

Machine Intelligence 2

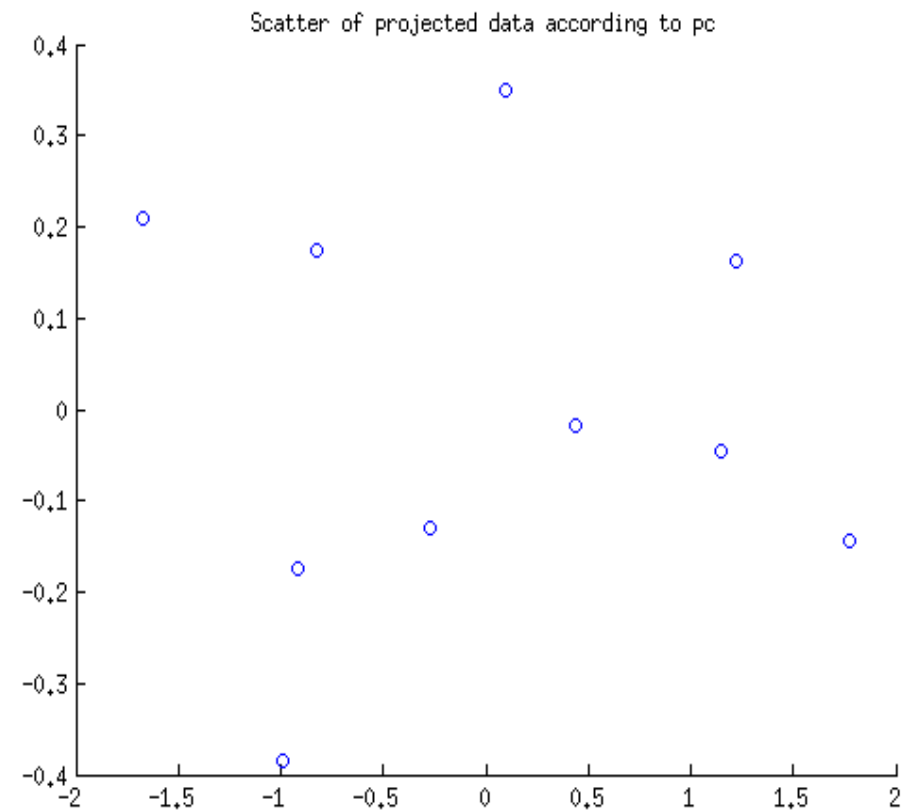
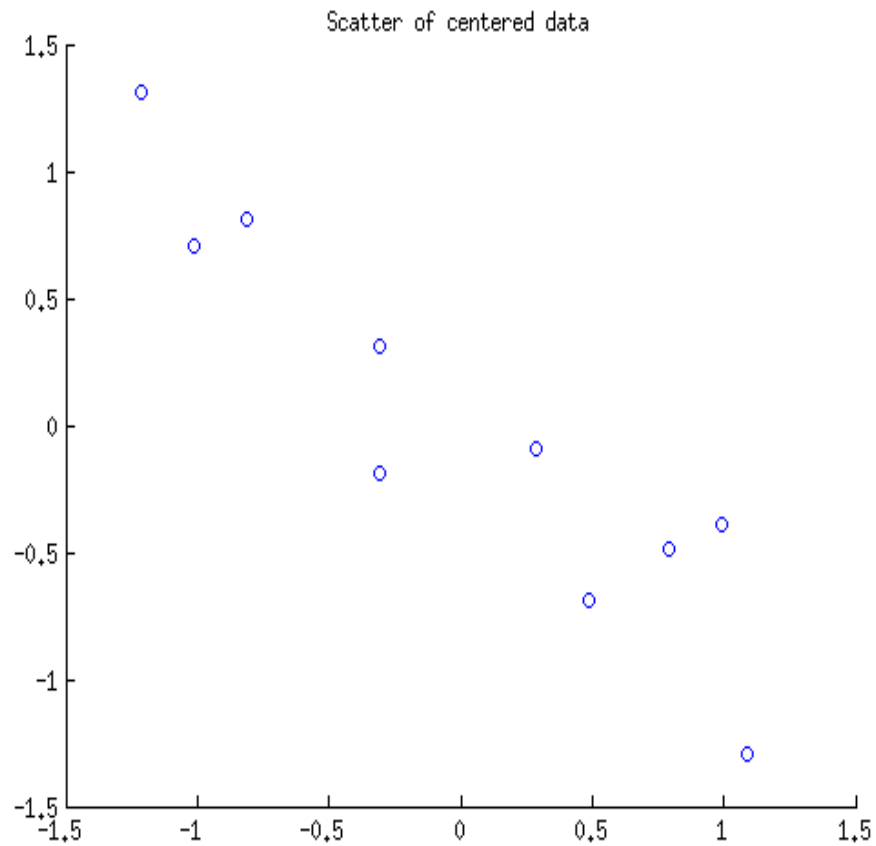
Exercise Sheet 3

