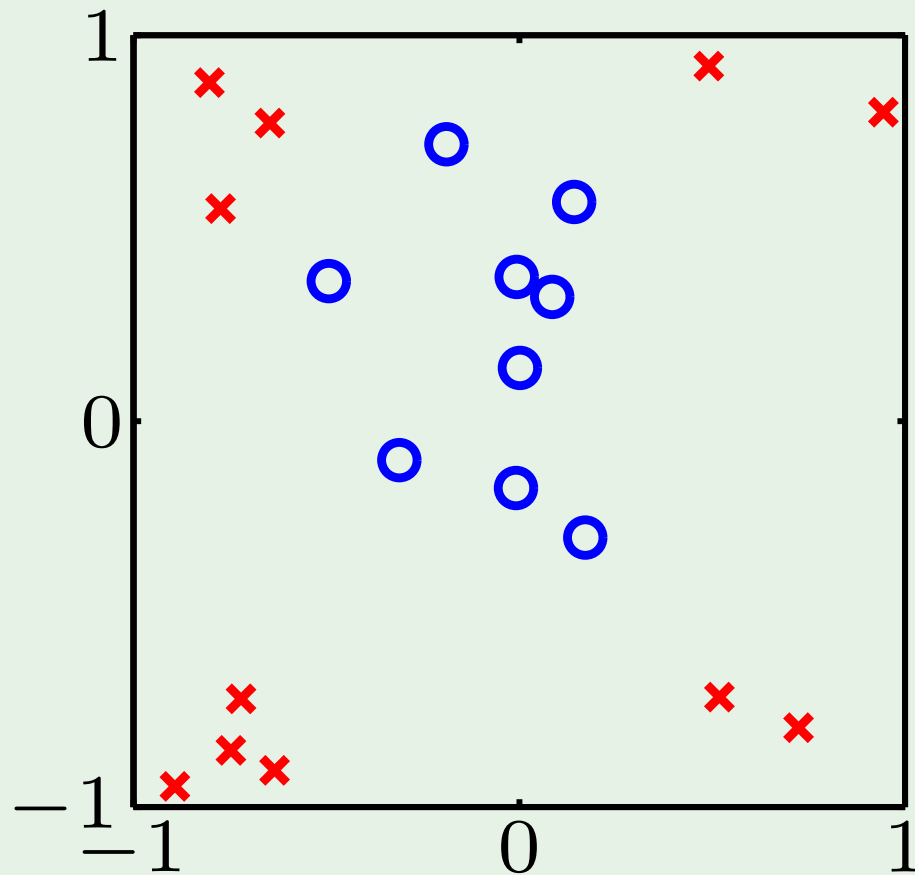# Outline
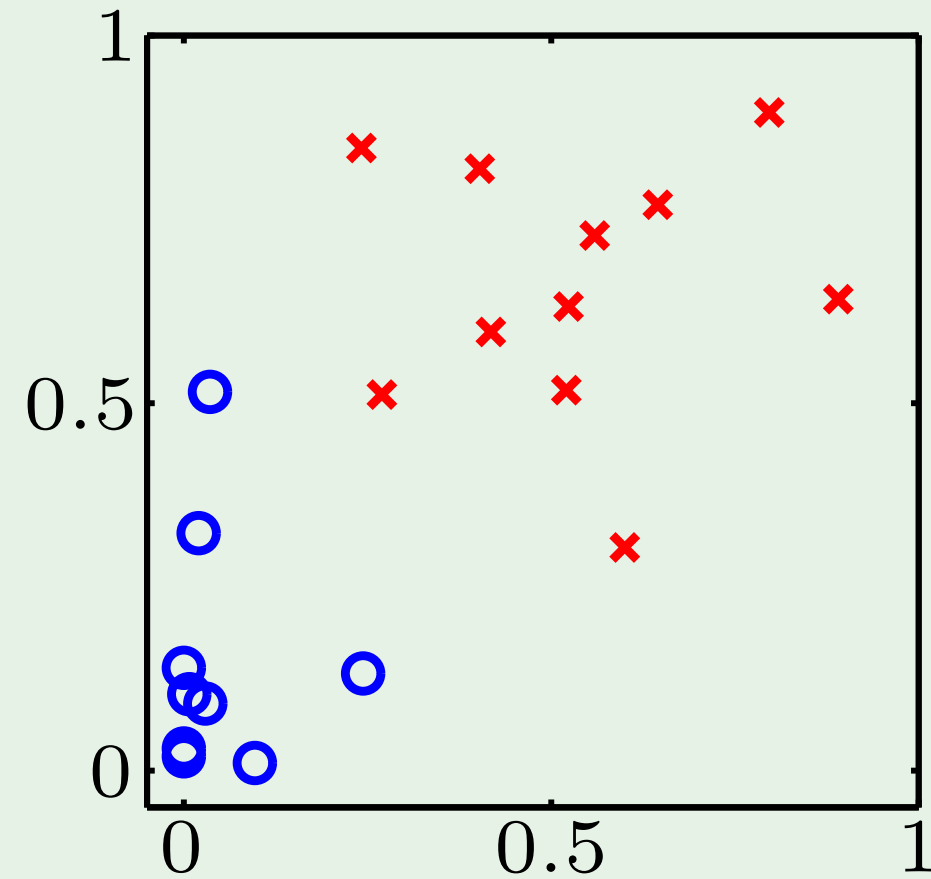
- Maximizing the margin

- The solution

- Nonlinear transforms

z instead of x

$$\mathcal{L}(\boldsymbol{\alpha}) = \sum_{n=1}^{N} \alpha_n - \frac{1}{2} \sum_{n=1}^{N} \sum_{m=1}^{N} y_n y_m \, \alpha_n \alpha_m \, \mathbf{z}_n^\mathsf{T} \mathbf{z}_m$$

$$\mathcal{X} \longrightarrow \mathcal{Z}$$

"Support vectors" in $\mathcal{X}$ space

Support vectors live in $\mathcal{Z}$ space

In $\mathcal{X}$ space, "pre-images" of support vectors

The margin is maintained in $\mathcal{Z}$ space

Generalization result

$$\mathbb{E}\big[E_{\text{out}}\big] \leq \frac{\mathbb{E}\big[\# \text{ of SV's}\big]}{N-1}$$