ESTRUCTURA DE DATOS 2
Código ST0247

Laboratory practice No. 3: Backtracking

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3) Practice for final project defense presentation

3.1 Other algorithms that exist to find the shortest way in a graph are Dijkstra's algorithm, Bellman Ford's algorithm, Floyd-Warshall's algorithm, and SSSP (Single Source Shortest Path)

3.2 n! being n the number of vertex

3.3

Value of N	Execution time (Brute Force)	Execution time (Backtracking)
4	0.196s	0.163s
5	0.152s	0.174s
6	0.149s	0.172s
…	…	…
32	More than 5m	54.537s
N	$O(n!)$	$O(2^n)$

3.4 We use BFS (Wide path) when we need to know all the possibilities of ways between one vertex in specific and its successor, verifying which one is the best, it means the shortest way. In this, there is an evaluation function and the one with the lowest cost is selected from among allá the nodes that have been expanded so far.

For another side, we use DFS (Depth path) to verify the shortest path between two nodes because this algorithm takes one vertex (source) and then its successor (destination), doing the processor in a quick way. This always choose the node deeper to expand it

3.5 The data structure is an ArrayList since it can eliminate and save data dynamically without saying a size, the program receives a first parameter in which it is composed of two things (N, M), N is The first value is the number of nodes and the second (M) is the number of vertices, then the number of arcs is sent so that the first value is the origin node, the second value is the arrival node and the third is the weight (all these are typed at the same time separated by

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space since a Split is used to separate each one), after this, the program begins to calculate which is the best route to get from the starting point to point N through depth graph traversal

3.8 This algorithm works through in-depth traversal, with the help of backtracking. The first thing is to go through the graph with dfs from an initial node to a final node, and at the same time accumulate the cost or weight of the route, at the end of each possible route the final value will be saved in a variable and it will be asked what it is the lowest, in order to finally return the lowest cost

4) Practice for midterms

4.1
   4.1.1 Line 4: n-a,a,b,c
   4.1.2 Line 5: res,solucionar(n-b,a,b,c)+1
   4.1.3 Line 6: res,solucionar(n-c,a,b,c)+1
4.2
   4.2.1 pos==path[0]
   4.2.2 v,graph,path,pos
   4.2.3 graph,path,v
4.3
   4.3.1 Since 0: 0,3,7,4,2,1,5,6
              Since 1: 1,0,3,7,4,2,6,5
              Since 2: 2,1,0,3,7,4,5,6
              Since 3: 3,7
              Since 4: 4,2,1,0,3,7,5,6
              Since 5: 5
              Since 6: 6,2,1,0,3,7,4,5
              Since 7: 7

   4.3.2 Since 0: 0,3,4,7,2,1,6,5
              Since 1: 1,0,2,5,3,4,6,7
              Since 2: 2,1,4,6,0,5,3,7
              Since 3: 3,7
              Since 4: 4,2,1,6,0,5,3,7
              Since 5: 5
              Since 6: 6,2,1,4,0,5,3,7
              Since 7: 7

4.5
   4.5.1 Line 1: 1
   4.5.2 Line 11: ni,nj
   4.5.3 $O(2^n)$

4.6
   4.6.1 C
   4.6.2 A

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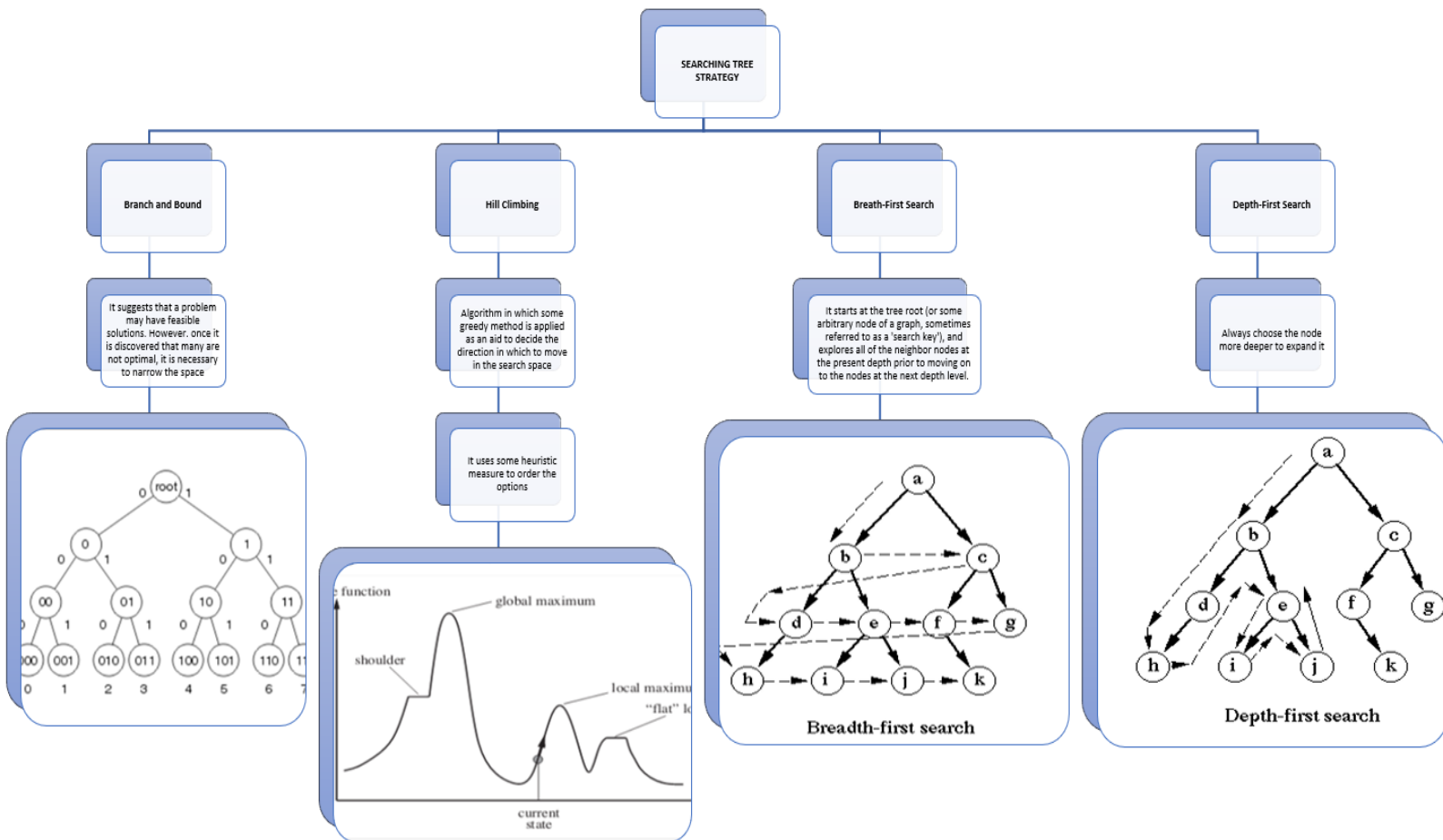Phone: (+57) (4) 261 95 00 Ext. 9473

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4.7
    4.7.1 Line 3: N==3
    4.7.2 Line 8: i
    4.7.3 Line 9: r+1

5) Recommended reading (optional)

6) Team work and gradual progress (optional)

I'm alone, I hope that counts as teamwork haha :(

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