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AI lab test-1
1BM18CS112
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Q) Implement IDS algorithm using suitable heuristic function where d should not be greater than 4

Sol:-

#code.

```
def dfs(src, target, visited_states, limit):
    if src == target
        return True

    if limit == 0
        return False

    visited_states.append(src)
    poss_moves = []
    poss_moves = possible_states(src,
                                 visited_states);
    all_cost = [], index = 0
    for move in poss_moves:
        all_cost[index] = h(move, target);
        index = index + 1
    poss = [], index = 0
    min_cost = min(all_cost)
    for move in poss_moves:
        if allcost[index] == min_cost
        poss.append(move)
        index += 1
```

```
for move in poss:
    if (dfs(move, target, visited_states, limit-1))
        return True.
return False

def possible_states(src, visited_states):
    blank = src.index(-1)
    d = []
    if blank is not in [0,1,2]:
        d.append('u')
    if blank not in [6,7,8]:
        d.append('d')
    if blank not in [0,3,6]:
        d.append('l')
    if blank not in [2,5,8]:
        d.append('r')
    all_states = []
    for i in d:
        all_states.append(get_possible(src, i, blank))
    return [move for move in all_states if
    move not in visited_states]
```

```
def get_possible(src, action, blank):

    temp = src.copy()
    if action == 'u':
        temp[blank], temp[blank-3] =
            temp[blank-3], temp[blank]

    if action == 'r':
        temp[blank], temp[blank+1] =
            temp[blank+1], temp[blank]

    if action == 'l':
        temp[blank], temp[blank-1] =
            temp[blank-1], temp[blank]

    if action == 'd':
        temp[blank], temp[blank+3] =
            temp[blank+3], temp[blank]

    return temp

def h(state, target):
    dis = 0
    for i in state:
        ind1, ind2 = state.index(i), target.index(i)
        y_1, x_1 = ind1%3, ind1//3
        y_2, x_2 = ind2%3, ind2//3

        dist = abs(x_1-x_2) +
               abs(y_1-y_2)

    return dis
```

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```
if __name__ == "__main__":

    for i in range(t):
        if (dfs(src, target, i))
            return True.

    return False.
```

(4) Sumanth.KN