AI Lab 1 Report | G6

Shreyas sathe | 180010033
Janhavi Dadhania | 180010012

Introduction

- Pacman starts from (0,0) position and Goal state is (*).
- Input is mXn grid.
- Pacman is allowed to move left,right,up,down (in any order)

Aim of this task is to design and experiment with search algorithms (BFS, DFS, DFID) and observe the path length and states explored. Report also contains the tabulation of results for different orders of addition of neighbours.

Pseudo Code

MoveGen(currPosition):

```
candidate_neighbours = [currPositionDown, currPositionUp, currPositionRight,
currPositionLeft]
neighbours = []

for each element in candidate_neighbours:
    If (element is not boundary) and (element equals space or goal):
        neighbours.add(element)

return neighbours
```

GoalTest(current, destination):

```
If current equals destination:
    return true
else:
    return false
```

Statistics and Tabulation of Observation

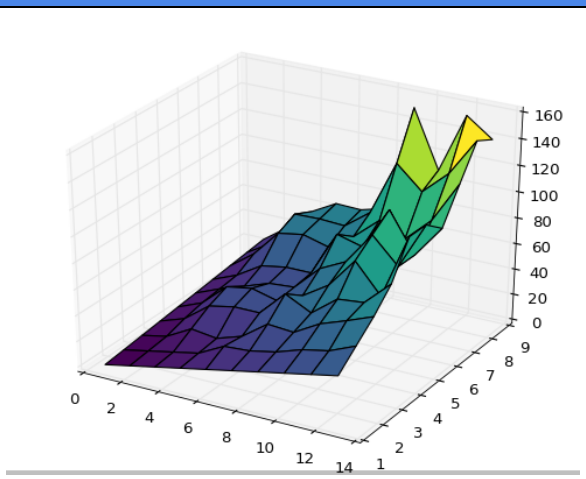
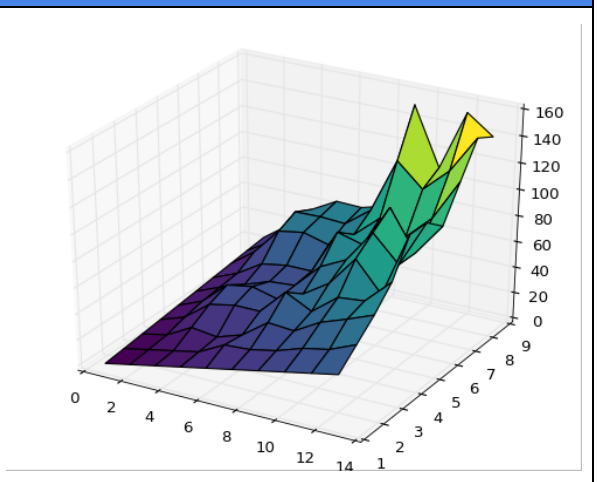
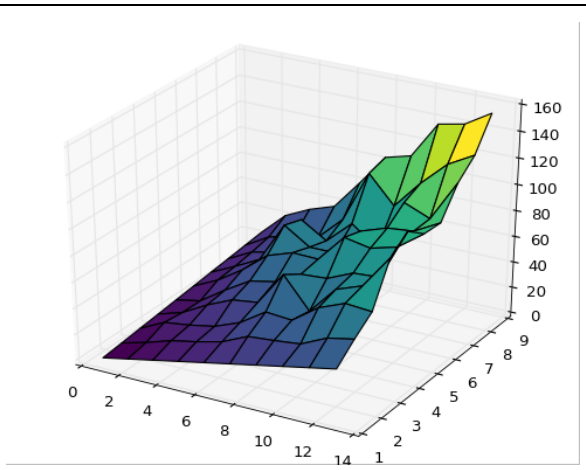
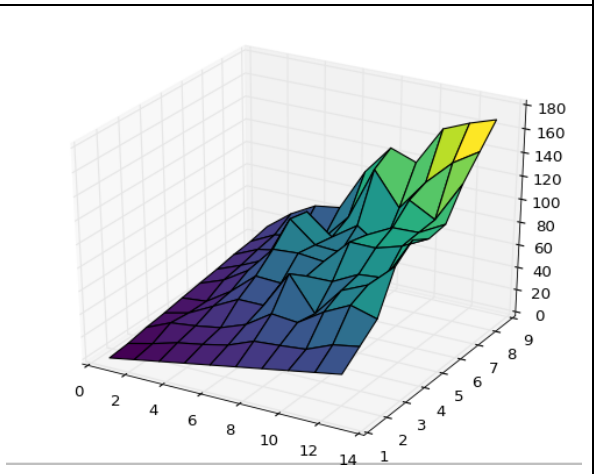
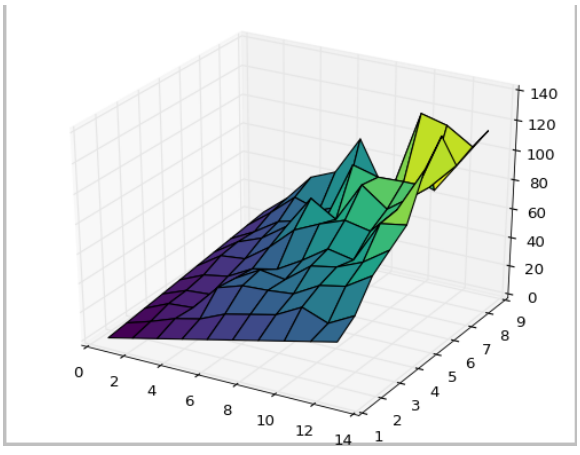
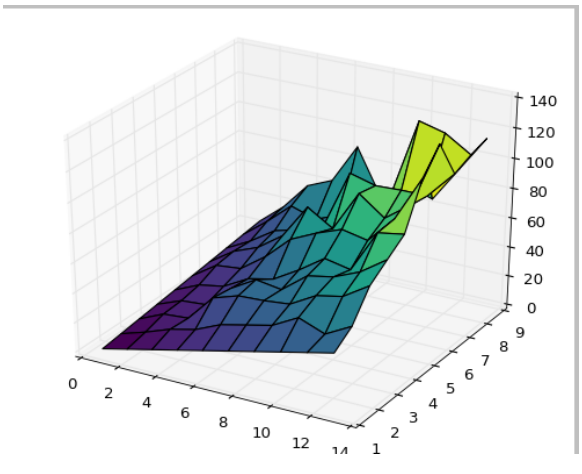
Link to sheet containing full table for different **117 maze** patterns:
https://docs.google.com/spreadsheets/d/1U-rIw7-KK8a9SiiL_MbvNNfyElgjo7wqsiNNZ2fzyHs/edit?usp=sharing

