

Knowledge Discovery in Databases II
WS 2014/2015

Übungsblatt 8: Ensembles

Aufgabe 8-1 Bias, Variance, and Noise

Ensembles are influenced by bias, variance, and noise. But individual classifiers encounter these effects as well. Discuss their differences using the following examples:

- (a) Arrows shot from a longbow miss the target by a larger margin than arrows shot by a modern olympic recurve bow.
- (b) The shooter observes that he misses the mark horizontally when there is wind.
- (c) Shooting over a distance of 30 meters leads to smaller deviation than shooting over a distance of 50 meters.

Aufgabe 8-2 Bias, Variance und Noise II

Discuss which consequences on bias, variance, and noise the following changes to an experiment have:

- (a) Using a larger training set.
- (b) Using additional, helpful attributes (features)
- (c) Using fewer attributes (features)
- (d) Using polynomial kernels and derived features
- (e) Fewer regularisations
- (f) Stronger regularisations
- (g) More precise definition and validation of labels

Aufgabe 8-3 Combining similarity measures

Given two kernels k_1 and k_2 , combined into a common kernel k_{com} :

$$k_{com} = \alpha k_1 + (1 - \alpha)k_2, \quad (1)$$

with $\alpha \in [0; 1]$.

k_{com} is applied to two classification tasks, using two separate values of α for each experiment. The figure below shows the classification accuracy on the first dataset ($R1$) and the second dataset ($R2$):

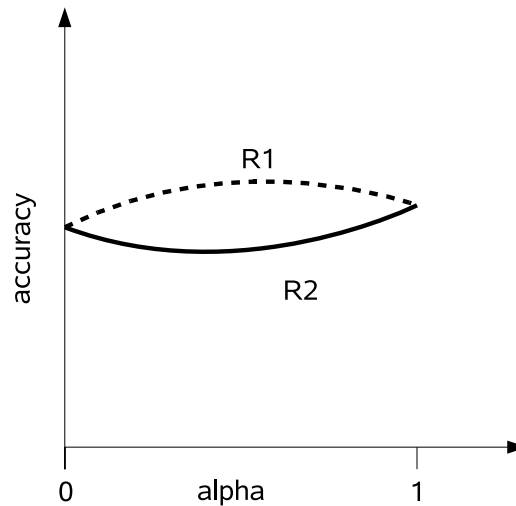


Abbildung 1: Classification accuracy vs. α

Answer the following questions using Figure 1:

- For which dataset is using a combined kernel beneficial?
- When do k_1 and k_2 work better individually than combined?

Aufgabe 8-4 Error Correcting Output Codes

- Describe the classification strategy *one-versus-rest* for a 4-class-problem using the notation used to specify ECOCs.
- Describe an ECOC strategy for a minimum number of base-classifiers. Specify a complete ECOC strategy which specifies codes for each non-trivial partitioning of the classes in a two-element set of classes.

What influences row separation?