

Sheet 12

Topic: Iterative Closest Point Algorithm (ICP)

Submission deadline: Tuesday 21.7.2009 (before class)

Exercise 1: ICP / SVD

Recall the formulas on the slides 5-7 of the ICP-lecture and prove the following:

$$\text{If } X' = P' \text{ then } R = I .$$

Hint: Find out, how singular value decomposition and eigen value decomposition are related to each other.

Exercise 2: Implementation

Implement the ICP algorithm for all source points and known correspondences using the octave stub file `sheet12_ICP_stub.m`. Test your implementation for the two data sets P1 and P2, and visualize the results (data in stub file) Hint: Octave has a built-in `svd(.)` function that can be used.

Exercise 3: Data association

If the correspondences between the points are unknown, they have to be estimated at first. Implement closest-point matching and test it using the two data sets P3 and P4. Visualize the and explain the results.