

Exercise Sheet 8

Theory and Practice

Remark:

- Submit a report containing your findings and source code until the given deadline. Submission tool: OLAT (eLearning platform)
- **Important note, valid for all exercise sheets:** An extension of the deadline can not be accepted since template solutions will be made available.

Exercise T-8.1: MAP parameter estimation

In this exercise, we consider an image region with constant but unknown gray value c . This constant c is assumed to be a normally distributed random variable with zero mean and variance σ_c^2 .

The region is observed by a sensor in the presence of Gaussian noise e , which has zero mean and variance σ_e^2 . These n *measured* pixel intensities, which constitute the training corpus, are given by

$$\{x_k \mid x_k = c + e_k, \ k = 1, \dots, n\}$$

Use MAP parameter estimation to determine the constant gray value \hat{c} of the noisy image region. Compare your result **theoretically and practically** (Octave experiments) with the Maximum-likelihood solution and discuss the differences. Which influence does the number of training samples have?

Hint: The mean of the a-posteriori distribution $p(x_k|c)$ is c since the random variable e has the mean 0.