Softwareprojekt CGAL, WiSe 12/13
Übung 2

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Aufgabe 1 - Convex hull benchmarking

Our program first generates 100 points to compute an inital convex hull P for further sample generation.

It then generates different point sets according to the specification with points partly on ∂P and the rest within $\overset{\circ}{P}$.

Visualization test data

The program reads a number from standard input and generates that number of sample points for the different configurations depending on $i \in \{0, 1, 2, 3, 4\}$. It then plot those on the images shown below.

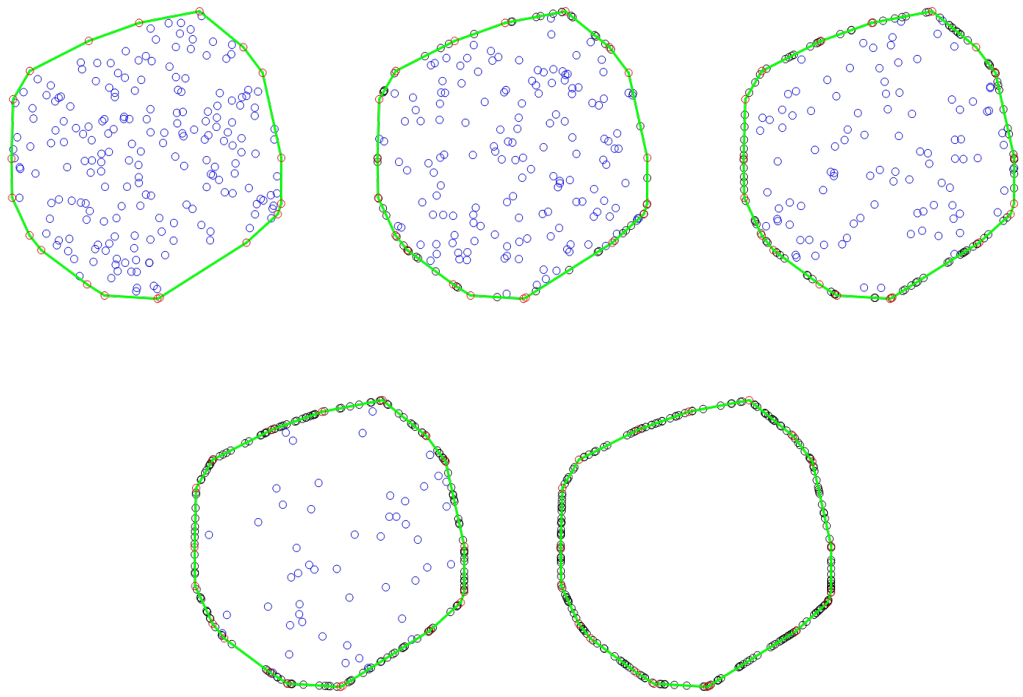

Figure 1: Testdaten

Benchmarking

Our program then creates points samples of different sizes for each configuration and runs each of the following algorithms on each single problem instance: toussaint, bykat, eddy, graham-andrew, jarvis. We ran tests for the following number of points: 1000, 10000, 50000, 80000,

100000, 150000, 200000. Each configuration has been ran 4 times with different randomly generated point sets to compensate for outliers due to memory allocation or similar problems. The results can be seen and compared on the figures 2 to 11.

