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Solutions by Yingbo Zhou

Name:

ID#:

Section: 455   or   555

2	8	10

Directions – *The quiz is closed book/notes. You have 10 minutes to complete it; use this paper only.*

Problem 1: Recall (2pts) (Answer in one sentence only.)

What is boosting?

Solution:
Boosting refers to effective methods of producing accurate classifier by combining the outcome from moderately accurate classifiers.

Problem 2: Work (8 pts) (Show all derivations/work and explain.)
In AdaBoost we combine M 'weak leaners' to get an accurate classifier. During training, we need to select the data distribution wisely so that the classifier at each round is focusing on different sub-problems. According to AdaBoost, how should we choose the data distribution at each round?

Solution:
The data weight distribution is uniform initially. In the following iterations, for data that are misclassified, the weight will be increased; and for the part of data that are correctly classified, the weight will be decreased.

How to combine the M classifier output to get the final prediction?

Solution:
The decision is a weighted combination of the classifier output, where the weight for each classifier is determined based on the weighted error . We decide the class based on the sign of the combined output.

Now consider that we have a multi-class problem with lots of classes (≥ 100 classes), is it a good idea to directly apply AdaBoost on multi-class learners?

Solution:
Directly apply AdaBoost on multi-class problem may not be a good idea, since it assumes each learner have error less than 0.5. It is very hard to get classifier that can achieve error less than 0.5 when there are a lot of classes.