Homework 6

J&M chapter 4 - 4.8

Due Wed, Dec. 13, 17:00

Submission Instructions

Submit exercise files to Moodle as usual. Show your work for full credit. Please write legibly.

Exercise 1 (6 pts)

Consider the documents and their corresponding classes:

Class	Document
sport	player hurt in game
sport	player wins match
sport	team wins game in over time
weather	heat wave over city
weather	record snow in city

(a) Train a Naive Bayes classifier using the tables provided. Apply Add-1 smoothing, but do not make any optimizations for sentiment analysis.

counts	city	game	heat	hurt	in	match	over	player	record	snow	team	time	wave	wins
sport														
weather														

probs	city	game	heat	hurt	in	match	over	player	record	snow	team	time	wave	wins
sport														
weather														

(b) Which class does the model predict for the document: **game cancelled due to record heat** ?

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Exercise 2 (6 pts)

Suppose you trained a POS tagger, then evaluated it on a test dataset with the following results for the POS tags *adj*, *noun*, *verb*:

- Your model correctly predicts 150 adjectives as *adj*, 400 nouns as *noun*, and 200 verbs as *verb*
- Your model incorrectly predicts 10 adjectives as *noun*, and 40 adjectives as *verb*
- Your model incorrectly predicts 30 nouns as *adj*, and 70 nouns as *verb*
- Your model incorrectly predicts 40 verbs as *adj*, and 60 verbs as *noun*

(a) Fill in the following confusion matrix and calculate the precision and recall for each class:

		Gold			
		adj	*noun*	*verb*	
Predicted	*adj*				$P_a =$
	noun				$P_n =$
	verb				$P_v =$
		$R_a =$	$R_n =$	$R_v =$	

(b) Calculate the macroaveraged F_1 score for your model.

(c) Calculate the microaveraged F_1 score for your model. Hint: Pool the results into one confusion matrix, then treat it like a 2-class classification task.

Exercise 3 (4 pts)

Suppose you have an unbalanced set of movie reviews with 800 positive reviews and 600 negative reviews. You use 80% of the data for training and 20% for evaluation (testing).

(a) How many positive reviews and negative reviews should be in the training and evaluation data?

training positive:

training negative:

evaluation positive:

evaluation negative:

(b) Now suppose you do 10-fold cross-validation. How many positive and negative reviews should be in the training and dev parts of each fold?

training positive:

training negative:

dev positive:

dev negative: