Laboratory practice No. 4: Greedy algorithms

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3) Practice for final project defense presentation

3.1 We solved this problem with the nearest neighbour algorithm (a greedy approach). The data structure used is a stack in which we push the selected node and a boolean array that stores whether a node has been visited . At each step we select the nearest neighbour of the current node and then move on to the selected node's neighbours.We do this until every node has been visited and then we return to the initial node.

3.2 The greedy algorithm will not ensure an optimal solution. The graph must be complete because otherwise there will be nodes that are unreachable and could be left univisited or we could compute a path were returning to the initial node is impossible.

3.3 The greedy approach to solving the travelling salesman problem could be applied to a delivery service, in this case only visiting the nodes where a product must be delivered. One option is to apply the solution to a subsets of relatively close nodes where deliveries are pending.

3.4 The only data structured use were arrays to represent the available routes in the morning and in the afternoon. The algorithm sorts the arrays with the routes in ascending order (based on duration).The route in the morning with least duration is paired with the afternoon route with more duration , that is the first morning route in the array with the last afternoon route . We compute the extra hours for each driver and then add them all.The amount that has to be paid is the sum of all extra hours multiplied by the hourly rate (r).

3.5 O(N log N)

3.6 N is the number of routes as defined in the problem statement.

4) Practice for midterms

4.1 i=j

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4.2 **min > adjacencyMatrix[element][i]**

4.3

4.3.1

Paso		*B*	*C*	*D*	*E*	*F*	*G*	*H*
1	*A*	*20,A*	∞	*80,A*	∞	∞	*90,A*	∞
2	*B*	*20,A*	∞	*80,A*	∞	*30,B*	*90,A*	∞
3	*F*	*20,A*	*40,F*	*70,F*	∞	*30,B*	*90,A*	∞
4	*C*	*20,A*	*40,F*	*50,C*	∞	*30,B*	*90,A*	*60,C*
5	*D*	*20,A*	*40,F*	*50,C*	∞	*30,B*	*70,D*	*60,C*
6	*H*	*20,A*	*40,F*	*50,C*	∞	*30,B*	*70,D*	*60,C*
7	*G*	*20,A*	*40,F*	*50,C*	∞	*30,B*	*70,D*	*60,C*

4.3.2 A-B-F-C-D-G. (costo 70)

4.4

4.4.1 temp / 2

4.4.2 temp + minimo

4.4.3 b) O(1)

4.5

4.5.1 a)

4.5.2 We can sort the numbers from the smallest to the largest and then choose the first 'k' numbers and sum them. In order to do this, we can use a sorting algorithm with a small complexity such as Quicksort and in that case we will have a complexity of O(nlogn).

4.6

4.6.1 i+1

4.6.2 res+1

4.6.3 i

4.6.4 the answer for `{1,0,0,4,0,0,0,0,0,0,11} and k = 3 is 2`

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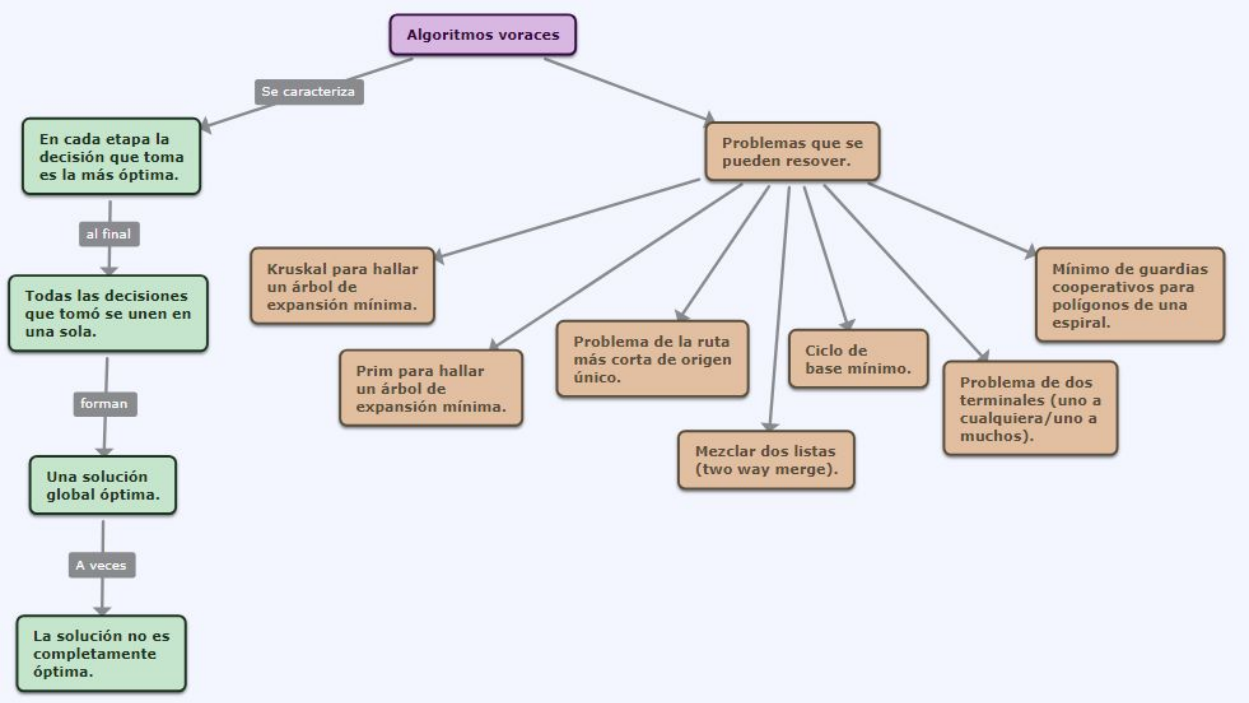
5) Recommended reading (optional)