Authors:

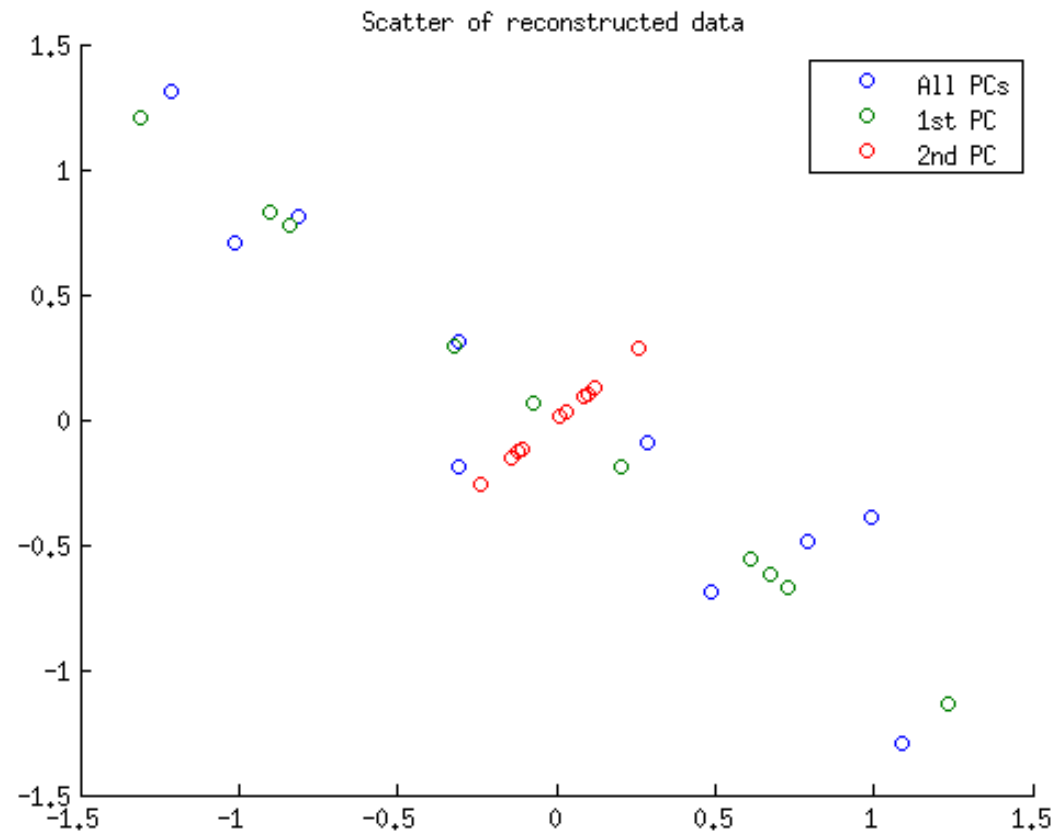
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3.1 PCA toy data

