Activity 1. Counting inversions.

file	t O(n2)	t O(nlogn)	t O(n2)/t O(nlogn)	n inversions
ranking1.txt	24	4	6,00	14074466
ranking2.txt	65	3	21,67	56256142
ranking3.txt	244	6	40,67	225312650
ranking4.txt	945	13	72,69	903869574
ranking5.txt	3688	22	167,64	3613758061
ranking6.txt	14944	41	364,49	14444260441
ranking7.txt	60213	99	608,21	57561381803

In order to decide if the results are as expected we calculate some theoretical values and see if they adjust to the empirical ones. Using the formula:

$$t2 = \frac{f(n2)}{f(n1)} * t1$$

With n1 being the previous value of n, n2 the new one and t1 being the previous value of t, we calculate t2.

Note that ranking1 has n = 7500, and the next file doubles this figure, until ranking 7, which has n = 480000.

n	t O(n2)	t O(nlogn)	n inversions
120000 (ranking5.txt)	3780	27	3613758061
240000 (ranking6.txt)	15120	57	14444260441
480000 (ranking7.txt)	60480	127	57561381803

We can see that they are similar, unfortunately not all the times we have of the O(nlogn) version are above the valid threshold (50), so they are not completely accurate, but, either way, we can say that we were pretty close, more in the quadratic method than in the other one. In conclusion we can say that the times grow as expected.