ESTRUCTURA DE DATOS 2
Código ST0247

Laboratory practice No. III: Backtracking

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3) Practice for final project defense presentation

3.1 The problem of the shorter algorithm accounts with different solutions or methods to find their answer, one of them is the Dijkstra Algorithm which solves the problem of the shortest paths from a single vertex origin to all the other vertex of the graph, another algorithm used for them is Bellman Algorithm - Ford, solves the problem of the shortest paths from one origin if the edge weighting is negative, finally appears Algorithm Floyd - Warshall, solves the problem of the shortest paths among all the vertex.

3.2. “n” being the number of nodes.
Ans: n!

3.3.

Valor de N	Tiempo de ejecución (Backtracking)	Tiempo de ejecución (Brute Force)
4	0ms	10ms
5	0ms	11ms
6	2ms	11ms
7	0ms	12ms
8	3ms	134ms
9	1ms	412ms
10	2ms	453ms
11	1ms	15132ms
12	11ms	21234ms
13	6ms	160120ms
14	137ms	366717ms
15	125ms	410512ms
16	1263ms	468853ms
17	839ms	528200ms
18	842ms	+50 mins
19	606ms	+50 mins
20	62390ms	+50 mins
21	3085ms	+50 mins
22	343251ms	+50 mins

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23	13602ms	+50 mins
24	288956ms	+50 mins
25	35513ms	+50 mins
26	368853ms	+50 mins
27	458200ms	+50 mins
28	+50 mins	+50 mins
29	+50 mins	+50 mins
30	+50 mins	+50 mins
31	+50 mins	+50 mins
32	+50 mins	+50 mins

3.4 The DFS is usually implemented for route searches, find the route between two vertices, usually implemented in maps, another use that has is to test if a graph is bipartite or is also common to solve riddles with a single solution. For its part, the BFS is usually used to determine if it is Bipartite Graph or not, find shortest safe route in a field with sensors present or also for total number of paths in given digraph from given source to destination having exactly m edges

3.5. In 2.1, the algorithm uses Backtracking and DFS to look for the shortest path in the graph. It starts with vertex 0. We use a loop to look for the weights between our vertex (0 in this case) and the vertices it has a path with. At the loop's first iteration, it takes a "v" vertex, and uses backtracking to do the same thing until it reaches the vertex n. Once it reaches the vertex n it means that we found a candidate path to be the shortest one, so it compares the value with the stored one to know if it is true.

3.6. O(V+E)

3.7. V, number of vertices.
E, number of edges.

3.8 The algorithm of the first point, works in the following way, basically this algorithm receives a node of origin and one of destination to which it is going to arrive in the graph, later it begins with a node of origin, and it starts when crossing the graph and as I visit a node is registered in a Boolean array that will handle the states of the graph. Finally, it will make the comparison of each weight that exists in the arcs of the graph and determining the lowest cost and it will be accumulated, and will return said value.

4) Practice for midterms

4.1 *Line 4: Solucionar(n-a, a, b, c) + 1 ;*
Line 5: Math.max(res, Solucionar(n-b, a, b, c))+1;
Line 6: Math.max(res, Solucionar(n-c, a, b, c))+1;

4.2 *Line 2: path[0]*
Line 9: SePuede(v, graph, path, pos);
Line 11 : CicloHamilAux(graph, path, pos);

4.5 *Line 7: 1*
Line 11: ni, nj;
O(2^n)

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4.6 *Line 3: N == r*
Line 8: a [r] = i;
Line 9: sol (a, r + 1)

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