Fall 2022 Quiz 1

Due No due date **Points** 55 **Questions** 8
Available Sep 23 at 12pm - Dec 12 at 11:59pm **Time Limit** 75 Minutes

Instructions

This quiz is open book/open notes. The quiz will be open for 75 min from the time you open it (it should not take that long). Don't collaborate with anyone during the quiz. Don't discuss the quiz with anyone after you complete it until after the quiz is closed. You'll probably want to have a calculator handy.

Attempt History

	Attempt	Time	Score
LATEST	Attempt 1	27 minutes	30 out of 55

Score for this quiz: **30** out of 55
Submitted Sep 24 at 3:52pm
This attempt took 27 minutes.

Question 1 — 5 / 5 pts

What is your favorite color?

Your Answer:

White

Question 2 — 5 / 5 pts

Morphemes are the fundamental unit in language's morphology.
True/False: Morphemes convey meaning.

Correct!

- (•) True
- ( ) False

Question 3

0 / 5 pts

After the completion of the learning phase, a trained byte pair encoding (BPE) system is used to tokenize words in test data.

True/False: Frequency statistics about adjacent elements in the test data are used during the tokenization phase.

ou Answered

- (•) True

orrect Answer

- ( ) False

<s> some are red </s>

<s> and some are blue </s>

<s> some are old </s>

<s> and some are new </s>

Question 4

5 / 5 pts

What is the probability seeing the word "some" given the start of sentence token <s>, given this corpus (e.g., $P(some| < s >)$? Assume a bigram model with no smoothing. Give a numerical answer not a fraction.

Correct!

0.5

orrect Answers

0 (with margin: 0)
0.5 (with margin: 0)

Question 5

10 / 10 pts

Assuming a trigram model with Add-1 (Laplace) smoothing, compute the probability of </s> given "are new", or P(</s> | are new). When applying Add-1 be sure to include <s> and </s> as elements in the vocabulary.

ou Answered

0.2

orrect Answers

0.1 (with margin: 0)
0 (with margin: 0)

Question 6

0 / 5 pts

Consider a training example {*x*, 0} (x is in the input vector, 0 is the correct answer) in the context of **binary logistic regression**. Assume a classifier has assigned the value 0.7 to this example input during training. What is the **cross-entropy loss** for this single example?

orrect Answer

- -log 0.3
- 0.3

ou Answered

- -log 0.7
- 0.7

Question 7

0 / 10 pts

Assume you have a 3-way authorship classification problem that you are addressing with logistic regression. Let's call the classes A, B, and C. During training you encounter a training document from class **A** with the feature vector [-3, 1, 4, 1]. With a given set of weights, the model returns the softmax vector [0.2, 0.1, 0.7] over the classes A, B, and C respectively.

Give the gradient (vector of partial derivatives of the loss) for the weights associated with the **C** class that would be generated during training for this example using cross-entropy loss. Express your answer as a vector of values as in [0.9 , -0.3 , -1.2 , -0.3]

Answer 1:

ou Answered

0.9

orrect Answer 2.1

Answer 2:

ou Answered -0.3

orrect Answer -0.7

Answer 3:

ou Answered -1.2

orrect Answer -2.8

Answer 4:

ou Answered -0.3

orrect Answer -0.7

A Matrix

From/To	Q1	Q2
Q1	0.6	0.4
Q2	0.5	0.5

B Matrix

	a	b	c
Q1	0.2	0.4	0.4
Q2	0.5	0.4	0.1

Pi

Q1	0.8
Q2	0.2

Question 8

5 / 10 pts

Given this HMM, complete the Viterbi table for the observation sequence "a a". That is fill each of the 4 cells with their Viterbi probabilities.

	a	a
Q1	0.16	0.025
Q2	0.1	0.025

Answer 1:

Correct!

0.16

orrect Answer

.16

Answer 2:

ou Answered

0.025

orrect Answer

.0192

orrect Answer

0.0192

Answer 3:

Correct!

0.1

orrect Answer

0.10

orrect Answer

.1

Answer 4:

ou Answered

0.025

orrect Answer

0.032

orrect Answer

.032

Quiz Score: **30** out of 55