

## Outline

- ✓ A. Intro
- ✓ B. Basic proximity problems
- ➡ C. Basic decision and summation problems
- D. Basic 'all'-type problems
- E. Basic counting problems
- F. Further topics

## Three basic types of statistical computation problems

1. Kernel decision  
"Which is bigger,  $K(\|x - x^{(1)}\|)$  or  $K(\|x - x^{(2)}\|)$ ?"
2. Kernel summation  
"Compute  $\sum_i K(\|x - x_i\|)$ ."
3. Kernel sum decision  
"Which is bigger,  $\sum_i K(\|x - x_i^{(1)}\|)$  or  $\sum_i K(\|x - x_i^{(2)}\|)$ ?"

## Some kernel decision problems

- Bayes classification

## Some kernel summation problems

- Nadaraya-Watson and locally-weighted regression
- Kernel density estimation
- EM for mixtures of Gaussians
- Gaussian process prediction
- Radial basis function networks

## Some kernel sum decision problems

- Nonparametric Bayes classification