



# **Fakultät für Ingenieurwissenschaften und Informatik**

## **Informatik-Fachvortrag**

**Donnerstag, den 29. Oktober 2009, 16 Uhr c.t.**  
Universität Ulm, Oberer Eselsberg  
Helmholtzstr. 18, Raum 220

**Herr Prof. Dr. Klaus-Robert Müller**  
Institute for Software Engineering and Theoretical Computer Science,  
Technische Universität Berlin

spricht zum Thema

### **The Denoising and Dimension Reduction in Feature Space**

The talk presents recent work that interestingly complements our understanding of the VC picture in kernel based learning.

Our finding is that the relevant information of a supervised learning problem is contained up to negligible error in a finite number of leading kernel PCA components if the kernel matches the underlying learning problem. Thus, kernels not only transform data sets such that good generalization can be achieved using only linear discriminant functions, but this transformation is also performed in a manner which makes economic use of feature space dimensions. In the best case, kernels provide efficient implicit representations of the data for supervised learning problems. Practically, we propose an algorithm which enables us to recover the subspace and dimensionality relevant for good classification. Our algorithm can therefore be applied (1) to analyze the interplay of data set and kernel in a geometric fashion, (2) to aid in model selection, and to (3) denoise in feature space in order to yield better classification results.

We complement our theoretical findings by reporting on applications of our method to data from gene finding and brain computer interfacing.

This is joint work with Claudia Sanelli, Mikio Braun and Joachim M. Buhmann.

Es laden ein die Dozenten der Fakultät für Ingenieurwissenschaften und Informatik.

Ulm, den 22.10.2009

gez. Prof. Dr. G. Palm