

# LING 572 Hw5 (MaxEnt decoder)

Due: 11pm on Feb 8, 2022

The example files are under `/dropbox/21-22/572/hw5/examples/`.

**Q1 (5 points):** Run the Mallet MaxEnt learner (i.e., the trainer’s name is MaxEnt) with **train2.vectors.txt** as the training data and **test2.vectors.txt** as the test data.

- You can use *vectors2classify* or “*mallet train-classifier*” plus “*mallet classify-svmLight*”.
- Save the model to a file called *q1/m1*.
- Convert the model into the text format with the following command: `classifier2info --classifier q1/m1 > q1/m1.txt`
- In your note file, write down the command you used, the training accuracy and the test accuracy.

**Q2 (25 points):** Write a MaxEnt classifier, called **maxent\_classify.sh**, that classifies test data given a MaxEnt model learned from training data.

- The format is: `maxent_classify.sh test_data model_file sys_output > acc_file`
- `test_data`, `sys_output`, and `acc_file` have the same format as in Hw2-Hw4, except that `sys_output` and `acc_file` contain only the results for the TEST data, not the training data (since the training data is not available to the classifier).
- `model_file` has the same format as `q1/m1.txt` created in Q1.
- Run “`maxent_classify.sh test2.vectors.txt q1/m1.txt q2/res > q2/acc`”. What is the test accuracy? Is it the same as the test accuracy in Q1?

**Q3 (15 points):** Write a script, `calc_emp_exp.sh`, to calculate empirical expectation.

- The format is: `calc_emp_exp.sh training_data output_file`
- `training_data` has the same format as before.
- `output_file` has the format “`class.label feat_name expectation raw_count`” (c.f. `emp_count.ex`): *raw\_count* is the number of training instances with that *class\_label* and contains that *feat\_name*; *expectation* is the empirical expectation.
- Run “`calc_emp_exp.sh train2.vectors.txt q3/emp_count`” and include `q3/emp_count` in your submission.

**Q4 (30 points):** Write a script, `calc_model_exp.sh`, to calculate model expectation.

- The format is: `calc_model_exp.sh training_data output_file {model_file}`
- `training_data` has the same format as before.
- `output_file` has the format “class\_label feat\_name expectation count” (e.g., **emp\_count\_ex**): *expectation* is the model expectation; *count* is *expectation* multiplied by the number of training instances. Note that the *count* is often a real number, not an integer, so outputting it as a real number.
- `model_file` is optional. If it is given, it has the same format as in Q2 (e.g., `q1/m1.txt`) and it is used to calculate  $p(y|x_i)$ . If it is not given,  $p(y|x_i) = 1/|C|$ , where  $|C|$  is the number of class labels.
- Run “`calc_model_exp.sh train2.vectors.txt q4/model_count q1/m1.txt`” and include `q4/model_count` in your submission.
- Run “`calc_model_exp.sh train2.vectors.txt q4/model_count2`” and include `q4/model_count2` in your submission.

**Submission:** Submit the following to Canvas:

- Your note file *readme.(txt | pdf)* that includes your answers to Q1 and Q2 and any notes that you want the TA to read.
- `hw.tar.gz` that includes all the files specified in `dropbox/21-22/572/hw5/submit-file-list`, plus any source code (and binary code) used by the shell scripts.
- Make sure that you run **check\_hw5.sh** before submitting your `hw.tar.gz`.