



MASTER OF BIOINFORMATICS

Support Vector Machines

Assignment 1: Classification

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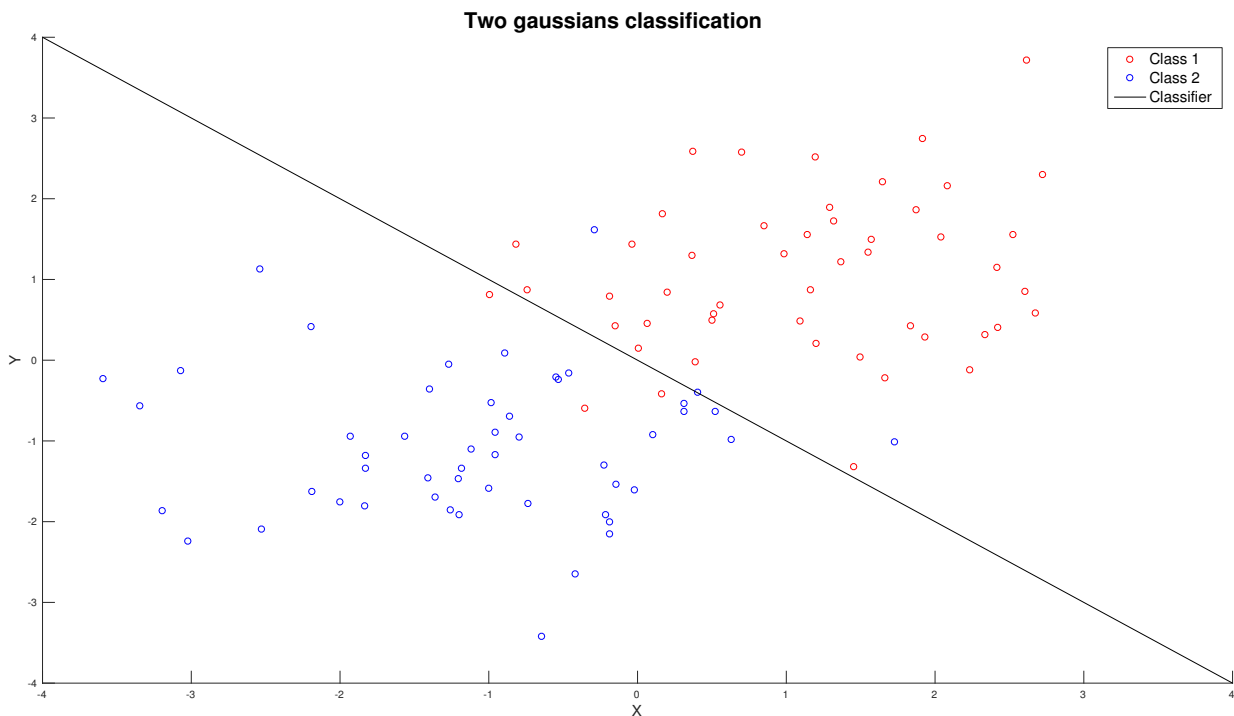
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Context

The analysis presented in this report was produced for the class of “Support Vector Machines: methods and applications” (Spring 2016) at KU Leuven. The goal is to display understanding of the techniques and of their practical use. This first report focuses on classification using SVM, and Least-Squares SVM (LS-SVM). The implementation was done using the MatLab software (v2015a) and the libraries for LS-SVM developed at KU Leuven.

1 Two Gaussians

In this first application, an artificial dataset was generated consisting of 100 points in \mathbb{R}^2 . Two centroids were defined to generate the points, one at $(1, 1)$ and the other at $(-1, -1)$. For both centers, 50 datapoints were generated by adding a gaussian noise $N(0, 1)$. Since we know the true underlying distribution for both classes, we can define an optimal classifier as per the Bayesian Decision Theory. This classifier, regardless of the overlap between the distributions of the 2 classes, will consist of a line in \mathbb{R}^2 , and otherwise a hyperplane in higher dimensions.



2 Support Vector Machine

The exercises in this section consisted of exploring the properties of Support Vector Machines via a web application ¹

¹<http://cs.stanford.edu/people/karpathy/svmjs/demo/>

2.1 Linear kernel (q1,q2,q3)

2.2 RBF kernel (q4,q5)

2.3 Other (q6,q7,q8)

3 Least-Squares Support Vector Machine

4 Applications

References