Algorithmics	Student information	Date	Number of session
	UO: 271580	15/03	4
	Surname: Lopez Amado		
	Name: Pablo		

Escuela de Ingeniería Informática
Universidad de Oviedo

Universidad de Oviedo
Universidá d'Uviéu
University of Oviedo

Activity 1. Salesman

Heuristic 1:

With first algorithm we got an $0(n^2)$ complexity since it has two nested loops.

First we select a pivot node from where we have to iterate over all the array to find the lowest edge cost to a node that is node in the path yet. Once done this we repeat the process with all the nodes until the path is completed.

Heuristic 2:

With this second algorithm complexity is also $0(n^2)$. In this approach we first add all the edges to a collection an then sort them by lowest cost which gives us a $0(n^2)$ complexity. Then we sort the first item to be selected in order to be a edge departing from 0. After that we start with the algorithm taking the lowest edges and considering that each node does not get more than 2 links and we don't create an internal cycle. Once done this we have all the edges, now just need to sort them. So we iterate the list with all the final edges and for each one added to the solution we look for an edge starting on the last arriving node which gives us also $0(n^2)$ complexity.

Activity 2. Salesman Times 1

After executing both heuristics we can see that despite neither of them get always the optimal solution the heuristic of getting the shortest edge performs better than closest node's one. Using the graphs at the project some of them get the same result whereas in others the result of greedy2 is much better than the one from greedy1.

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Activity 3. Salesman Times 2

n	Greedy1	Greedy2
10	0	14
20	1	24
40	3	128
80	1	192
160	5	360
320	14	1402
640	44	6668
1280	161	32305
2560	567	158698
5120	1967	901391

Times taken by Greedy1 get really close to the theoretical value since for example:

t2 = $\frac{5120^2}{2560^2}$ * 567 => t2 = 2268. We can see that the values are a bit better than the theoretical because the loops aren't always "completed".

In the other hand times taken by Greedy2 are far worse than the expected value since regardless it has an 0(n^2) complexity it has several times two nested loops making the times increase, not much but when considering the theoretical ones they are going to be worse.