ARTIFICIAL INTELLIGENCE

LAB-1

8 Puzzle Problem.

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⇒ Start State

1	5	3
2	4	0
8	7	6

Goal State

1	2	3
4	5	6
7	8	

ALGORITHM :-

1. Define a function find_next() that accepts a node.
2. moves:= map defining moves as a list corresponding to each value {0: [1,3], 1: [0,2,4], 2: [1,5]; 3: [0,4,6], 4: [1,3,5,7], 5: [2,4,8], 6: [3,7], 7: [4,6,8], 8: [5,7],}
3. results:= a new list
4. pos_0:= first value of node.
5. for each move in moves [pos_0], do
   - new_node:= a new list from node.
   - swap new_node [move] and new_node [pos_0]
   - Insert a new tuple from new_node at the end of result
6. Return result
7. Define a function get_paths(). This will take dict.
8. cnt:= 0

9. Do the following infinitely, do

- current_nodes:= a list where value is same as cnt.
- if size of current_nodes is same as 0, then
  - return -1.
- for each node in current_nodes, do
  - next_moves:= find_next(node)
  - for each move in next_moves, do
    - if move is not present in dict, then
      - dict[move] := cnt + 1
    - if move is same as (0,1,2,3,4,5,6,7,8), then
      - return cnt + 1
    - cnt:=cnt + 1
- From the main method do the following :
- dict:= a new map, flatten := a new list.
- for i in range 0 to row count of board, do
  - flatten := flatten + board[i]
- flatten := a copy of listen.
- dict[flatten] :=0
- if flatten is same as (0,1,2,3,4,5,6,7,8), then
  - return 0.
- return get_paths(dict)

RESULT :- Hence, the implementation of 8 Puzzle Problem is successfully executed.

Artificial Intelligence

Lab 1

8 Puzzle Problem

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Algorithm:-

- Define a function find_next() . // accept node
- moves := a map defining moves as a list corresponding to each value {0: [1, 3],1: [0, 2, 4],2: [1, 5],3: [0, 4, 6],4: [1, 3, 5, 7],5: [2, 4, 8],6: [3, 7],7: [4, 6, 8],8: [5, 7],}
- results := a new list
- pos_0 := first value of node
- for each move in moves[pos_0], do
    - new_node := a new list from node
    - swap new_node[move] and new_node[pos_0]
    - insert a new tuple from new_node at the end of results
- return results
- Define a function get_paths() . This will take dict
- cnt := 0
- Do the following infinitely, do
    - current_nodes := a list where value is same as cnt
    - if size of current_nodes is same as 0, then
        - return -1
    - for each node in current_nodes, do
        - next_moves := find_next(node)
        - for each move in next_moves, do
            - if move is not present in dict, then
                - dict[move] := cnt + 1

        - if move is same as (0, 1, 2, 3, 4, 5, 6, 7, 8) , then
            - return cnt + 1
        - cnt := cnt + 1
- From the main method do the following:
- dict := a new map, flatten := a new list
- for i in range 0 to row count of board, do
    - flatten := flatten + board[i]
- flatten := a copy of flatten
- dict[flatten] := 0
- if flatten is same as (0, 1, 2, 3, 4, 5, 6, 7, 8) , then
    - return 0
- return get_paths(dict)

Code:-

```
class Solution:

    def solve(self, board):

        dict = {}

        flatten = []

        for i in range(len(board)):

            flatten += board[i]

        flatten = tuple(flatten)



        dict[flatten] = 0



        if flatten == (0, 1, 2, 3, 4, 5, 6, 7, 8):
```

```
        return 0


    return self.get_paths(dict)


def get_paths(self, dict):
    cnt = 0
    while True:
        current_nodes = [x for x in dict if dict[x] == cnt]
        if len(current_nodes) == 0:
            return -1


        for node in current_nodes:
            next_moves = self.find_next(node)
            for move in next_moves:
                if move not in dict:
                    dict[move] = cnt + 1
                if move == (0, 1, 2, 3, 4, 5, 6, 7, 8):
                    return cnt + 1
        cnt += 1


def find_next(self, node):
    moves = {
```

```
            0: [1, 3],
            1: [0, 2, 4],
            2: [1, 5],
            3: [0, 4, 6],
            4: [1, 3, 5, 7],
            5: [2, 4, 8],
            6: [3, 7],
            7: [4, 6, 8],
            8: [5, 7],
        }

        results = []
        pos_0 = node.index(0)
        for move in moves[pos_0]:
            new_node = list(node)
            new_node[move], new_node[pos_0] = new_node[pos_0], new_node[move]
            results.append(tuple(new_node))

        return results
ob = Solution()
matrix = [
    [3, 1, 2],
```