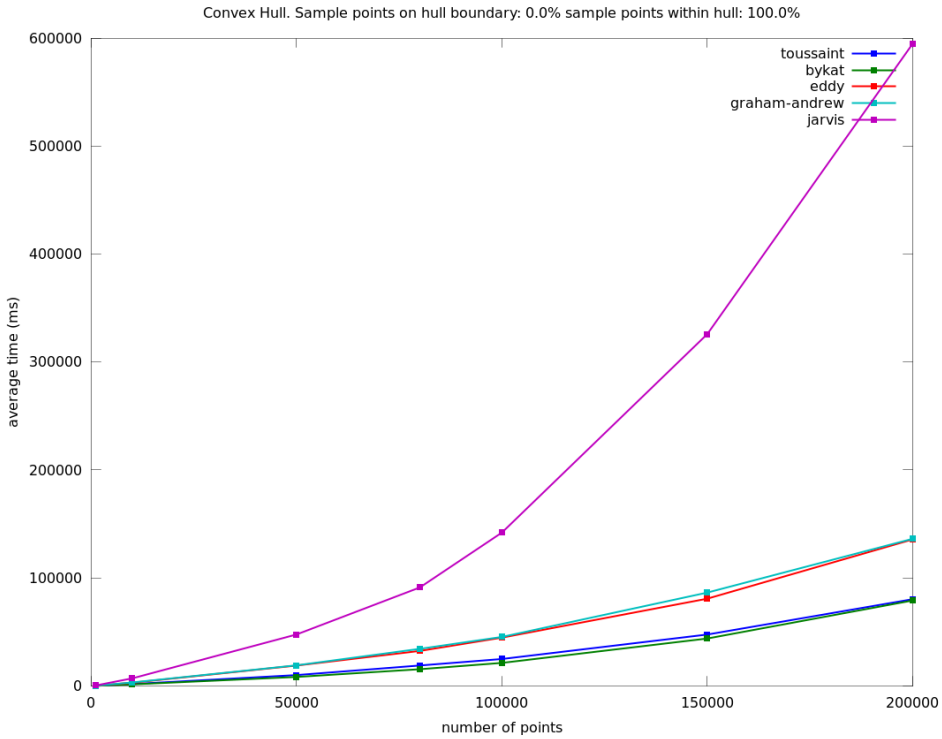

Figure 2: Ergebnisse für i=0

Aufgabe 2 - Onion Peeling

Our algorithm runs in a while loop and removes the points of the convex hull from the original point set in each iteration. Figure 12 shows a resulting image for 200 points.

Aufgabe 3 - Adding points to the convex hull

Here we just add the one additional point to the result vector of computing the convex hull before. We then run the algorithm on that vector again. Figure 13 shows a resulting image.

