CS 534 : Machine Learning
Homework 3
Liang Huang

Eric Klinkhammer

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1 Structured Perceptron

1.1 Normal Structured Perceptron

After training for five epochs, the best dev error percentage (with a learning rate of 0.1) was 4.97% on the fourth epoch. The best overall dev error rate was 4.68% after 13 epochs.

1.2 Averaged Structured Perceptron

After training for five epochs, the best dev error percentage (with a learning rate of 0.5) was 5.26% on the fifth epoch (ie, it did not improve). The best overall dev error rate was 4.39% after 15 epochs.

1.3 Time Comparison between Unaveraged and Averaged Perceptron

The averaged perceptron was substantially slower to test, but not substantially slower to run. When testing, a copy of all the weights had to be generated with the averaged weights (scaled by the current value of c) incorporated appropriately. When just running (and not outputting any intermediate scores), the run time was nearly identical.

1.4 Plot of error rates

The averaged perceptron performs better than the unaveraged perceptron on the dev set.

2 Feature Engineering

I used a tag trigram (t0_t-1_t-2) and was able (with an averaged perceptron) to get an error rate of 4.97% on the dev set.

Please find the labeled dev and test data attached.

3 Debrief

This section is duplicated in included file debrief.txt and in latex document.

Type of Time	Unaveraged	Averaged
Real	4.147	0.947
User	4.1	0.911
Sys	0.029	0.022

Table 1: Comparison of unix command 'time' when run with averaged and unaveraged perceptron.

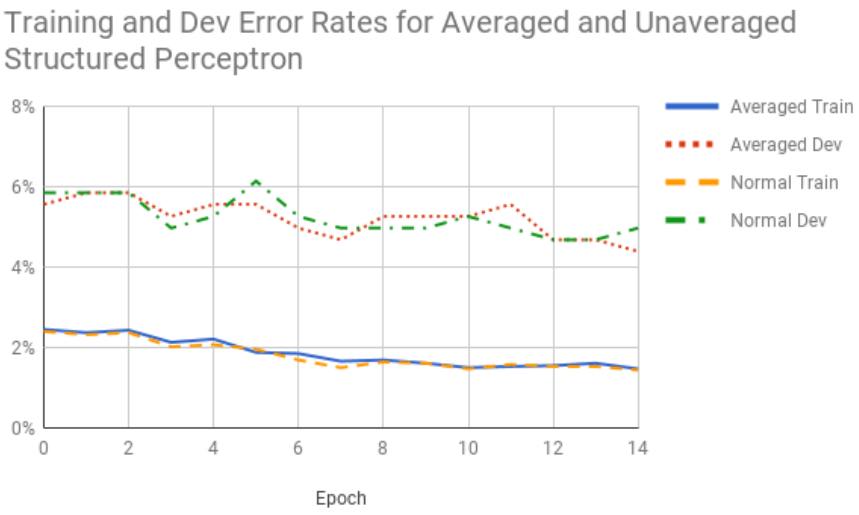

Figure 1:

3.1 Hours Spent on Assignment

Including the writeup and catching up on the material, this assignment took about 4 hours.

3.2 Difficulty

I would rate this assignment as easy. With regards to the extent of provided code, I think it is appropriate when the provided code removes boiler plate or non-ML tasks. The Viterbi solution, however, seems a crucial part of POS tagging. With that code provided, this assignment was basically just another rehash of perceptron.

3.3 Lecture Speed

When teaching, just right. However, the bulk of lectures seems to be review of some kind.

3.4 Other Comments

No comment.