ESTRUCTURA DE DATOS 2
Código ST0247

Laboratory practice No. 3: Backtracking

Camila Barona Cabrera
Universidad Eafit
Medellín, Colombia
cbaronac@eafit.edu.co

Felipe Sosa Patiño
Universidad Eafit
Medellín, Colombia
fsosap@eafit.edu.co

3) Practice for final project defense presentation

3.1 Another 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(n-1)/2 being n the number of vertexs.

3.3

Value of N	Execution time (Brute Force)	Execution time (Backtracking)
4	1 ms	0 ms
5	2 ms	0 ms
6	5 ms	1 ms
…	…	…
32	More than 5 minutes	58017 ms

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

For other side, we use DFS (in Depth path) to verify the shortest path beetwen two nodes because this algorithm take one vertex (source) and then it successor (destination), doing the processor in a quickly way.This always choose the node more deeper to expand it.

3.5 The data structured used in this problem is bracktracking, because with this we can find the shortest way beetwen the inicial vertex and final one. In this is not necessary to go through all the vertices, the objective is to reach the destination in the cost minimum.

PhD. Mauricio Toro Bermúdez
Professor | School of Engineering | Informatics and Systems
Email: mtorobe@eafit.edu.co | Office: Building 19 – 627
Phone: (+57) (4) 261 95 00 Ext. 9473

3.6 O(n^2)

3.7 n is graph's successors.

3.8 The data structure used for saving information of the point 1.1 is a hashmap thas saves vertexID as a key and his information and list of edges as the value of the hashmap. For the algorithm we use two queues. One of them is the main queue and the other one is auxiliar. So the auxiliar is going to be fill by pairs with vertex and their distance, and when the recusion finds the destination vertex, compares his total distance with the main queue, and if the distance of the auxiliar is smallest than the main, we replace it.

4) Practice for midterms

4.1 *Line 2: n-a,a,b,c*
Line 5: res,solucionar(n-b,a,b,c)+1
Line 6: res,solucionar(n-c,a,b,c)+1
4.2.1 *pos==path[0]*
4.2.2 *v, graph, path, pos*
4.2.3 *graph, path, v*
4.3.1 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

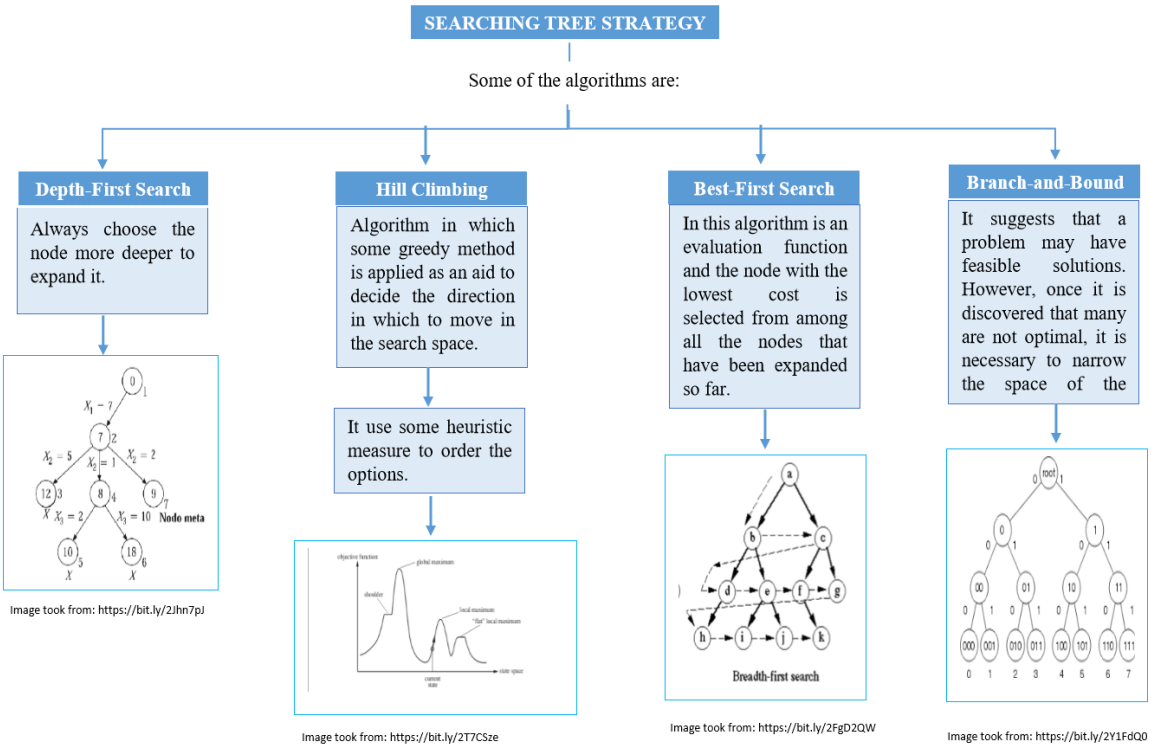
4.3.2 since 0: 0,3,7,4,2,1,5,6
since 1: 1,0,3,7,4,2,6,5
since 2: 2,1,0,3,7,4,5,6
since 3: 3,7
since 4: 4,2,1,0,3,7,5,6
since 5: 5
since 6: 6,2,1,0,3,7,4,5
since 7: 7

4.5.1 *Line 7: 1*
4.5.2 *Line 11: ni,nj*
4.5.3 *O(2^n)*
4.6.1 *c.*
4.6.2 *a.*
4.7.1 *Line 3: N==r*
4.7.2 *Line 8: i*

PhD. Mauricio Toro Bermúdez
Professor | School of Engineering | Informatics and Systems
Email: mtorobe@eafit.edu.co | Office: Building 19 – 627
Phone: (+57) (4) 261 95 00 Ext. 9473

4.7.3 Line 9: r+1

5) Recommended reading (optional)



6) Team work and gradual progress (optional)

PhD. Mauricio Toro Bermúdez
Professor | School of Engineering | Informatics and Systems
Email: mtorobe@eafit.edu.co | Office: Building 19 – 627
Phone: (+57) (4) 261 95 00 Ext. 9473

ESTRUCTURA DE DATOS 2
Código ST0247

Member	Date	Done	To do
Felipe Sosa	14/03/2019	Search a solution to point 1	Implement a solution to point 1
Felipe Sosa	15/03/2019	Implement a solution to point 1	Search a solution to point 2
Camila Barona	16/03/2019	Search a solution to point 2	Implement a solution to point 2
Camila Barona	16/03/2019	Implement a solution to point 1	Make the laboratory report
Camila Barona and Felipe Sosa	17/03/2019	Laboratory report	

PhD. Mauricio Toro Bermúdez
Professor | School of Engineering | Informatics and Systems
Email: mtorobe@eafit.edu.co | Office: Building 19 – 627
Phone: (+57) (4) 261 95 00 Ext. 9473