A	B	C	D	E	F	G
			Left Right Up Down		Down Up Right Left	
Algorithm	Rows	Cols	States Explored	Path Length	States Explored	Path Length
BFS	1	1	5	5	5	5
DFS	1	1	5	5	5	5
DFID	1	1	14	5	14	5
BFS	2	1	8	8	8	8
DFS	2	1	8	8	8	8
DFID	2	1	35	8	35	8
BFS	3	1	11	11	11	11
DFS	3	1	11	11	11	11
DFID	3	1	65	11	65	11
BFS	4	1	14	14	14	14
DFS	4	1	14	14	14	14
DFID	4	1	104	14	104	14
BFS	5	1	17	17	17	17
DFS	5	1	17	17	17	17
DFID	5	1	152	17	152	17
BFS	6	1	20	20	20	20
DFS	6	1	20	20	20	20
DFID	6	1	209	20	209	20
BFS	7	1	23	23	23	23
DFS	7	1	23	23	23	23
DFID	7	1	275	23	275	23
BFS	8	1	26	26	26	26
DFS	8	1	26	26	26	26
DFID	8	1	350	26	350	26
BFS	9	1	29	29	29	29
DFS	9	1	29	29	29	29
DFID	9	1	434	29	434	29

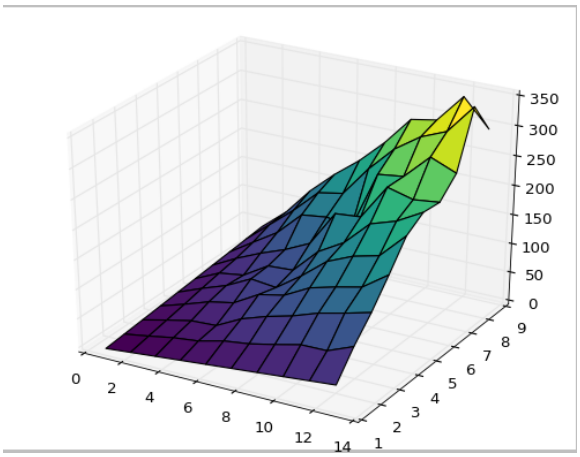
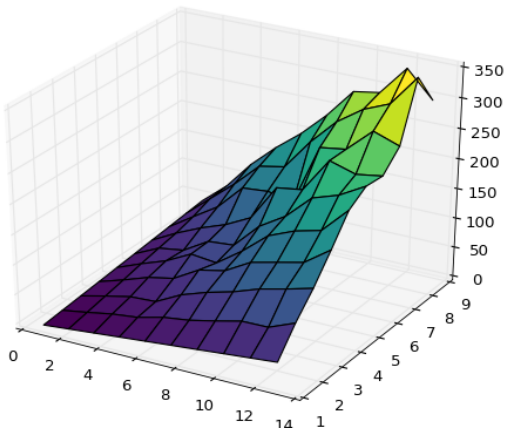
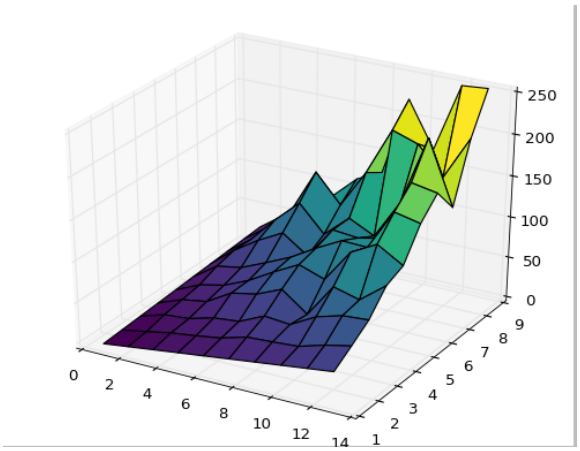
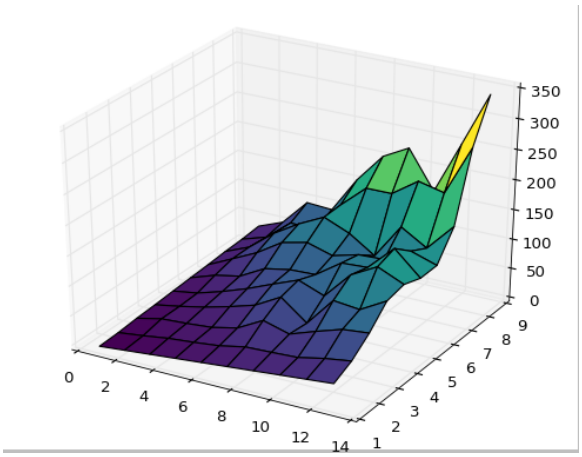
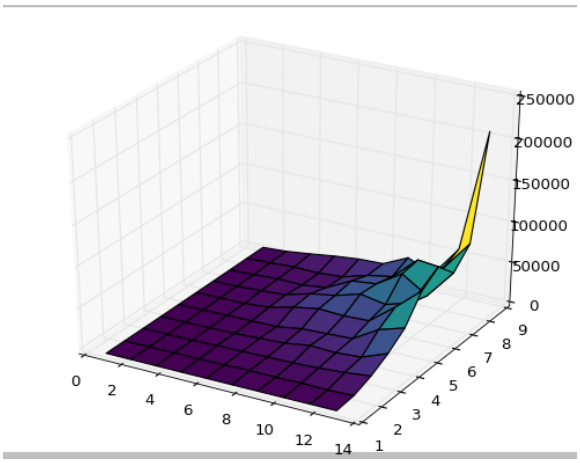
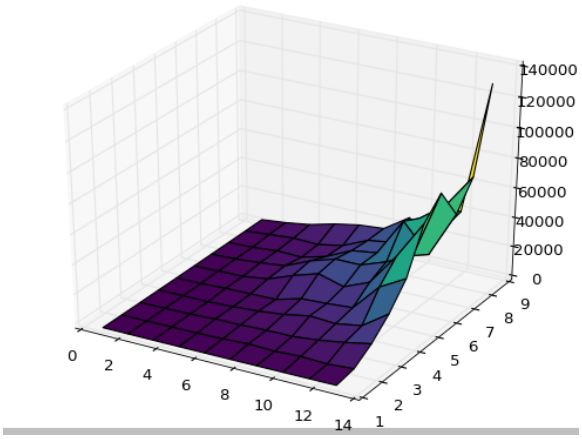
Plots

Vertical axis contains path length

Horizontal axis (x,y) contains the number of rows and columns respectively.

	Path Length	
	Left Right Up Down	Down Up Right Left
BFS		
DFS		
DFID		

Vertical axis contains path length
Horizontal axis (x,y) contains the number of rows and columns respectively.

	Stats Explored	
	Down Up Right Left	Up Down Left Right
BFS		
DFS		
DFID		

Dependence of Order of Neighbours added

	Path Length	States Explored
BFS	Does't Depend	Depends(for higher Depth graphs)
DFS	Depends	Depends
DFID	Doesn't Depend	Depends

- BFS and DFID find the shortest path from starting state to goal state thus changing the order in which neighbours are added doesn't affect the path length as observed.
- DFS continues to explore the states till no further move is possible and thus usually returns a path longer than BFS. Thus, when the order is changed the path length in DFS changes.
- As pac man starts from (0,0) and it's destination is towards the other end the order (Up, Left, Down, Right) explores more number of states compared to (Down, Up, Right, Left) order. This difference is huge in DFIS as tabulated and shown in the graph.