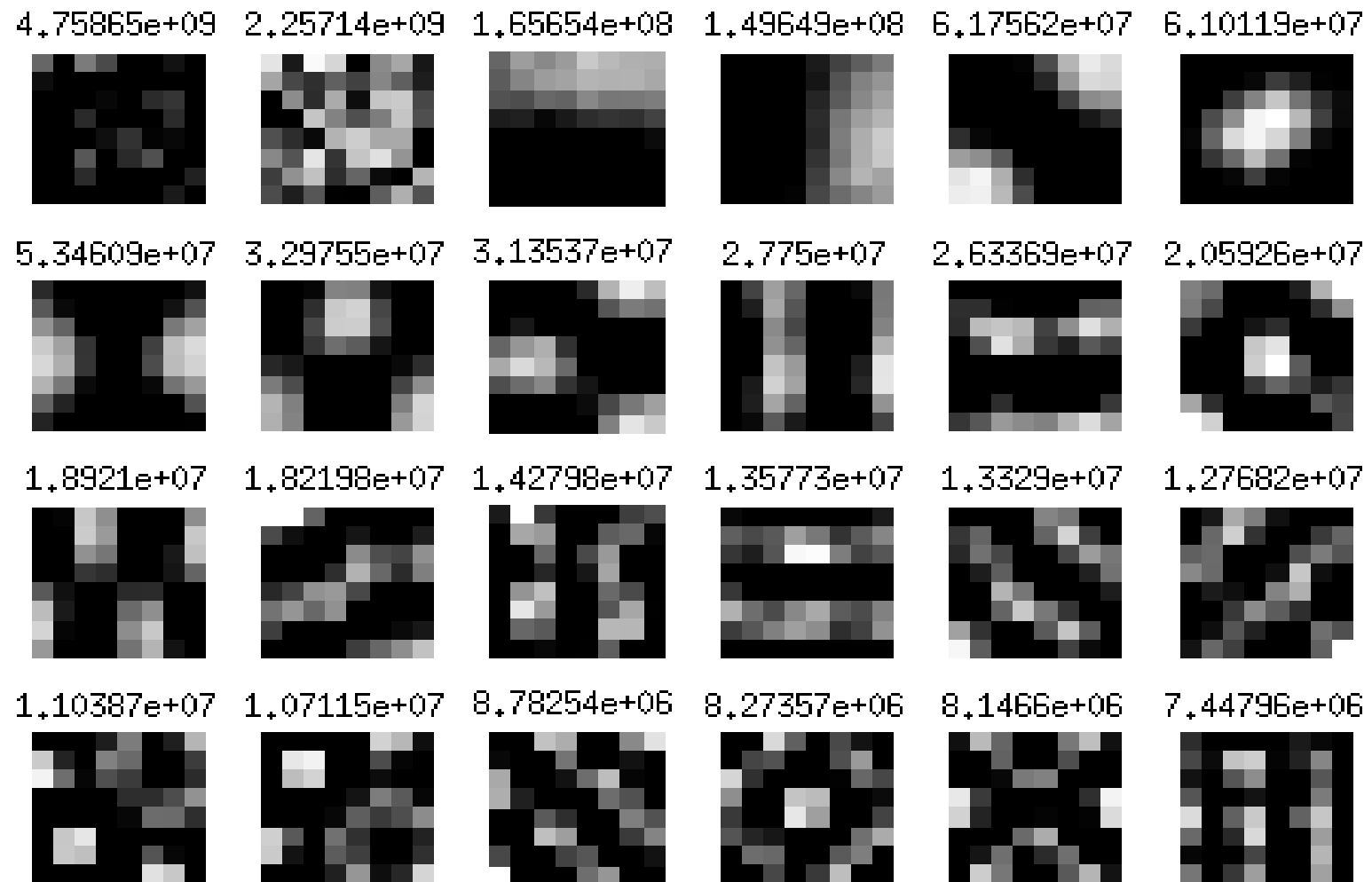


3.1 PCA toy data



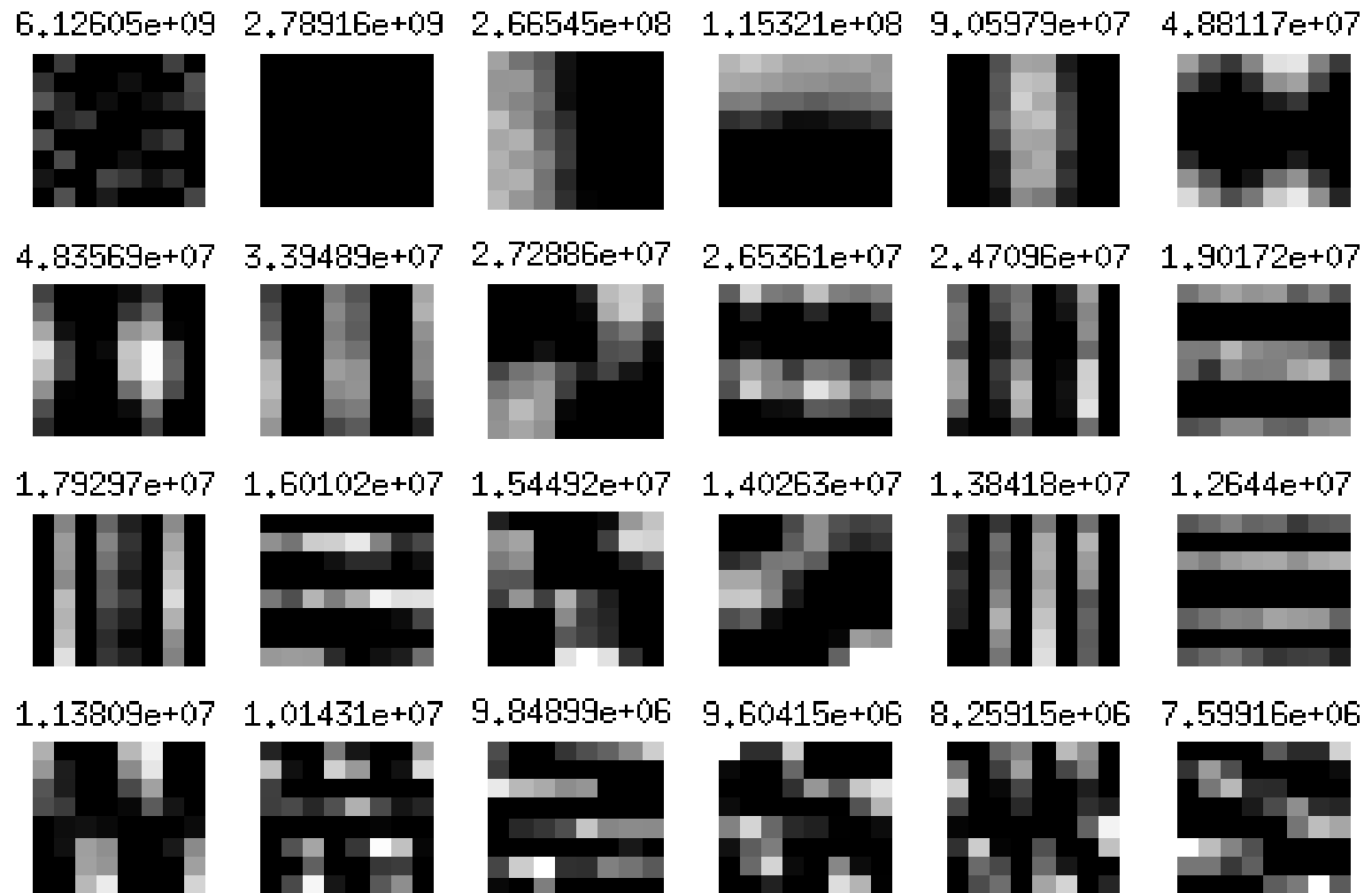
3.2 PCA image data

Nature files



3.2 PCA image data

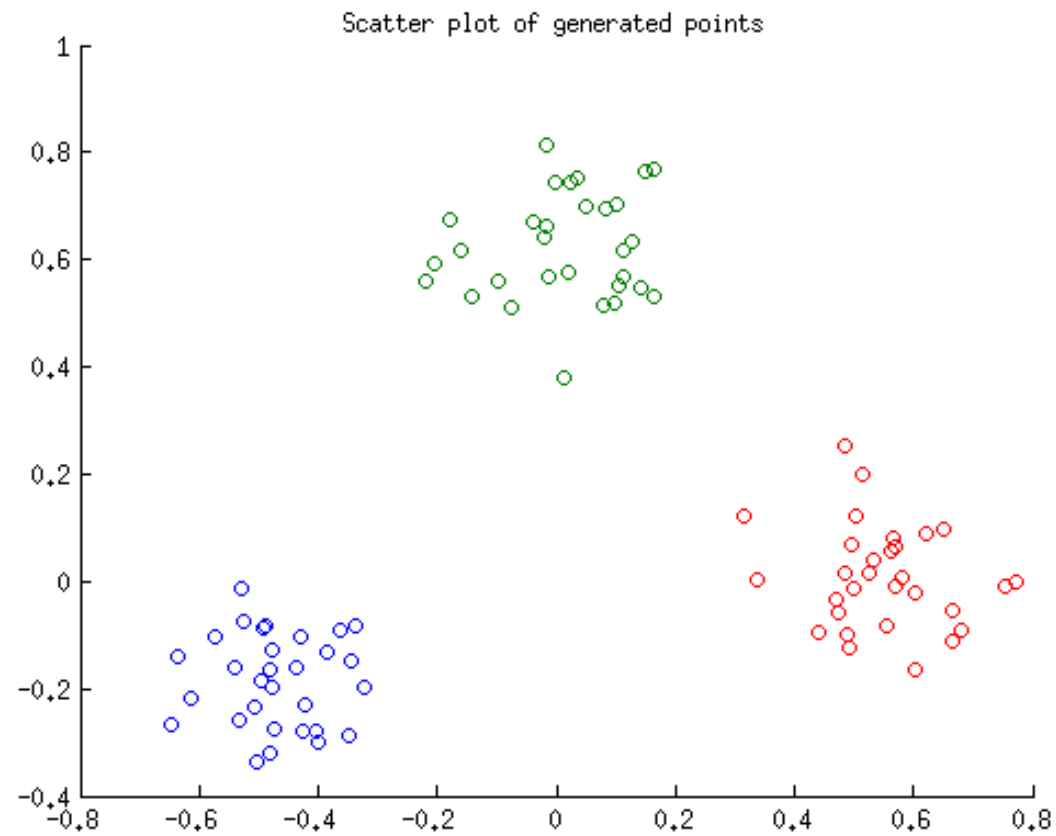
Building files



3.2 PCA image data

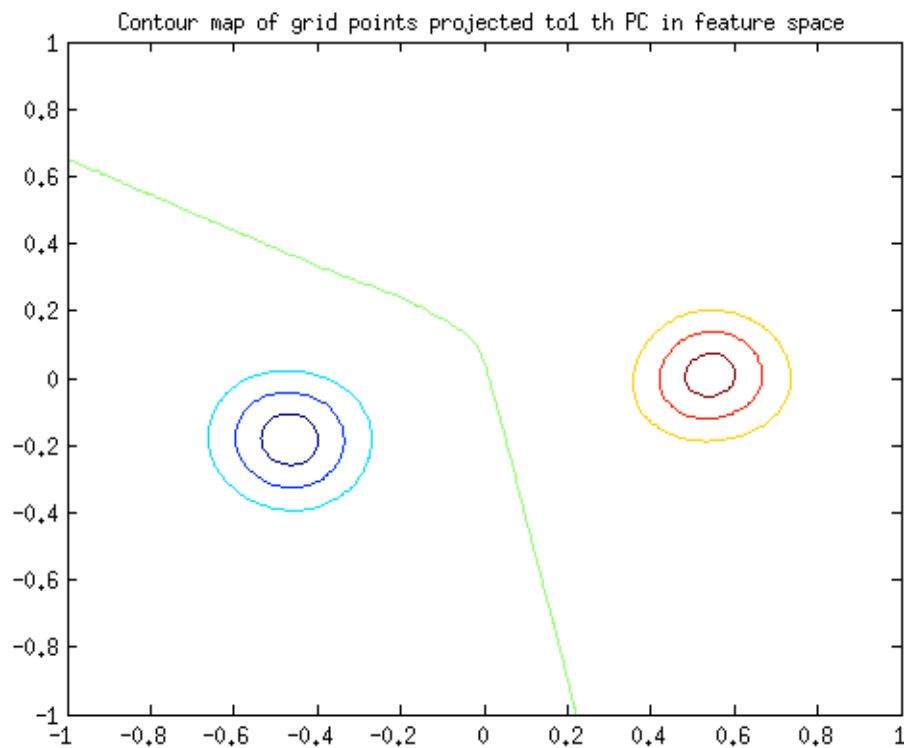
- The PCs of the buildings group show a quite regular structure (horizontal and vertical lines) as one would expect from human-made objects
- The PCs of the nature group are more complex and resemble more biological structures
- In order to represent the different images with the PCs, one should keep the PCs with the highest eigenvalues and thus variance
- In the nature and the buildings group the variance of the 21st PC is by a factor of 1000 smaller than the highest value. Thus one should keep the first 20 PCs.

