

Report For SVM with CVXOPT

We try to formulate our optimization problem of maximizing margin to dual problem. And with help convex optimization we find out the variables of dual. Using these variables we find out w and b , where w is normal to separating hyperplane and b is intercept.

In case of overlapping data we try to find the best value for hyperparameter C , which is the weight associated with summation of slack variables.

Lower the value of C ----> more the misclassification allowed

Higher the value of C -----> fewer misclassifications allowed

We also use kernel for projecting given data into high dimensional spaces .

While plotting we have $w \cdot x + b = 0$ is the equation of separating hyperplane

$w \cdot x + b = 1$ will be of positive class support vectors hyperplane

$w \cdot x + b = -1$ will be of negative class support vectors hyperplane

KERNEL:

can utilize a Kernel to help us translate our data to a plausibly infinite number of dimensions in order to find one that has linear separability

So when you specify a kernel as quadratic what actually happens is your data gets projected into higher dimensions, $(1 + \langle x, x' \rangle^2)$ this is your kernel it will give you output as $[1, x, x', x^2, x'^2, xx']$ like this.

Libraries Used:

1. CVXOPT for convex optimization of dual problem
2. Matplotlib, pylab for plotting
3. Numpy for numeric calculations