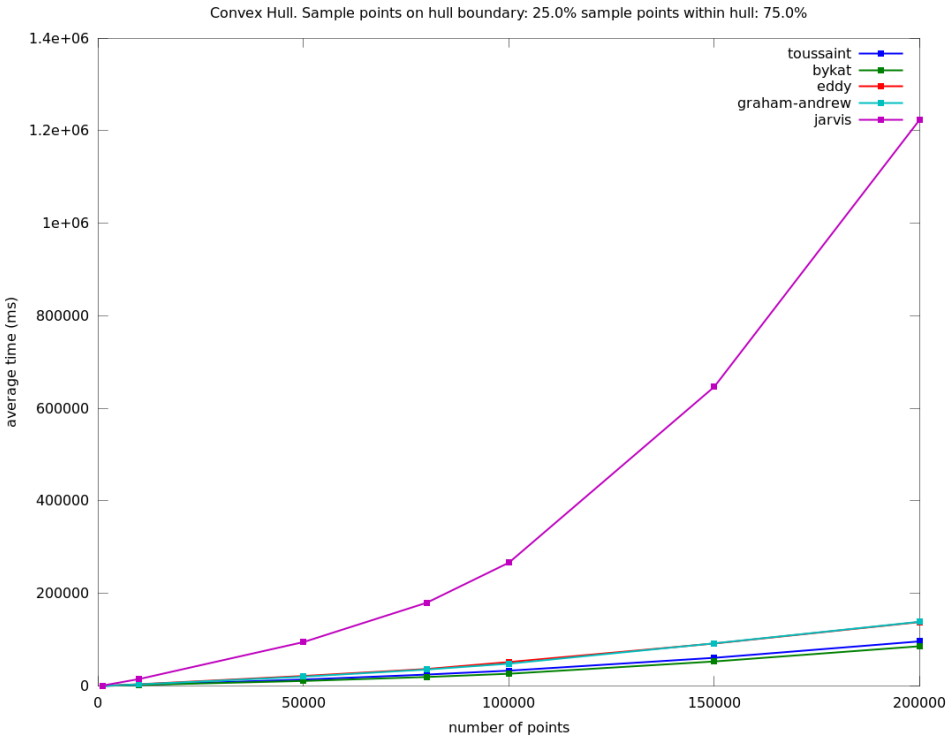

Figure 3: Ergebnisse für i=1

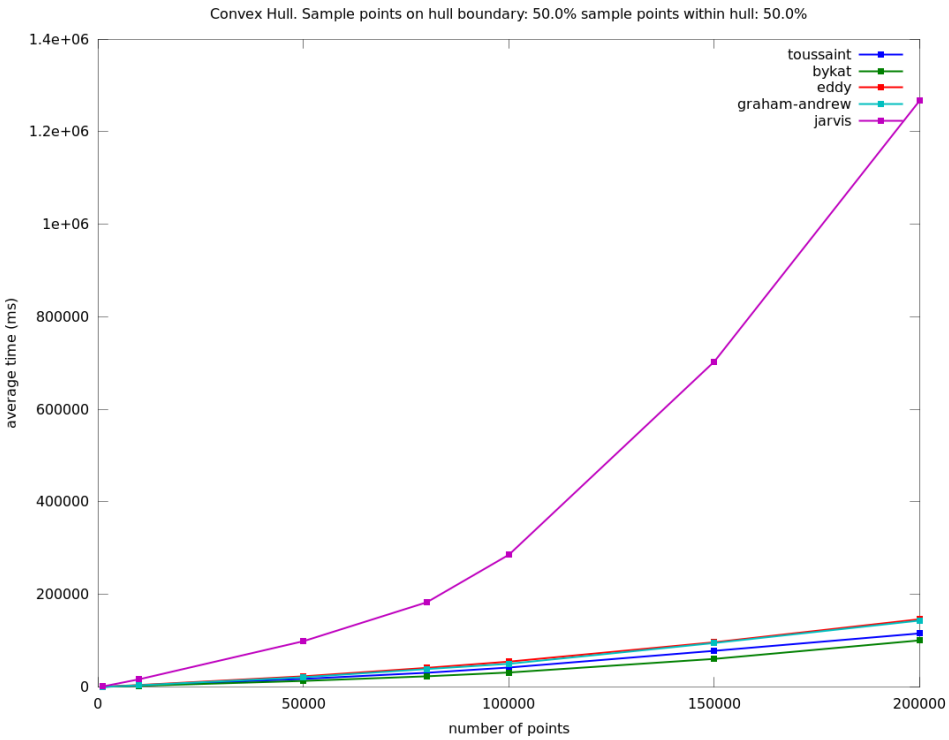

Figure 4: Ergebnisse für i=2