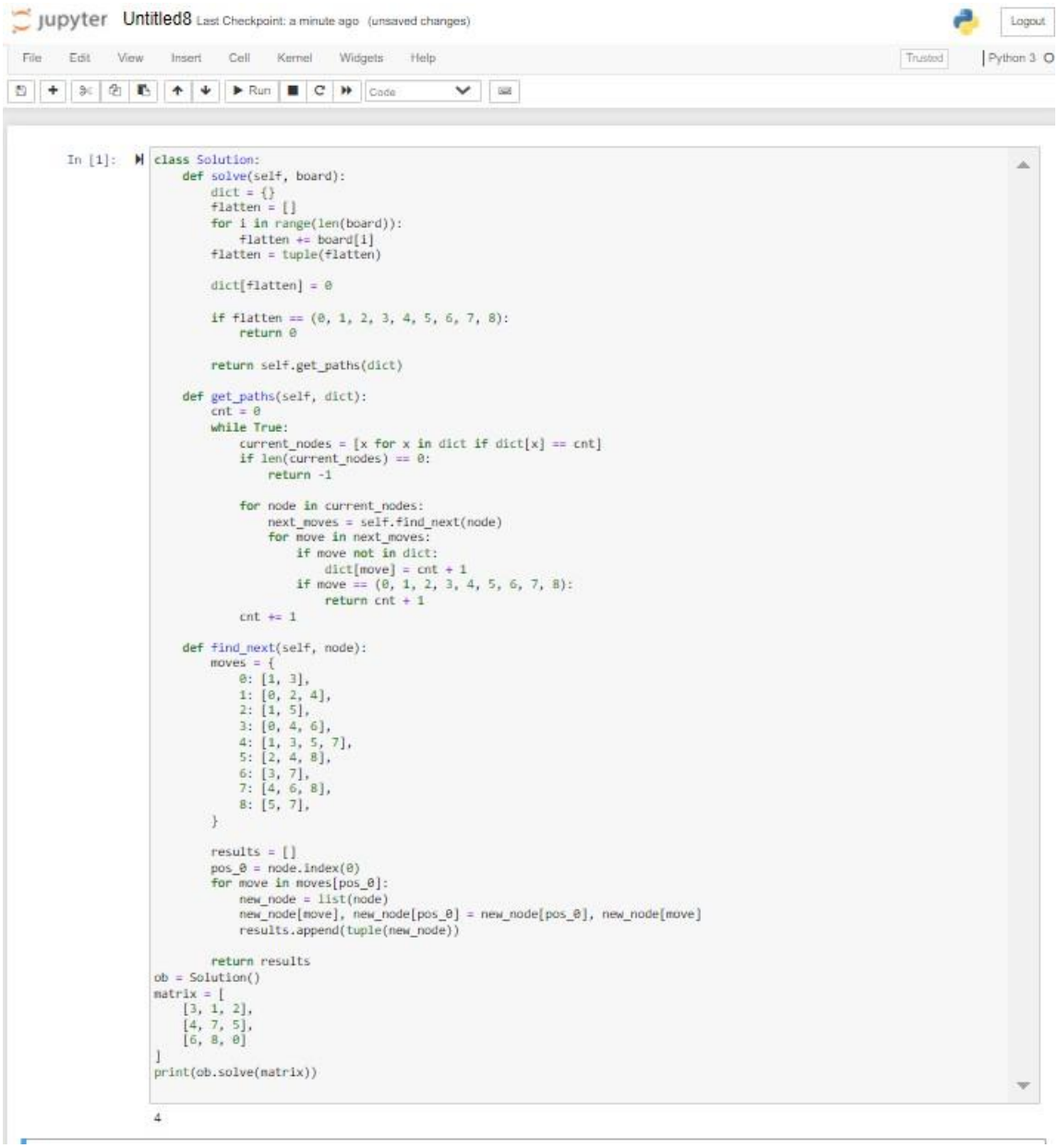
[4, 7, 5],

[6, 8, 0]

]

print(ob.solve(matrix))

Output:-



Result:- Hence the implementation of 8 Puzzle Problem is successfully executed.