

Problems 5g-5h

For problems 5g-5h, does it want a SVC/SVM fit to the model obtained from problem 5c, 5e, or some other model?

5. We have seen that we can fit an SVM with a non-linear kernel in order to perform classification using a non-linear decision boundary. We will now see that we can also obtain a non-linear decision boundary by performing logistic regression using non-linear transformations of the features.

370 9. Support Vector Machines

- (a) Generate a data set with $n = 500$ and $p = 2$, such that the observations belong to two classes with a quadratic decision boundary between them. For instance, you can do this as follows:

```
> x1=runif(500)-0.5
> x2=runif(500)-0.5
> y=1*(x1^2-x2^2 > 0)
```

- (b) Plot the observations, colored according to their class labels. Your plot should display X_1 on the x -axis, and X_2 on the y -axis.
- (c) Fit a logistic regression model to the data, using X_1 and X_2 as predictors.
- (d) Apply this model to the *training data* in order to obtain a predicted class label for each training observation. Plot the observations, colored according to the *predicted* class labels. The decision boundary should be linear.
- (e) Now fit a logistic regression model to the data using non-linear functions of X_1 and X_2 as predictors (e.g. X_1^2 , $X_1 \times X_2$, $\log(X_2)$, and so forth).
- (f) Apply this model to the *training data* in order to obtain a predicted class label for each training observation. Plot the observations, colored according to the *predicted* class labels. The decision boundary should be obviously non-linear. If it is not, then repeat (a)-(e) until you come up with an example in which the predicted class labels are obviously non-linear.
- (g) Fit a support vector classifier to the data with X_1 and X_2 as predictors. Obtain a class prediction for each training observation. Plot the observations, colored according to the *predicted class labels*.

- (h) Fit a SVM using a non-linear kernel to the data. Obtain a class prediction for each training observation. Plot the observations, colored according to the *predicted class labels*.

- (i) Comment on your results.

hw7

Edit

good question | 0

Updated 4 years ago by Charles Hwang

S

the students' answer, *where students collectively construct a single answer*

Actions ▾

Thanks!

Edit

thanks! | 0

Updated 4 years ago by Charles Hwang

followup discussions *for lingering questions and comments*



Resolved



Unresolved

@51_f1



Gregory J. Matthews 4 years ago

Fit it using the data created in part a.

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