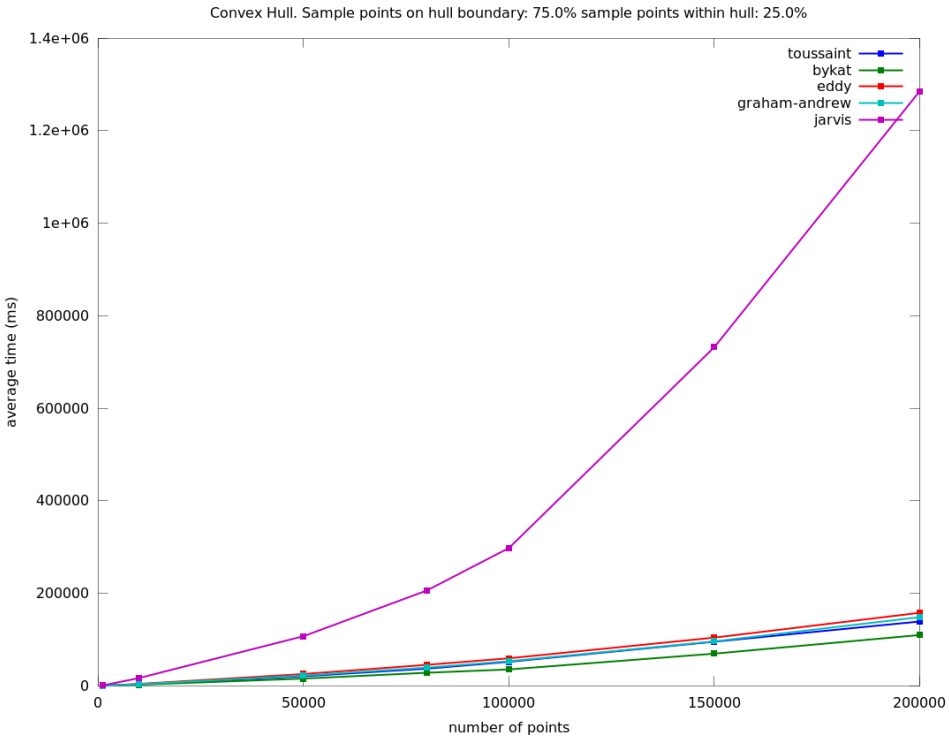

Figure 5: Ergebnisse für i=3

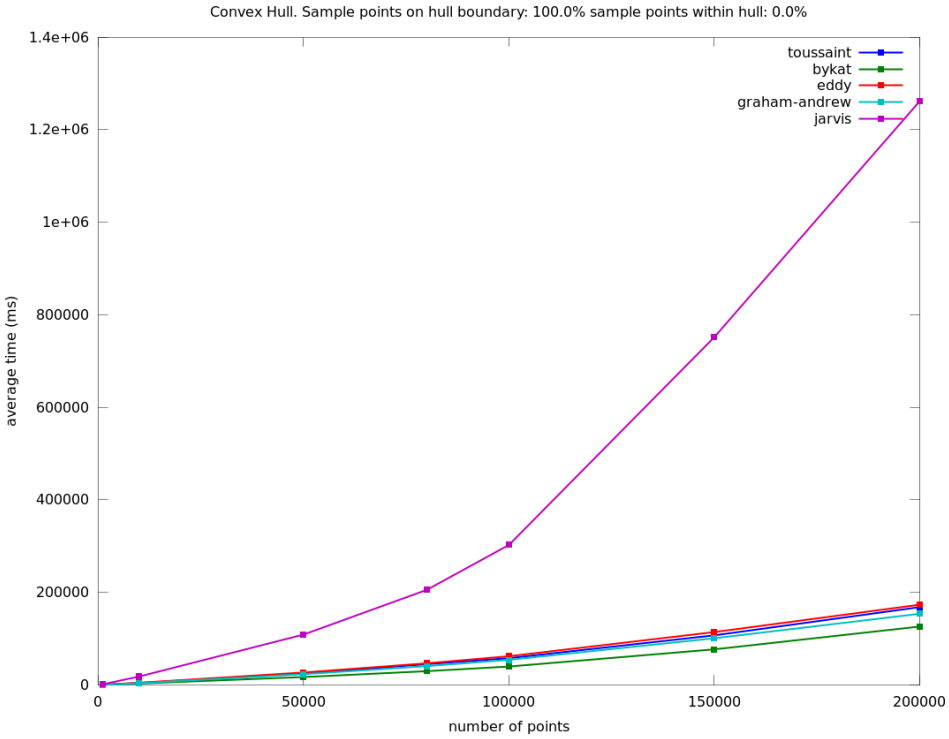

Figure 6: Ergebnisse für i=4

