Algorithmics	Student information	Date	Number of session
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Activity 3.2 Measurements

n	ZNCC_greedy	Time_greedy	ZNNC_BT	Time_BT	ZNNC_BT_balancing
2	0,000000	15	0,000000	15	0,000000
3	0,034384	18	0,882738	36	0,883147
4	-0,009152	21	0,695931	92	0,688199
5	0,000000	22	0,562783	279	0,561228
6	-0,018743	34	0,571613	849	0,564897
7	0,048414	39	0,647200	2526	0,628446
8	0,001380	37	0,696400	7633	0,681738
9	-0,002113	39	0,747173	22762	0,736648
10	-0,003647	50	0,774218	68992	0,786325
11	0,030912	50	0,802293	206814	0,809922
12	0,034030	52	0,823187	617986	0,831502
13	0,006061	57			
14	0,025288	60			
15	-0,018585	65			
16	0,027973	69			
17	-0,011420	75			
18	-0,021353	78			
19	0,011175	82			
20	0,040141	87			
21	0,010848	91			
22	-0,032501	96			
23	0,007604	100			
24	0,016469	106			
25	-0,023824	108			

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Activity 3.3 Questions

A) State an algorithm that provides better results and explain why

The algorithm that provides the best ZNCC is the backtracking solution without balancing.

The solutions I obtain for a number of 10 images are:

- Greedy: ZNCC -> 0,23472
- Backtracking: ZNCC -> 0,783067
- Backtracking with balancing: ZNCC -> 0.692036

The algorithm that provides the better results is the backtracking without balancing because it is exploring all the possible paths so it is going to find the best ZNCC. The backtracking with balancing is conditioned by the number of images on each group so it cannot find the best solution always and the greedy is completely random so we are going to fin a bad result comparing it with the other two.

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

In my case, I don't know if it is the best but having into account that we are going to use a dataset of million of images I probably will use the greedy.

The reason is that the greedy is so much faster than the backtracking ones, we are not going to obtain the best result in most cases but as we have million of images to use it is possible that the result is close to the best.

It's not useful to use the backtracking because it takes a long time just processing 10 images with a high-end hardware so with more images it will take so much time.

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

n	Theoretical Complexities
2	#
3	45
4	108
5	276
6	837
7	2547
8	7578
9	22899
10	68286
11	206976
12	620442

This table represent the theoretical complexity for the Backtracking algorithm without balancing. The times obtained are similar to the obtained on the experimental results so I can assume it is working as expected. The minimum variances maybe are because some process being executed in the background.

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 this approach regarding the common backtracking approach is that is going to take a less amount of time because of the load factor. The counter is smaller so we can assume that it is not doing the same amount of recursive calls as the other approach.

And it is going to affect the final result, the results are a little bit worst.

For example, in the results I got for A,

- Backtracking: ZNCC -> 0,783067
- Backtracking with balancing: ZNCC -> 0.692036

We can see that the results are worst but not so much.