

Laboratory Class 1

Recursion

Estruturas de Informação

- 1. Write a recursive method that receives a string and returns another string:
 - a) With its characters with the same order of the original string.
 - **b)** With its characters with reverse order of the original string.
- 2. Make a recursive method to see if a number is palindrome that is, the number is the same when written forwards or backwards (examples: 99, 101, 111, 121, 1221, 21112, 10001, ...).
- **3.** State a recursive method that calculates the greatest common divisor of two positive integers using the algorithm of successive divisions. For example, m.d.c (48,30)=6.
- **4.** Develop a recursive method to demonstrate the backtracking through the search of a path in a labyrinth. Consider that only horizontal and vertical movements are allowed (diagonal are prohibited) and movements obey the following order: north↑, east→, south↓ and west ←. Represent the labyrinth by a matrix of zeros and ones, in which the walls represent zeros and ones halls. For example, for the following labyrinth 7x13:

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

A recursive method that seeks a path between the source (0, 0) and the destination (6, 12) should mark to 9 the labyrinth path cells and cells accessed but which have not led to this solution with 2. So the return positions (backtracking) can be viewed with 2.

9	9	9	0	2	2	0	0	0	2	2	2	2
1	0	9	9	9	0	2	2	2	2	2	0	2
1	0	0	0	9	0	2	0	2	0	2	0	2
1	0	0	0	9	2	2	0	2	0	2	2	2
1	1	1	1	9	0	0	0	0	1	0	0	0
0	0	0	0	9	0	0	0	0	0	0	0	0
0	0	0	0	9	9	9	9	9	9	9	9	9