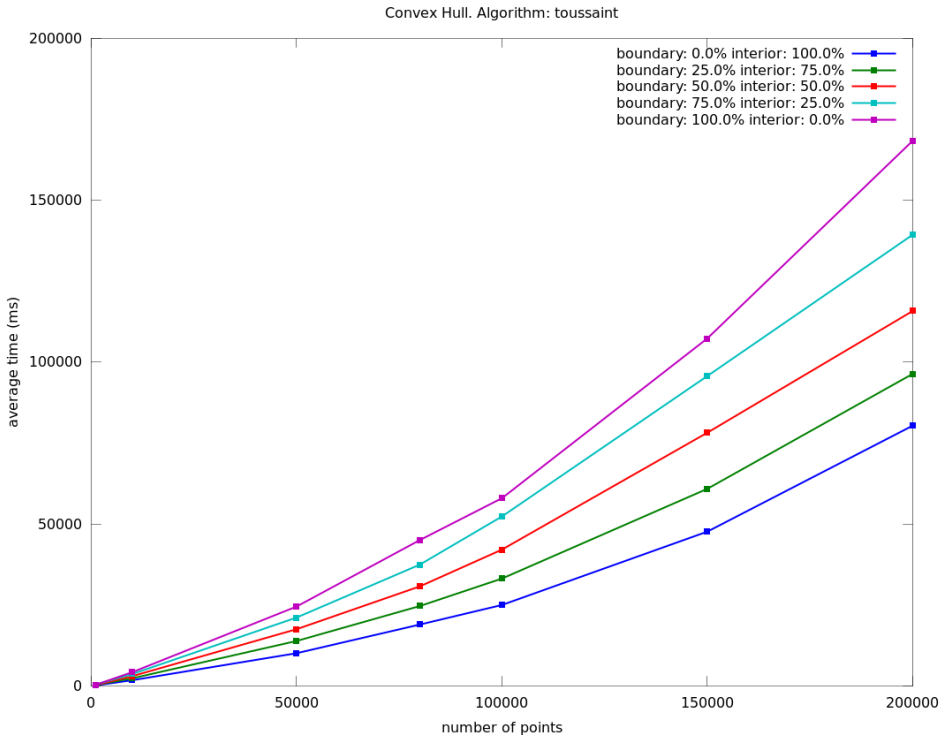

Figure 7: Ergebnisse für Toussaint

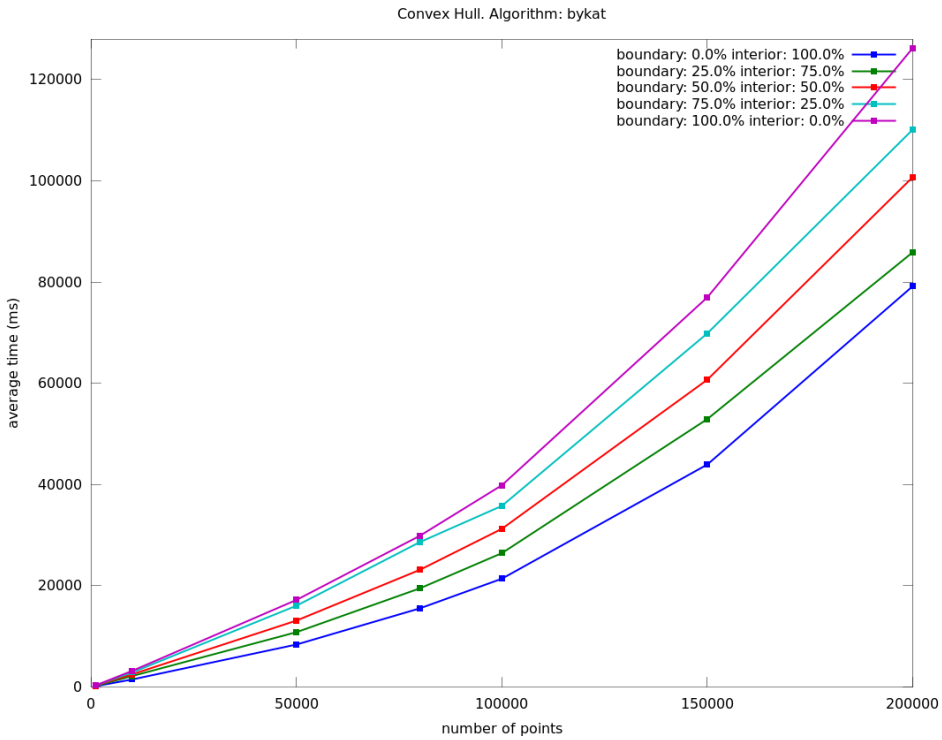

