DOCUMENTATION

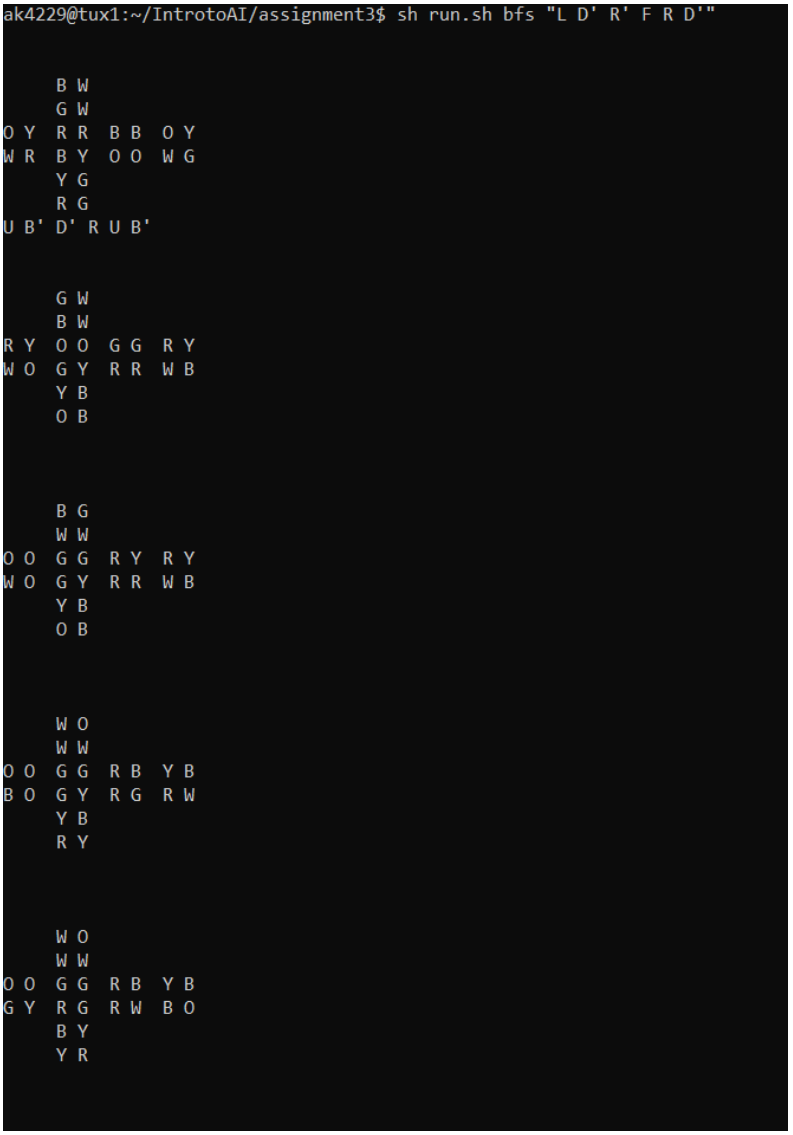
Functions:

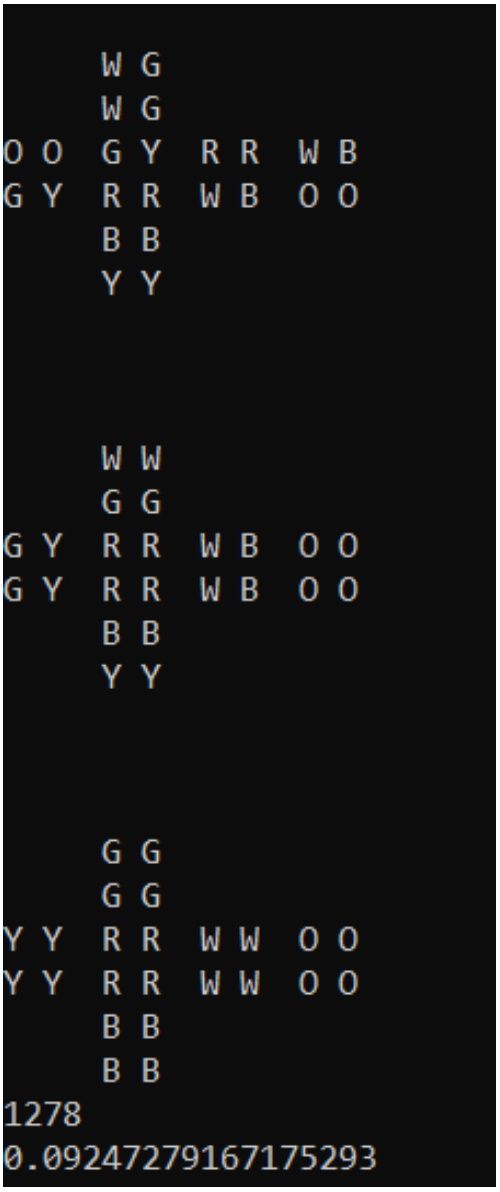
1. bfs
2. ids
3. astar

bfs-

Returns goal state of the cube using BFS with the list of moves to achieve the goal state. This function first print's the initial state of the cube, then prints the moves applied to achieve the goal state. Then, it prints the related states to the moves applied. First state printed after the list of moves is the normalized form of initial state on which moves are applied. Finally, this function shows the nodes that were explored and time that function took to find the solution. Sometimes, this function tends to find a solution in 8 steps instead of 6.

Testing:



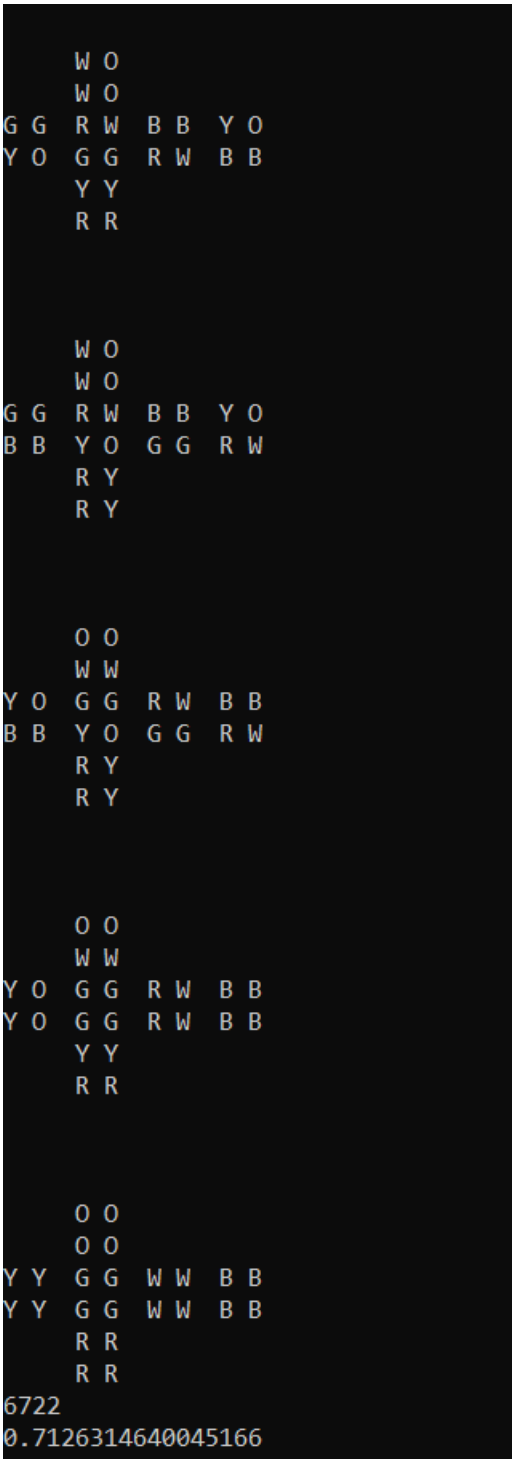


ids-

Returns goal state of the cube using IDS with the list of moves to achieve the goal state. This function first print's the initial state of the cube, then prints algorithm's current search depth, and the number of nodes it explored at that depth. Then, it prints the depth at which solution is found and the entire list of moves and relative states required to solve the cube. First state printed after the list of moves is the normalized form of initial state on which moves are applied. Finally, this function prints the nodes that were explored and time that function took to find the solution. Sometimes, this function tends to find a solution in 8 steps instead of 6.

Testing:

```
ak4229@tux1:~/IntrotoAI/assignment3$ sh run.sh ids "L' B' U' D L' F B"


     G G
     B B
W W  R R  Y Y  R R
B B  O O  G G  O O
     Y Y
     W W
Depth 0 d: 1
Depth 1 d: 5
Depth 2 d: 32
Depth 3 d: 108
Depth 4 d: 1011
Depth 5 d: 5565
Depth 6 d: 0
IDS found a solution at depth 6
B B U' D U' D' F


     R R
     O O
W W  B B  Y Y  B B
O O  G G  R R  G G
     Y Y
     W W



     Y R
     O O
R W  B B  Y W  G B
R O  G G  R W  G B
     Y Y
     W O



     W W
     O O
R W  B B  Y O  G G
Y O  G G  R W  B B
     Y Y
     R R
```

