

# Machine Learning 2

## Exercise Sheet 3

Prof. Dr. Dr. Lars Schmidt-Thieme, Nicolas Schilling  
Information Systems and Machine Learning Lab  
University of Hildesheim

April 26th, 2016

Submission until May 3rd, 18.00 to schilling@ismll.de

### Exercise 5: Simple SVM (5 Points)

Given are the following labeled points:

$$X = \begin{pmatrix} 4 & 1 \\ 3 & 2.5 \\ 2 & 2.5 \\ 1.5 & 2.5 \\ 2 & 4.5 \\ 0.5 & 1 \end{pmatrix} \quad y = \begin{pmatrix} 1 \\ 1 \\ 1 \\ -1 \\ -1 \\ -1 \end{pmatrix}$$

and two hyperplanes:

$$\beta_0 = 1.5 \quad \beta_1 = 1.2 \quad \beta_2 = -1 \quad \hat{\beta}_0 = 0 \quad \hat{\beta}_1 = 1 \quad \hat{\beta}_2 = -1$$

All points  $(x_1, x_2)$  where:

$$\beta_0 + \beta_1 x_1 + \beta_2 x_2 = 0$$

form the hyperplane. Plot the points and the two hyperplanes. Which one is better and why?

### Exercise 6: SVM with R (5 Points)

Install the libsvm package within R which is called 'e1071'. Call the famous iris data using the variable 'iris' within R. Shuffle the dataset, take 30% as test data and the remaining instances for train. Learn a linear SVM and one with RBF kernel. Which one performs better?