Laboratory practice No. 5: Divide to conquer and Dynamic programming

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3) Practice for final project defense presentation

3.1 The data structure that the program use is a matrix of costs and another matrix of visited vertices. And the algorithm travel through the matrix, and the horizontal index of the vertex will represent the power set of the verteces not including the origen vertex which is the final vertex too. While the algorithm creates previus values of the costs of going from one vertex to another going through other. So a lot of costs depends of the previus values, so, it can return and take them without doing the process again.

3.2 The program is going to have to do n times the power set of a set made up of n-1 elements so it is going to be $n*(2^{(n-1)})$, arround $2,81 \times 10^{16}$ operations

3.3 The algorithm works searching the shortest path that the delivery man have to cross for going by every vertex in the graph but obviusly in the reality the delivery man tooks shortcuts, so the algorithm must have as verteces the points of delivery. And the distance between two points of delivery is calculated directly if there isn't another vertex between them, or searching which path is the shortest going by another point.

3.4 The data structure used is a matrix of String type, that will be fill by "K" that is the position of Karolina, "R" that is the position of the radioactive waste, and numbers that are the distance from Karolina to that exactly point. So, the algorithm completes that numbers taking into account the position of Karolina while she get every waste, and acumulate the distance that Karolina cross.

3.5 the complexity of the algorithm is $O((X \times Y) \times R)$

3.6 $O((X \times Y) \times R)$ being X and Y the dimensions of the board and R the number of radioactive waste.

4) Practice for midterms

4.1.1

		C	A	L	L	E
	0	1	2	3	4	5
C	1	0	1	2	3	4
A	2	1	0	1	2	3

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ESTRUCTURA DE DATOS 2
Código ST0247

S	3	2	1	1	2	3
A	4	3	2	2	2	3

4.1.2

		M	A	D	R	E
	0	1	2	3	4	5
M	1	0	1	2	3	4
A	2	1	0	1	2	3
M	3	2	1	1	2	3
A	4	3	2	2	2	3

4.2.1 $O(i*j)$
4.2.2 return table[lenx][leny];
4.3.1 $O(n)$
4.3.2 a.
4.4.1 c.
4.5.1 c.
4.5.2 a[mitad]
4.5.3 a,mitad+1,der,z
4.6.1 scm[i]=arr[i];
4.6.2 max++;
4.6.3 max=scm[i];
4.6.4 $O(n^2)$
4.7.1 d[i][j]
4.7.2 d[i, k-1]
4.7.3 d[k-1, j]
4.7.4 $O(n^2)$

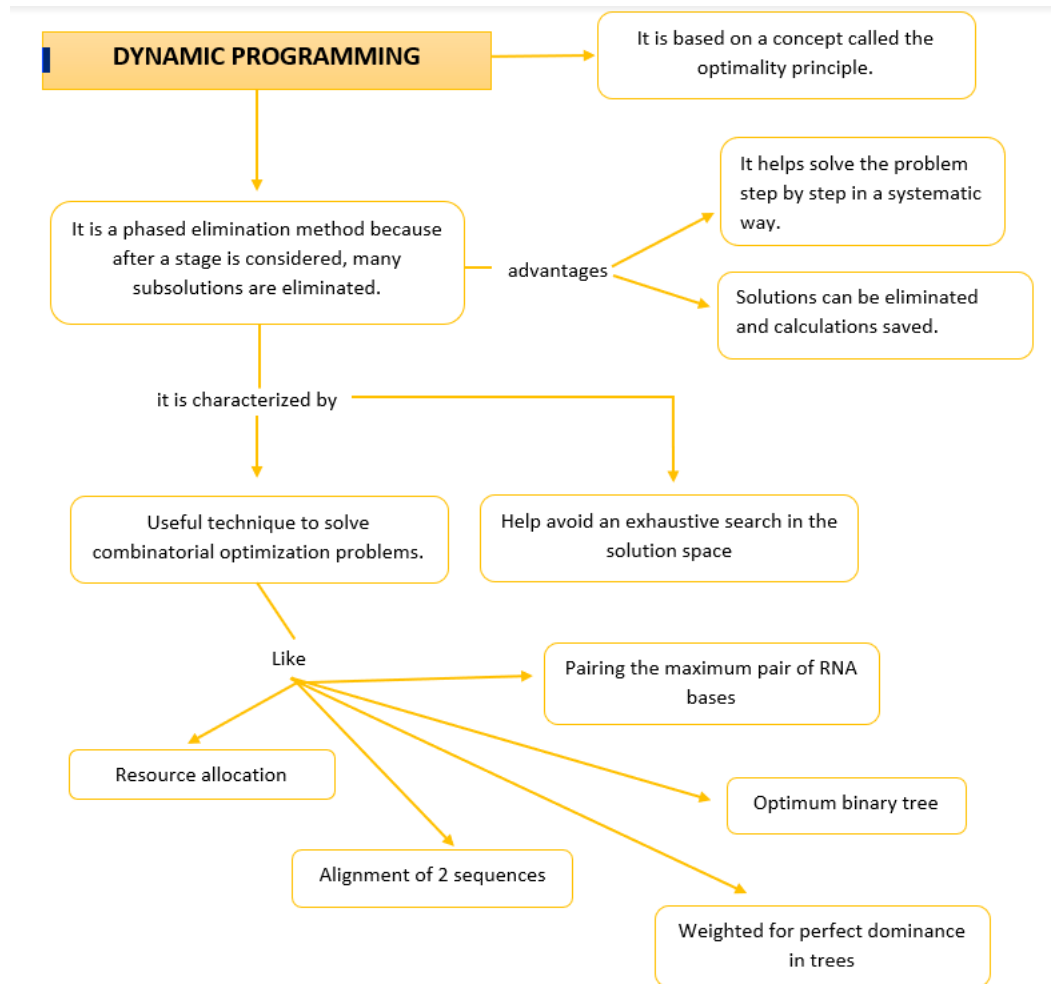## 5) Recommended reading (optional)

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DYNAMIC PROGRAMMING

It is based on a concept called the optimality principle.

It is a phased elimination method because after a stage is considered, many subsolutions are eliminated.

advantages

It helps solve the problem step by step in a systematic way.

Solutions can be eliminated and calculations saved.

it is characterized by

Useful technique to solve combinatorial optimization problems.

Help avoid an exhaustive search in the solution space

Like

Pairing the maximum pair of RNA bases

Resource allocation

Optimum binary tree

Alignment of 2 sequences

Weighted for perfect dominance in trees

6) Team work and gradual progress (optional)

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Member	Date	Done	To do
Camila Barona	4/05/2019	Search a solution to point 1	Implement a solution to point 1
Camila Barona and Felipe Sosa	4/05/2019	Implement a solution to point 1	Search a solution to point 2
Felipe Sosa	4/05/2019	Search a solution to point 2	Implement a solution to point 2
Felipe Sosa and Camila Barona	5/05/2019	Implement a solution to point 2	Make the laboratory report
Camila Barona and Felipe Sosa	5/05/2019	Laboratory report	

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