3.3 Kernel PCA

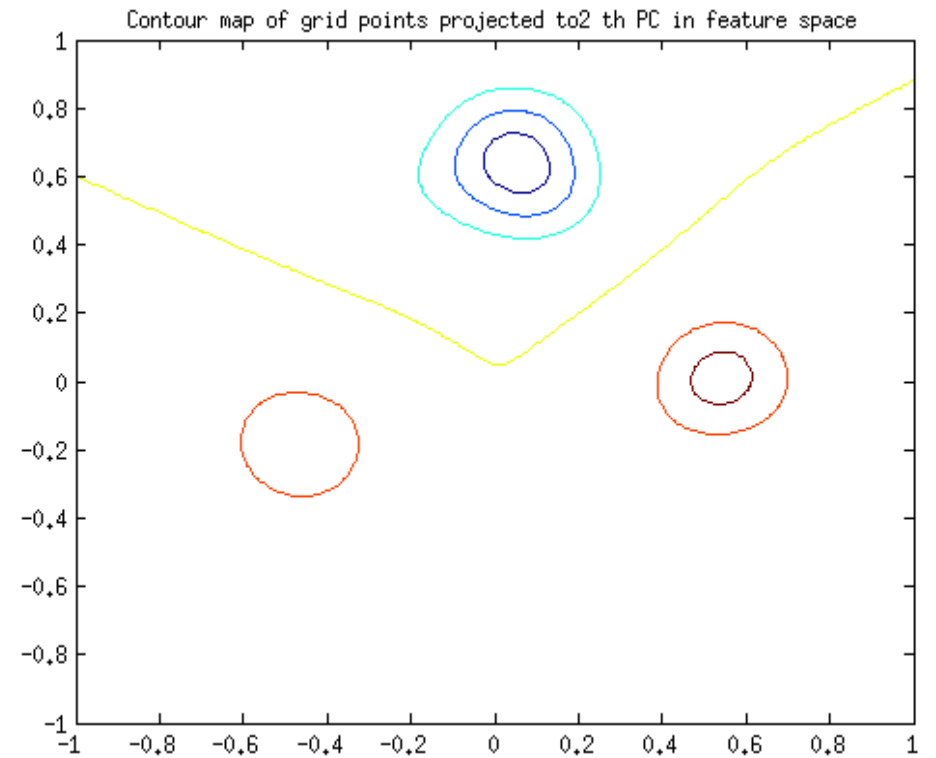


3.3 Kernel PCA

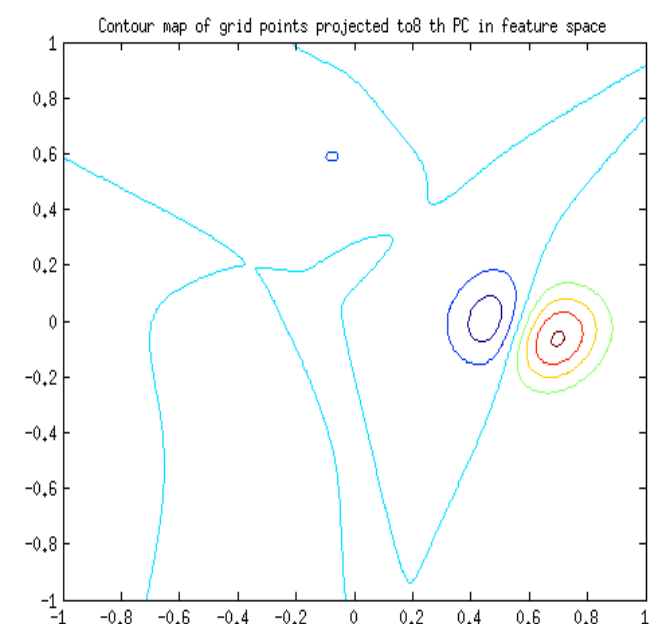
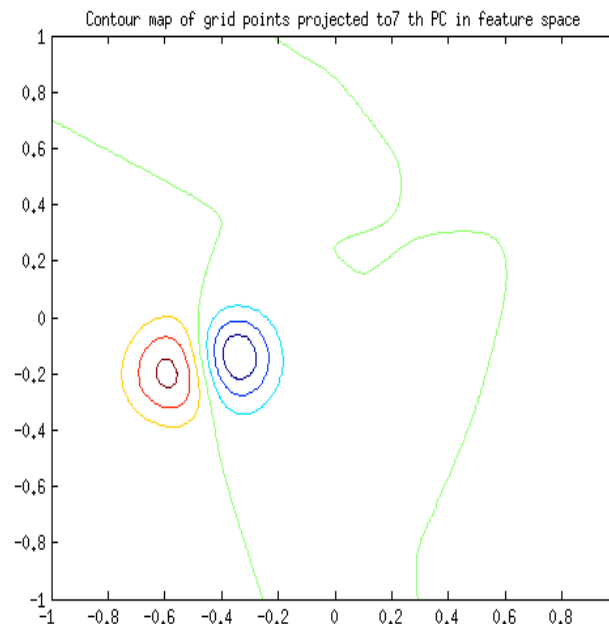
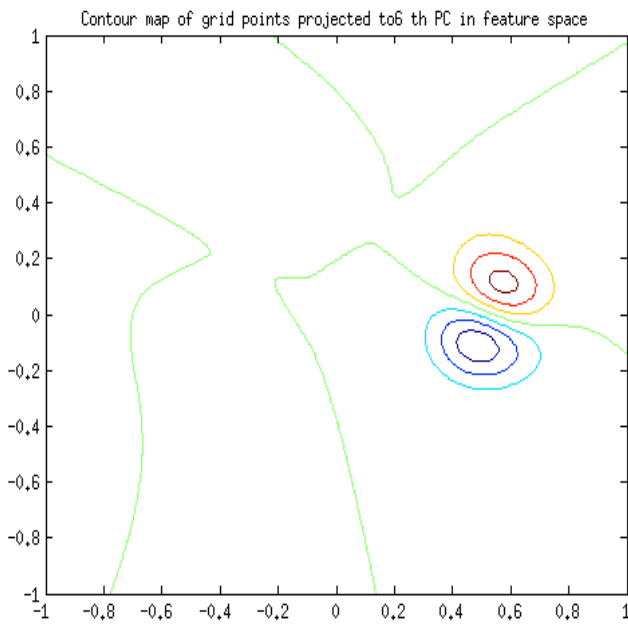
