



## Density Maximum Likelihood

### 1 Why

We provide a principle for density selection based on maximizing the probability of the dataset.

### 2 Definition

Let  $(x^1, \dots, x^n)$  be a dataset in  $\mathbf{R}^d$ .

The *principle of maximum likelihood* says to solve:

$$\begin{array}{ll} \mathbf{find} & f \text{ a density} \\ \mathbf{to maximize} & \prod_{k=1}^n f(x^k) \end{array}$$

We call a solution of the above problem a *maximum likelihood density*.

We call the objective of the above problem *density likelihood*.