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1 % HW3 Q2, ESL 18.9
2 % Dong-Bang Tsai
3 clear;
4 N = 100;
5 p = 200;
6 X = randn(N, p);
7 Y = randn(N,1);
8 for i=1:N
9     if Y(i) > 0
10         Y(i) = 1;
11     else
12         Y(i) = -1;
13     end
14 end
15 [U,S,V] = svd(X, 'econ');
16 beta_p = (V/S)*U'*Y;
17 % The following is the projection distance obtained by ESL18.8 (c)
18 D_p = X*beta_p/sqrt(sum(beta_p.^2));
19
20 SVMStruct = svmtrain(X,Y);
21 Group = svmclassify(SVMStruct,X);
22 beta_s = SVMStruct.SupportVectors'*SVMStruct.Alpha;
23 % The following is the projection distance obtained by SVM
24 D_s = -X*beta_s/sqrt(sum(beta_s.^2));
25
26 x_indx = [1:N];
27 plot(x_indx, D_p, 'bo', x_indx, D_s, 'ro');
28 xlabel('index of Data'); ylabel('Projections');
29 legend('ESL18.8 (c)', 'SVM')
```