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Readme

The 15 Puzzle is solved using BFS and Iterative Deepening DFS. **Both the programs are written from scratch without using any custom AIMA library.** The solution program through BFS is written in FifteenPuz_BFS.java file and for IDDFS its in FifteenPuz_IDDFS.java file. To compile and run please follow the below steps:

Using BFS Traversal

1. Import in Eclipse and run

Program will ask for the initial state of board as input. Input will be tile wise. Thus a state as below:

1	2	3	4
5	6	7	8
9	10	0	12
13	14	11	15

Will have the following input pattern:

```
:::: Enter the initial State::::
Enter value in position [1][1]:1
Enter value in position [1][2]:2
Enter value in position [1][3]:3
Enter value in position [1][4]:4
Enter value in position [2][1]:5
Enter value in position [2][2]:6
Enter value in position [2][3]:7
Enter value in position [2][4]:8
Enter value in position [3][1]:9
Enter value in position [3][2]:10
Enter value in position [3][3]:0
Enter value in position [3][4]:12
Enter value in position [4][1]:13
Enter value in position [4][2]:14
Enter value in position [4][3]:11
Enter value in position [4][4]:15
```

All the states of the board traversed using BFS to reach the goal is displayed:

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```
=============
State:0
=============
1 2 3 4
5 6 7 8
9 10 0 12
13 14 11 15
=============
State:1
=============
1 2 3 4
5 6 7 8
9 10 11 12
13 14 0 15
=============
State:2
=============
1 2 3 4
5 6 7 8
9 10 12 0
13 14 11 15
=============
State:3
=============
1 2 3 4
5 6 0 8
9 10 7 12
13 14 11 15
=============
State:4
=============
1 2 3 4
5 6 7 8
9 0 10 12
13 14 11 15
=============
State:5
=============
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 0

Goal Achieved through above states!!
```

Using IDDFS Traversal

1. Import in Eclipse and run

Program will ask for the **depth** of search and **initial state of board** as input. Input will be tile wise. Thus a state as below with search depth 2:

1	2	3	4
5	6	7	8
9	10	11	12
13	14	0	15

Will have the following input pattern:

```
Enter the maximum depth for search:2
:::: Enter the initial State::::
Enter value in position [1][1]:1
Enter value in position [1][2]:2
Enter value in position [1][3]:3
Enter value in position [1][4]:4
Enter value in position [2][1]:5
Enter value in position [2][2]:6
Enter value in position [2][3]:7
Enter value in position [2][4]:8
Enter value in position [3][1]:9
Enter value in position [3][2]:10
Enter value in position [3][3]:11
Enter value in position [3][4]:12
Enter value in position [4][1]:13
Enter value in position [4][2]:14
Enter value in position [4][3]:0
Enter value in position [4][4]:15
```

All the states of the board traversed using Iterative Deepening DFS to reach the goal is displayed. Level 0 representing the start root node.

```
======================
State at Level:0
======================
1 2 3 4 5 6 7 8 9 10 11 12 13 14 0 15
======================
State at Level:1
======================
1 2 3 4 5 6 7 8 9 10 11 12 13 0 14 15
======================
State at Level:1
======================
1 2 3 4 5 6 7 8 9 10 0 12 13 14 11 15
======================
Goal found at Level:1
======================
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 0
```