6) Team work and gradual progress (optional) Discussing

6.1 Meeting minutes

TEAM MEMBER	DATE	DONE	DOING	TO DO
ISABEL	10/04/2019	Discussing task distribution		Writing laboratory

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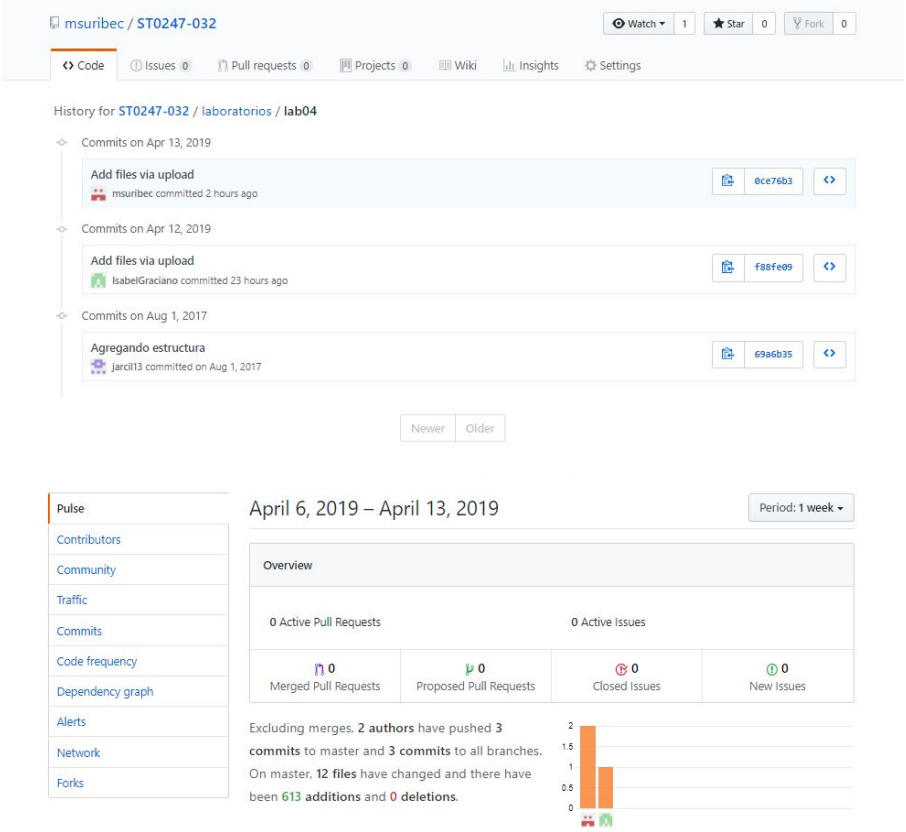
SOFIA	10/04/2019	Discussing task distribution		Writing laboratory
ISABEL	11/04/2019	Answer exercise 3.1, 3.2, 3.4		Optional Reading (concept diagram)
SOFIA	11/04/2019	Answer exercise 3.3, 3.5, 3.6, 3.7, 3.8		Code comments and practice for midterms
ISABEL	11/04/2019	Concept map and optional reading		Practice for midterms
SOFIA	12/04/2019	Practice for midterms		
ISABEL	12/04/2019	Practice for midterms		
SOFIA	13/04/2019	Upload files .java		
ISABEL	14/04/2019	Upload the laboratory report		

6.2Git report



6.3 Google doc history

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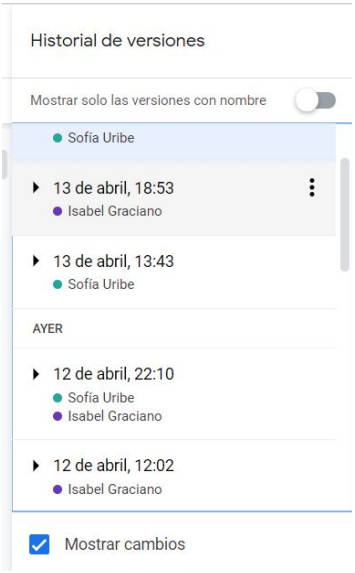

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