Machine Learning

Support Vector Machines, SoSe 2020

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The feature vectors we used consist of the three different RBG extrema for each image as well as the three RBG averages for each of the three colors. The training and test data was split in half randomly. 15 images of either negative or positive images where used to train the model, another 15 images where then classified with Libsvm.

We got the following specs for the different kernels:

Linear Kernel
Optimization finished after 12 iterations
Accuracy of 97.28%
Number of Support Vectors: 2
Features C = 0.03125, γ = 8.0

Polynomial Kernel, degree = 1: see Linear Kernel

Polynomial Kernel, degree = 2
Optimization finished after 8 iterations
Accuracy of 95.45%
Number of Support Vectors: 3
Features C = 0.03125, γ = 8.0

Polynomial Kernel, degree = 3
Optimization finished after 9 iterations
Accuracy of 95.45%
Number of Support Vectors: 3
Features C = 0.03125, γ = 8.0

Polynomial Kernel, degree = 4
Optimization finished after 7 iterations
Accuracy of 95.45%
Number of Support Vectors: 3
Features C = 0.03125, γ = 8.0

RBF Kernel
Optimization finished after 21 iterations
Accuracy of 97.72%
Number of Support Vectors: 13
Features C = 0.5, γ = 0.00048828125

Sigmoid Kernel
Optimization finished after 7 iterations
Accuracy of 47.73%
Number of Support Vectors: 14
Features C = 0.03125, γ = 0.0001220703125

The best accurancy with the least iterations could be attained by using the linear kernel. While the RBF kernel delivered the same accuracy, it needed almost double of the iterations that the linear kernel needed and more than 6 times the amount of support vectors.
Except the polynomial kernel with degree 1, all other polynomial kernels up to degree 4 deliver the same accuracy of 95.45%. Degree 4 proves to be the most efficient however, with only 7 iterations and 3 support vectors.
The worst accuracy was attained by using the Sigmoid kernel wth 14 support vectors over 7 iterations but n accuracy of only 47.73%.