Outline

- RBF and nearest neighbors
- RBF and neural networks
- RBF and kernel methods
- RBF and regularization
RBF versus its SVM kernel

SVM kernel implements:

$$\text{sign} \left( \sum_{\alpha_n > 0} \alpha_n y_n \exp \left( -\gamma \| x - x_n \|^2 \right) + b \right)$$

Straight RBF implements:

$$\text{sign} \left( \sum_{k=1}^{K} w_k \exp \left( -\gamma \| x - \mu_k \|^2 \right) + b \right)$$
RBF and regularization

RBF can be derived based purely on regularization:

\[ \sum_{n=1}^{N} (h(x_n) - y_n)^2 + \lambda \sum_{k=0}^{\infty} a_k \int_{-\infty}^{\infty} \left( \frac{d^k h}{dx^k} \right)^2 dx \]

"smoothest interpolation"