

$$\hat{y}_{ts} = \sum_{i \in \text{SupportV}} \alpha_i y_i \frac{x_i^T x_{ts}}{\|x_i\| \|x_{ts}\|} + b \Rightarrow \sum_{i \in \mathcal{S}} \alpha_i y_i \underbrace{\phi(x_i)^T \phi(x_{ts})}_{O(\mathcal{P} \times SV)} + b \Rightarrow$$

$$k(x, z) = (1 + x^T z)^d = (1 + x_1 z_1 + x_2 z_2)^2 = O(\mathcal{P}) \quad \vec{x} = (x_1, x_2) \quad \vec{z} = (z_1, z_2) \quad \phi(x)^T \phi(z)$$

$$\phi(\vec{x}) = [1, \sqrt{2}x_1, \sqrt{2}x_2, x_1^2, x_2^2, \sqrt{2}x_1 x_2]^T$$

$$\phi(\vec{z}) = [1, \sqrt{2}z_1, \sqrt{2}z_2, z_1^2, z_2^2, \sqrt{2}z_1 z_2]^T \in \phi(\vec{x})^T \phi(\vec{z})$$

$$\hat{y} = \frac{W^T}{\mathcal{P}} x_{ts} + b \Rightarrow \underbrace{\frac{W^T}{m} \phi(x_{ts}) + b}_{(3)}$$

	$x_i^T x_j$	$\phi(x_i)^T \phi(x_j)$	$k(x_i, x_j)$	explicit
Training Stage	$O(\mathcal{P} \times n^2)$	$O(m \times n^2)$	$O(\mathcal{P} \times n^2)$	W
Test Stage	$O(\mathcal{P} \times SV)$	$O(m \times SV)$	$O(\mathcal{P} \times SV)$	$\frac{W^T \phi(x_{ts}) + b}{O(\mathcal{P}^d)}$ @ for some b RBF, $m \sim \infty$
		(1)	(2)	(3)

\rightarrow $\underset{\alpha_i}{\operatorname{argmax}} \sum \alpha_i - \frac{1}{2} \sum_{i=1}^n \sum_{j=1}^n \alpha_i \alpha_j y_i y_j$
 $\underset{\alpha_i}{\operatorname{argmin}} \frac{1}{2} \|W\|_2^2 + C \sum \xi_i$
 $y_{ts} = \sum_{SV} \alpha_i y_i + b$
 $\Rightarrow \{\alpha_1, \alpha_2, \dots, \alpha_n\}$
 Most $\alpha_i = 0$