Exercise 7 in advanced image analysis 02503:

Statistical Shape Modelling

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Construct a Statistical model of the outlines (or silhouettes) or cars viewed from the side. Use the images on the course web page (`cars.mat`):

1. Annotate each car with at least 14 points. These points should of course correspond across the data set, and all cars should face the same way. You can use `markshape.m` for this.

2. Align the shapes using the Procrustes Algorithm. You can either use the iterative approach in the lecture notes or you can use the elegant (but harder to grasp) method based on a complex representation of points, see chapter 3 in *Dryden, I. L., Mardia, K.V, Statistical Shape Analysis, Wiley (1998).*

3. Estimate the covariance matrix of the aligned shape and extract the principal components – how many are needed to explain 95% of the variance?

4. Visualise the variation described by the first three modes, e.g. by drawing the mean and plus minus three standard deviations.

5. Make plots of the first and second principal component against each other.