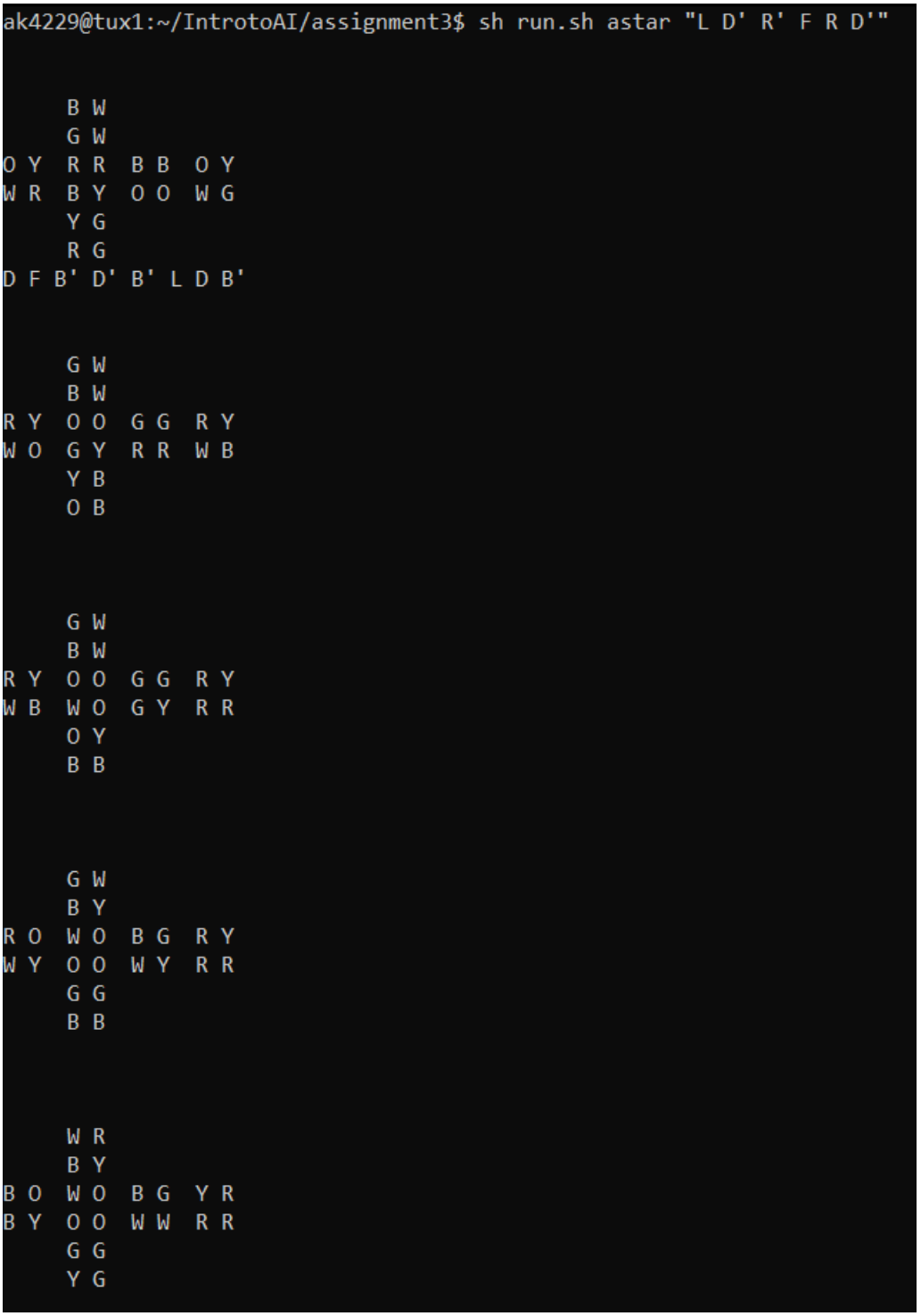


astar-

Returns goal state of the cube using AStar with the list of moves to achieve the goal state. This function first print's the initial state of the cube, then prints the moves applied to achieve the goal state. Then, it prints the related states to the moves applied. First state printed after the list of moves is the normalized form of initial state on which moves are applied. Finally, this function shows the

nodes that were explored and time that function took to find the solution. Sometimes, this function tends to find a solution in 8 steps instead of 6.

Testing:



```
    W R
    B Y
B O W O B G Y R
O O W W R R B Y
    G G
    G Y


    O B
    B Y
G O W O B W R Y
Y O W W R R Y B
    G G
    R G


    B B
    Y Y
Y G O O B W R R
O O B W R R Y G
    W G
    W G


    B B
    Y Y
Y G O O B W R R
Y G O O B W R R
    W W
    G G


    Y Y
    Y Y
G G O O B B R R
G G O O B B R R
    W W
    W W
104464
30.748330116271973
```