3 + 4 = 7
[[1,2,3][7,4,5][6,0,8]] - Already visited Node!
---------------------------------------------------------
Node Chosen for Level 4 - [[1,2,3][0,7,4][6,8,5]]

Generated Nodes :
-----------------
[[0,2,3][1,7,4][6,8,5]] - f(n) =  4 + 5 = 9
[[1,2,3][7,0,4][6,8,5]] - Already visited Node!
[[1,2,3][6,7,4][0,8,5]] - f(n) =  4 + 4 = 8
---------------------------------------------------------
Node Chosen for Level 4 - [[1,2,3][7,8,4][6,0,5]]

Generated Nodes :
-----------------
[[1,2,3][7,0,4][6,8,5]] - Already visited Node!
[[1,2,3][7,8,4][6,5,0]] - f(n) =  4 + 3 = 7
[[1,2,3][7,8,4][0,6,5]] - f(n) =  4 + 4 = 8
---------------------------------------------------------
Node Chosen for Level 4 - [[1,2,3][0,4,5][7,6,8]]

Generated Nodes :
-----------------
[[0,2,3][1,4,5][7,6,8]] - f(n) =  4 + 5 = 9
[[1,2,3][4,0,5][7,6,8]] - f(n) =  4 + 4 = 8
[[1,2,3][7,4,5][0,6,8]] - Already visited Node!
---------------------------------------------------------
Node Chosen for Level 5 - [[1,2,3][7,8,4][6,5,0]]

Generated Nodes :
-----------------
[[1,2,3][7,8,0][6,5,4]] - f(n) =  5 + 4 = 9
[[1,2,3][7,8,4][6,0,5]] - Already visited Node!
---------------------------------------------------------
Node Chosen for Level 3 - [[1,2,0][7,4,3][6,8,5]]

Generated Nodes :
-----------------
[[1,0,2][7,4,3][6,8,5]] - f(n) =  3 + 7 = 10
[[1,2,3][7,4,0][6,8,5]] - Already visited Node!
---------------------------------------------------------
Node Chosen for Level 4 - [[1,0,3][7,2,4][6,8,5]]

Generated Nodes :
-----------------
[[1,3,0][7,2,4][6,8,5]] - f(n) =  4 + 6 = 10
[[0,1,3][7,2,4][6,8,5]] - f(n) =  4 + 6 = 10
[[1,2,3][7,0,4][6,8,5]] - Already visited Node!
---------------------------------------------------------
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Node Chosen for Level 4 - [[1,2,3][7,5,0][6,4,8]]

Generated Nodes :
-----------------
[[1,2,0][7,5,3][6,4,8]] - f(n) =  4 + 6 = 10
[[1,2,3][7,0,5][6,4,8]] - Already visited Node!
[[1,2,3][7,5,8][6,4,0]] - f(n) =  4 + 5 = 9
-----------------------------------------------------------
Node Chosen for Level 4 - [[1,2,3][0,7,5][6,4,8]]

Generated Nodes :
-----------------
[[0,2,3][1,7,5][6,4,8]] - f(n) =  4 + 6 = 10
[[1,2,3][7,0,5][6,4,8]] - Already visited Node!
[[1,2,3][6,7,5][0,4,8]] - f(n) =  4 + 5 = 9
-----------------------------------------------------------
Node Chosen for Level 5 - [[1,2,3][6,7,4][0,8,5]]

Generated Nodes :
-----------------
[[1,2,3][0,7,4][6,8,5]] - Already visited Node!
[[1,2,3][6,7,4][8,0,5]] - f(n) =  5 + 4 = 9
-----------------------------------------------------------
Node Chosen for Level 5 - [[1,2,3][7,8,4][0,6,5]]

Generated Nodes :
-----------------
[[1,2,3][0,8,4][7,6,5]] - f(n) =  5 + 3 = 8
[[1,2,3][7,8,4][6,0,5]] - Already visited Node!
-----------------------------------------------------------
Node Chosen for Level 5 - [[1,2,3][4,0,5][7,6,8]]

Generated Nodes :
-----------------
[[1,0,3][4,2,5][7,6,8]] - f(n) =  5 + 5 = 10
[[1,2,3][4,5,0][7,6,8]] - f(n) =  5 + 4 = 9
[[1,2,3][0,4,5][7,6,8]] - Already visited Node!
[[1,2,3][4,6,5][7,0,8]] - f(n) =  5 + 3 = 8
-----------------------------------------------------------
Node Chosen for Level 6 - [[1,2,3][0,8,4][7,6,5]]

Generated Nodes :
-----------------
[[0,2,3][1,8,4][7,6,5]] - f(n) =  6 + 4 = 10
[[1,2,3][8,0,4][7,6,5]] - f(n) =  6 + 2 = 8
[[1,2,3][7,8,4][0,6,5]] - Already visited Node!
-----------------------------------------------------------
Node Chosen for Level 6 - [[1,2,3][4,6,5][7,0,8]]

Generated Nodes :
-----------------
[[1,2,3][4,0,5][7,6,8]] - Already visited Node!
[[1,2,3][4,6,5][7,8,0]] - f(n) =  6 + 3 = 9
[[1,2,3][4,6,5][0,7,8]] - f(n) =  6 + 4 = 10
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Node Chosen for Level 7 - [[1,2,3][8,0,4][7,6,5]]

Generated Nodes :
-----------------
[[1,0,3][8,2,4][7,6,5]] - f(n) =  7 + 3 = 10
[[1,2,3][8,4,0][7,6,5]] - f(n) =  7 + 3 = 10
[[1,2,3][0,8,4][7,6,5]] - Already visited Node!
[[1,2,3][8,6,4][7,0,5]] - f(n) =  7 + 1 = 8
-----------------------------------------------------------
Node Chosen for Level 8 - [[1,2,3][8,6,4][7,0,5]]

Generated Nodes :
-----------------
[[1,2,3][8,0,4][7,6,5]] - Already visited Node!
[[1,2,3][8,6,4][7,5,0]] - f(n) =  8 + 0 = 8
[[1,2,3][8,6,4][0,7,5]] - f(n) =  8 + 2 = 10
-----------------------------------------------------------
Node Chosen for Level 9 - [[1,2,3][8,6,4][7,5,0]]
The goal path found...
--------------------------
[[1,2,3][7,4,5][6,8,0]]
[[1,2,3][7,4,0][6,8,5]]
[[1,2,3][7,4,5][6,0,8]]
[[1,2,3][7,0,4][6,8,5]]
[[1,2,3][7,0,5][6,4,8]]
[[1,2,3][7,4,5][0,6,8]]
[[1,2,3][0,7,4][6,8,5]]
[[1,2,3][7,8,4][6,0,5]]
[[1,2,3][0,4,5][7,6,8]]
[[1,2,3][7,8,4][6,5,0]]
[[1,2,0][7,4,3][6,8,5]]
[[1,0,3][7,2,4][6,8,5]]
[[1,2,3][7,5,0][6,4,8]]
[[1,2,3][0,7,5][6,4,8]]
[[1,2,3][6,7,4][0,8,5]]
[[1,2,3][7,8,4][0,6,5]]
[[1,2,3][4,0,5][7,6,8]]
[[1,2,3][0,8,4][7,6,5]]
[[1,2,3][4,6,5][7,0,8]]
[[1,2,3][8,0,4][7,6,5]]
[[1,2,3][8,6,4][7,0,5]]
[[1,2,3][8,6,4][7,5,0]]
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Time Taken : 38 milliseconds
The number of nodes that are generated are : 61
The number of nodes that are expanded are : 22
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