

# Functional Data Analysis (Lecture 4) – PCA

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① manually: `cov`, `eig`.

② fastICA

`https://research.ics.aalto.fi/ica/fastica/`

③ built-in Matlab functions.

# Task-1: compress a picture with PCA

- 1 Download an image.
- 2 Divide it into patches ( $\{\mathbf{x}_i\}_{i=1}^N$ , `imread`, `rgb2gray`, `im2col`).
- 3 Approximate it using different  $d$ -s, monitor  $R^2$ .
- 4 Experiment with smaller/larger patch sizes.

## Task-2: compression using a different PCA dictionary

- 1 Learn PC-s on natural images:

`https://research.ics.aalto.fi/ica/imageica/`

- 2 Compress the image  $\in$  Task-1 with this PCA dictionary.