CSE353 Assignment 5 (Multi-class Classification)

Due Nov 23 2021 5:00PM

Main TA for this assignment:
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One data set is provided in 'X.txt' and 'Y.txt', where matrix X (3*80) contains N=80 training samples of dimension D=3 (the first dimension is a constant 1 for the bias term in the weight score) and Y (1*80) is a row vector containing ground truth multi-class labels {1,2,3,4}.

1. Use the One-Versus-All (OVA) strategy to implement the multi-class classification.

You can leverage your previous codes on PLA, linear regression or logistic regression. Logistic regression will be the better choice, as we explained in the class. Since the dataset is small, you don't need to use stochastic gradient descent in the logistic regression.

Plot the data and decision boundaries of the four one-versus-all binary classification, and highlight those samples that are misclassified.

Report the error rate of your OVA-based multiclass classification on this training dataset.

2. Use the One-Versus-One (OVO) strategy to implement the multi-class classification.

The tournament champion is better to be calculated by the "soft voting" from the related pairwise logistic regression. Refer to the example in the class.

Plot the data and highlight those samples that are misclassified.

Report the error rates of your OVO-based multiclass classification on this training dataset.

Upload your codes with enough comments and a brief report to Blackboard by the due date & time, including

a) Introduction. Brief summary of what you think the assignment is about,

b) Method. Brief outline of your (algorithmic) approach,

c) Experiments. Tables and/or pictures of intermediate and final results that convince us that the program does what you think it does.

d) Discussions and Conclusions. Any design decisions you had to make and your experimental observations. What do you observe about the behavior of your program when you run it? Does it seem to work the way you think it should? Play around a little with different setting to see what happens. Note, your open-ended exploration is highly valued.