Stable Learning

Foundations and Applations

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Contents

Background Knowledge

Hilbert Space & Kernel

Definition (Hilbert Space)

A Hilbert space is a real or complex **inner product space** that is also a **complete** metric space with respect to the distance function induced by the inner product.

Motivation: to generalize methods of linear algebra and calculus from the finite-dimensional Euclidean spaces to infinite-dimensional spaces.

Definition (Kernel)

Let χ be a non-empty set. A function $k : \chi \times \chi \to \mathbb{R}$ is called a kernel if there exists an $\mathbb{R}$-Hilbert space and a map $\phi : \chi \to \mathcal{H}$ such that $\forall x_1, x_2 \in chi$,

$$k(x_1, x_2) := \langle \phi(x_1), \phi(x_2) \rangle_{\mathcal{H}} \tag{1}$$

Motivation: to map features to an infinite-dimensional space.

RKHS(Reproducing Kernel Hilbert Spaces)

Conclusion

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Thank you!