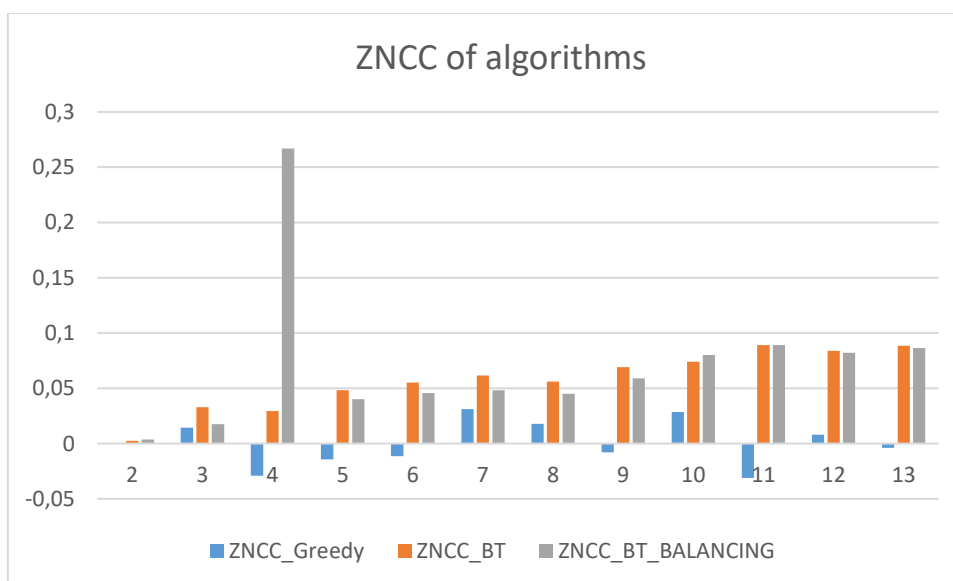


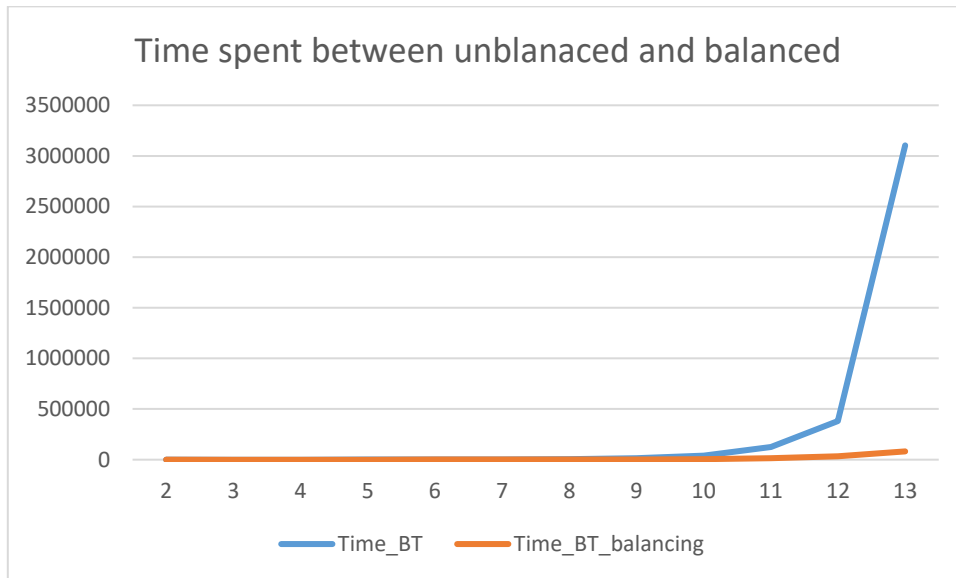
Algorithmics	Student information	Date	Number of session
	UO: UO282276	21/03/2022	6
	Surname: Cadenas Blanco		
	Name: Andrés		

Activity 1. Measurements

N	Time_BT	Time_BT_ balancing	ZNCC_ Greedy	ZNCC _BT	ZNCC_BT_ BALANCING
2	10	6	0	0,0024	0,0036
3	19	14	0,0143	0,0329	0,01768
4	51	33	-0,0292	0,02944	0,02668
5	192	76	-0,01426	0,0483	0,0401
6	475	151	-0,01136	0,05529	0,04578555
7	1424	375	0,03104	0,06153	0,04829
8	4332	923	0,0178	0,056	0,045
9	13214	2266	-0,008	0,069	0,059
10	40544	5527	0,0285044	0,074	0,08
11	123469	13538	-0,0311	0,089	0,089
12	380174	33371	0,0079	0,084	0,082
13	3103937	81433	-0,0038	0,0886	0,08652



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Activity 2. Questions

a) State the algorithm that provides better results and explain why.

The unbalanced algorithm shows better results if the time is not considered. However, taking both the time and the ZNCC the clear winner is the balanced backtracking. As the time can be seen in the second table to be way less than its competitor.

b) Which algorithm will you use for processing a realistic dataset a million of images? Explain why.

Obviously, the best way to go is the balanced Backtracking as it would be really less amount of time against the unbalanced algorithm

c) Determine the theoretical time complexity for backtracking (without balancing condition) and validate this analysis from the experimental results.

The theoretical complexity of the unbalanced algorithm is $O(3^n)$ as there are three possible groups and n number of images.

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Taking the case of $n = 5$ and 192 ms real time. Using the k constant that is 3 we obtain the theoretical result of 576 ms. However, the time obtained is 475 ms which is pretty similar.

$$k = \frac{3^6}{3^5} = 3$$

d) Determine the advantage of including the balancing condition in terms of time for backtracking, does it affect the quality of the results?

The main advantage of adding balancing is that there are some paths that are not taken decreasing the number of accesses to the recursive algorithm, and making in that way faster.