Figure 8: Ergebnisse für Bykat

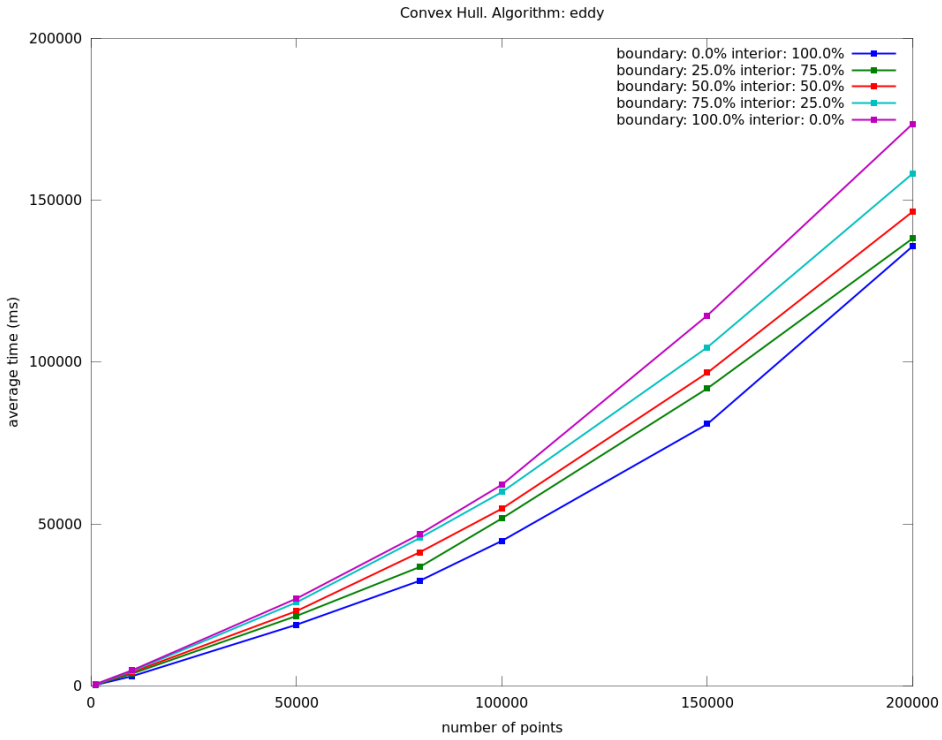

Figure 9: Ergebnisse für Eddy

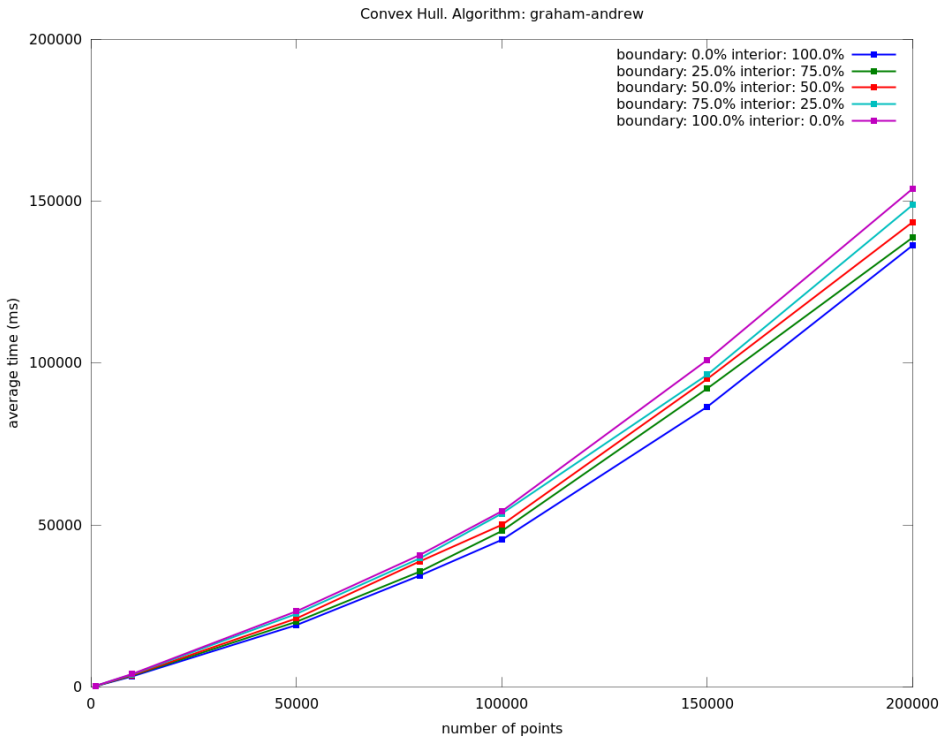

