

Lab Report 08 - Shape Context

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1 1. Shape Context Descriptors

The function `sc compute()` was implemented as described in the “Shape Matching and Object Recognition Using Shape Contexts” paper. By iteration over all the possible point combinations a polar histogram can be computed. This can then be used to calculate θ and the radius. The range of the radius denoted by smallest r and biggest r . Are normalized.

2 Cost Matrix

The cost matrix was computed according to the given formula by iterating over all points and descriptors the cost can be found by summing up.

3 Hungarian Algorithm

For the hungarian algorithm there was just a minor adjustment needed. It needs a square cost matrix and therefore it was decided to sample random points using `randperm` at the beginning of the file `shape matching.m`.

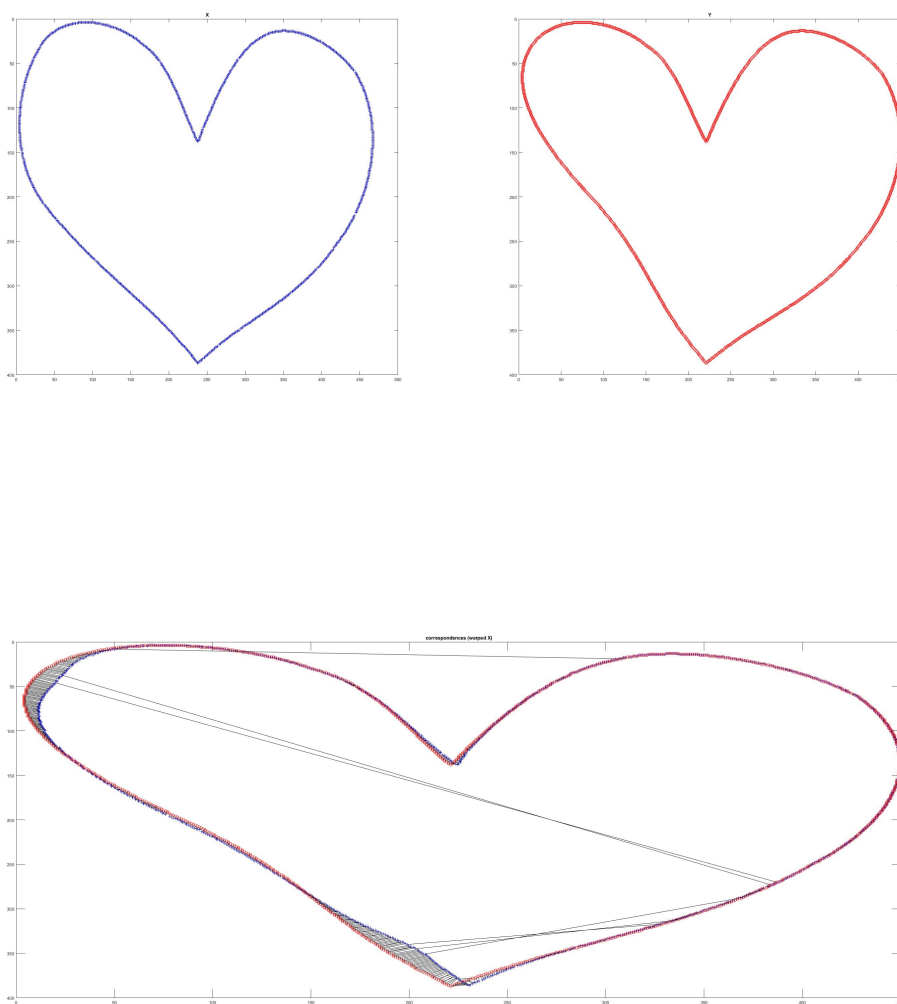
4 Thin Plate Splines

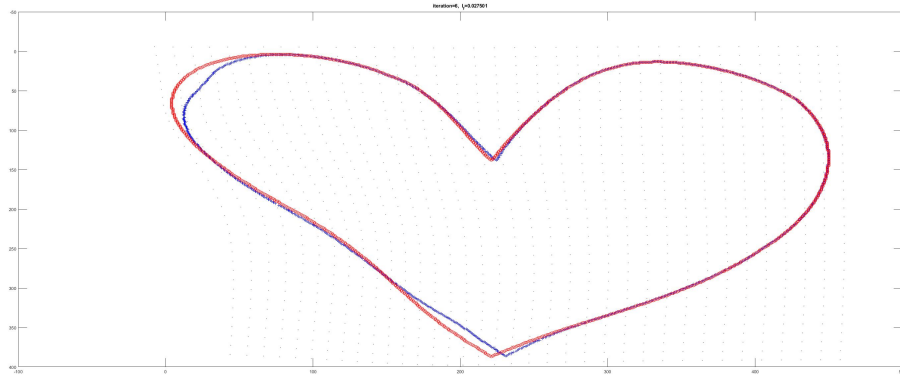
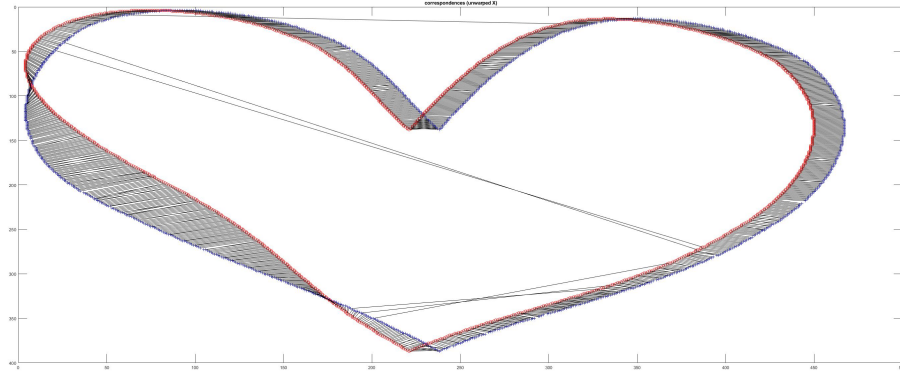
Also this algorithm was implemented according to the assignment. With the given formulas and the function `dist2` K , P and V could be obtained.

With these a linear system of equations can be constructed to obtain ω and a .

5 Results

Here the results of using the first and second heart images at the sixth iteration can be seen:





6 Conclusion and Discussion

As can be seen there are a couple of mismatches, but the overwhelming majority of points is correctly mapped. The transformation is fairly close to the correct one as well. The total bending energy was 0.0275.

Is the shape context descriptor is scale-invariant, because the radial distances are normalized using the average distances between the points. Therefore, it yields the same results for different scales.