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HW3 Report

Question1: What are the training errors and the test errors of perceptron, voted perceptron and averaged perceptron after two, three and four passes?

------basic perceptron-------

round 1

training error is: 0.0412844036697

testing error is: 0.053050397878

round 2

training error is: 0.0403669724771

testing error is: 0.0610079575597

round 3

training error is: 0.0211009174312

testing error is: 0.0450928381963

round 4

training error is: 0.0192660550459

testing error is: 0.0477453580902

------Voted perceptron-------

round 1

training error is: 0.0669724770642

testing error is: 0.0875331564987

round 2

training error is: 0.0403669724771

testing error is: 0.0610079575597

round 3

training error is: 0.0293577981651

testing error is: 0.0450928381963

round 4

training error is: 0.0247706422018

testing error is: 0.0450928381963

------average perceptron-------

round 1

training error is: 0.0798165137615

testing error is: 0.116710875332

round 2

training error is: 0.054128440367

testing error is: 0.0822281167109

round 3

training error is: 0.0376146788991

testing error is: 0.0610079575597

round 4

training error is: 0.0339449541284

testing error is: 0.0503978779841

Question 2: Find the **three coordinates** in wavg with the highest and lowest values. What are the **words** (frompa3dictionary.txt) that correspond to these coordinates?

------average perceptron running 3 rounds-------

lowest 3: [-225566.0, -122322.0, -114186.0]

**lowest 3 corrodinates: [ 78 469 393]**  index starting from 0!

highest 3: [386081.0, 235238.0, 142301.0]

**highest 3 corrodinates: [438 466 203]** index starting from 0!

words correspond to highest 3 coordinates are:

**file**

**program**

**line**

words correspond to lowest 3 coordinates are:

**he**

**team**

**game**

Question 3: Write down the confusion matrix for the one-vs-all classifier on the training data in pa3train.txt based on the test data in pa3test.txt.

the confusion matrix is:

[[ 0.71891892 0.00520833 0.03428571 0.02173913 0. 0. ]

[ 0.01081081 0.65625 0.03428571 0.02717391 0.01282051 0.01851852]

[ 0. 0.015625 0.37142857 0. 0. 0.02777778]

[ 0.01621622 0.00520833 0. 0.69021739 0. 0. ]

[ 0.01621622 0.03125 0.07428571 0.00543478 0.80128205 0.12037037]

[ 0.00540541 0.01041667 0.03428571 0. 0.07051282 0.49074074]

[ 0.23243243 0.27604167 0.45142857 0.25543478 0.11538462 0.34259259]]

Looking at the confusion matrix, what are the i and j in the following statements?

(a) The perceptron classifier has the **highest accuracy** for examples that belong to class i.

**The highest accuracy for examples that belong to class 5,**

**which is 0.80128205**

(b) The perceptron classifier has the **least accuracy** for examples that belong to class i.

**The highest accuracy for examples that belong to class 3,**

**which is 0.37142857**

(c) The perceptron classifier most often mistakenly classifies an example in class j as belonging to class i, for i; j 2 f1; 2; 3; 4; 5; 6g (i.e., excluding Don’t Know).

**The classifier most often mistakenly classifies an example**

**in class 6 as belonging to class5, with accuracy 0.12037037**