Figure 10: Ergebnisse für Graham-Andrew

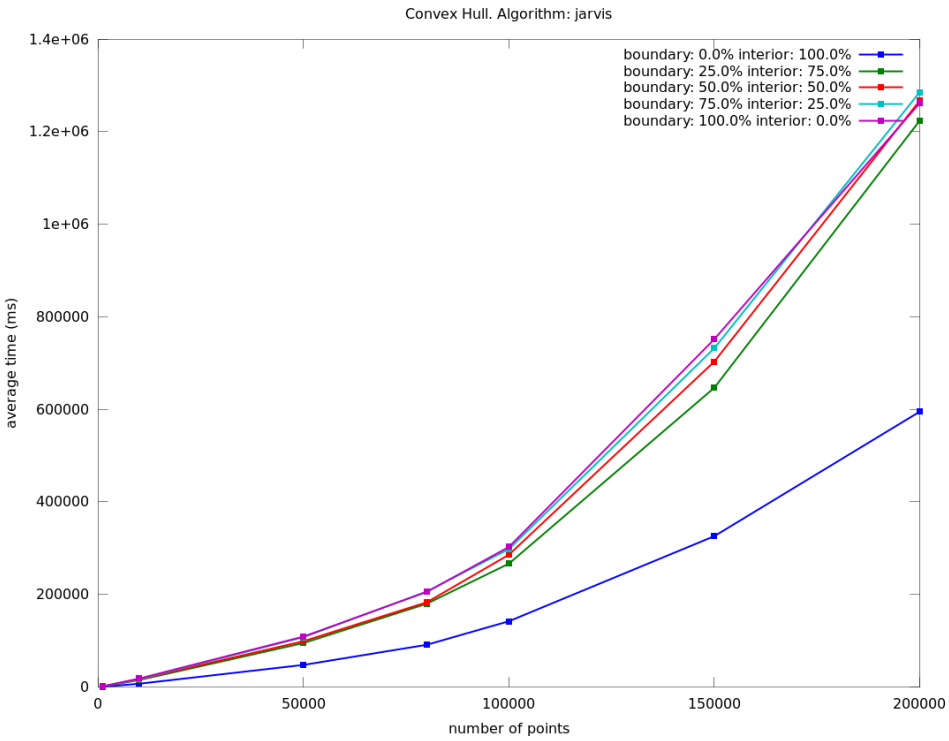

Figure 11: Ergebnisse für Jarvis

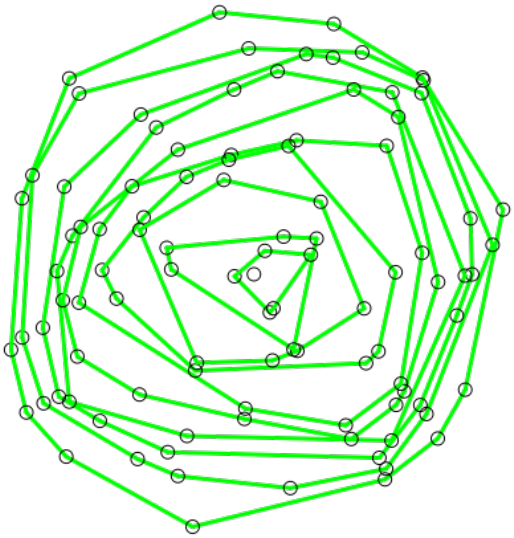

Figure 12: Onion Peeling

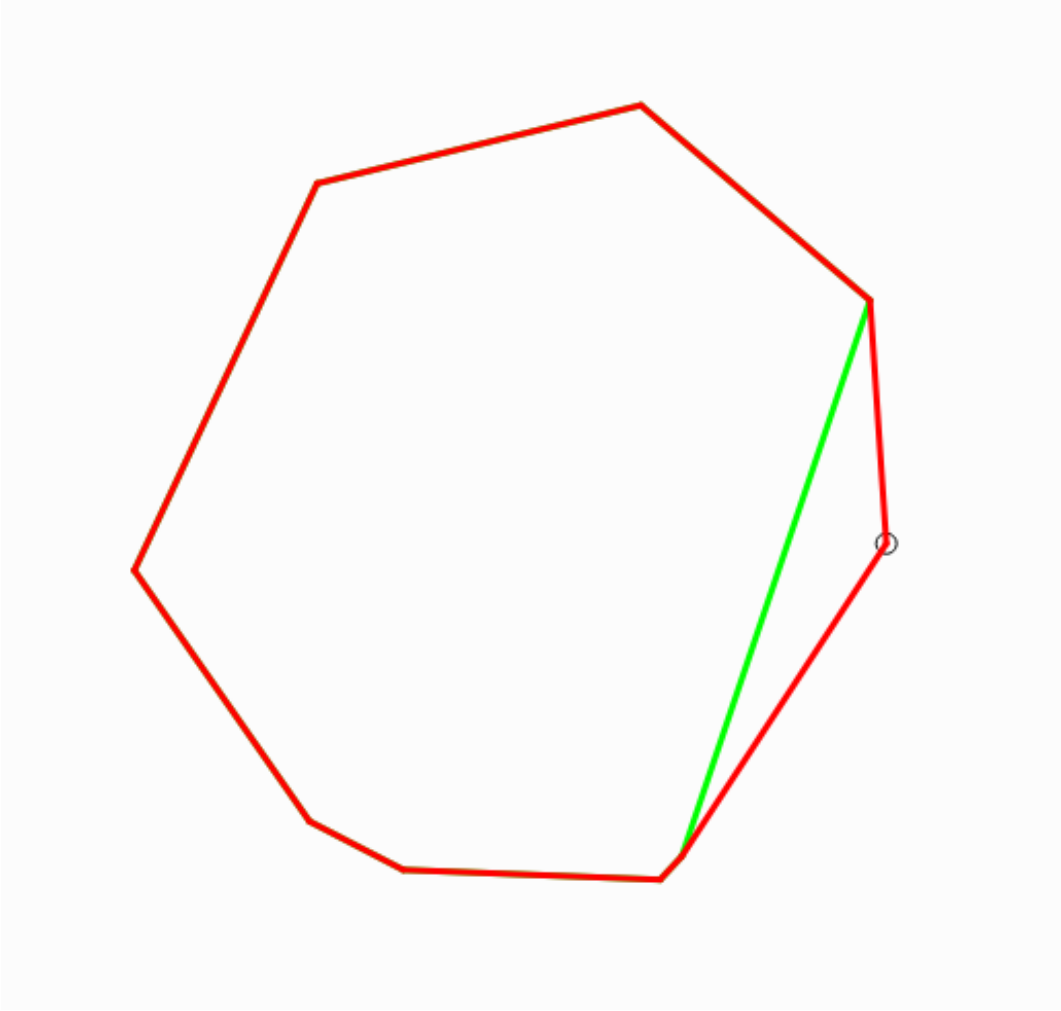

Figure 13: Adding a point to the convex hull