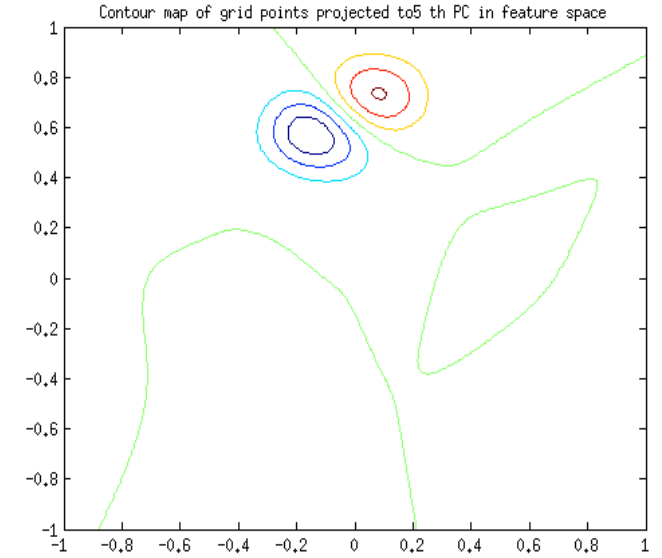
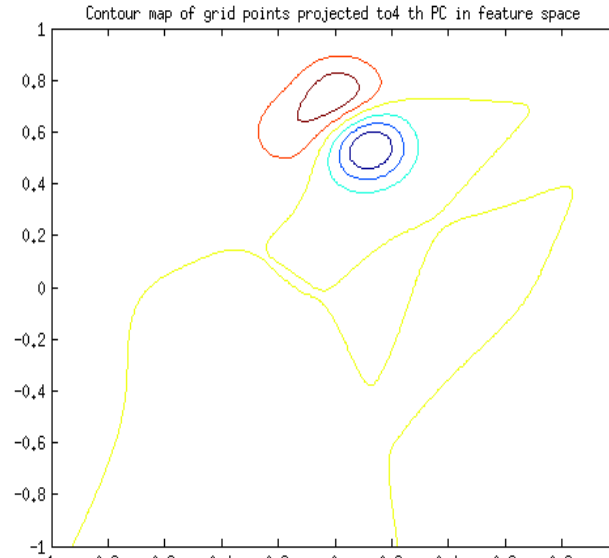
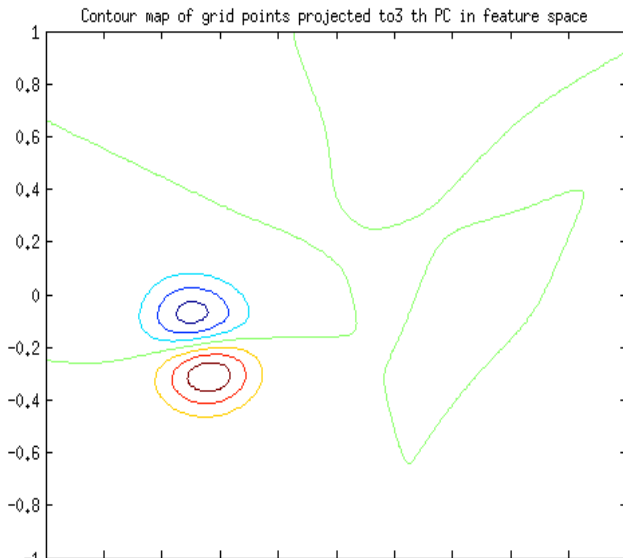
1st PC



2nd PC



3.3 Kernel PCA



3.3 Kernel PCA

- It is possible to categorize the 3 different heaps in the feature space by projecting onto the first 2 PCs → first 2 PCs in feature space capture the characteristics of the dataset sufficiently
- Moreover, by using further PCs one can separate the heaps into subheaps