Natural Language Processing & Word Embeddings

9/10 points (90%)

Quiz, 10 questions

✓ Congratulations! You passed!

Next Item

✓ 1 / 1 points

1\.

Suppose you learn a word embedding for a vocabulary of 10000 words. Then the embedding vectors should be 10000 dimensional, so as to capture the full range of variation and meaning in those words.

○ True

● False

Correct

✓ 1 / 1 points

2\.

What is t-SNE?

○ A linear transformation that allows us to solve analogies on word vectors

● A non-linear dimensionality reduction technique

Correct

○ A supervised learning algorithm for learning word embeddings

○ An open-source sequence modeling library

✓ 1 / 1 points

3.

Suppose you download a pre-trained word embedding which has been trained on a huge corpus of text. You then use this word embedding to train an RNN for a language task of recognizing if someone is happy from a short snippet of text, using a small training set.

x (input text)	y (happy?)
I'm feeling wonderful today!	1
I'm bummed my cat is ill.	0
Really enjoying this!	1

Then even if the word “ecstatic” does not appear in your small training set, your RNN might reasonably be expected to recognize “I’m ecstatic” as deserving a label $y = 1$.

○ True

Correct

○ False

✓ 1 / 1 points

4.

Which of these equations do you think should hold for a good word embedding? (Check all that apply)

□ $e_{boy} - e_{girl} \approx e_{brother} - e_{sister}$

Correct

□ $e_{boy} - e_{girl} \approx e_{sister} - e_{brother}$

Un-selected is correct

□ $e_{boy} - e_{brother} \approx e_{girl} - e_{sister}$

Correct

□ $e_{boy} - e_{brother} \approx e_{sister} - e_{girl}$

Un-selected is correct

✓ 1 / 1 points

5.

Let E be an embedding matrix, and let e_{1234} be a one-hot vector corresponding to word 1234. Then to get the embedding of word 1234, why don't we call $E * e_{1234}$ in Python?

○ It is computationally wasteful.

Correct

○ The correct formula is $E^T * e_{1234}$.

○ This doesn't handle unknown words (<UNK>).

○ None of the above: Calling the Python snippet as described above is fine.

✓ 1 / 1 points

6.

When learning word embeddings, we create an artificial task of estimating $P(target \mid context)$. It is okay if we do poorly on this artificial prediction task; the more important by-product of this task is that we learn a useful set of word embeddings.

● True

Correct

○ False

✓ 1 / 1 points

7.

In the word2vec algorithm, you estimate $P(t \mid c)$, where t is the target word and c is a context word. How are t and c chosen from the training set? Pick the best answer.

● c and t are chosen to be nearby words.

Correct

○ c is the one word that comes immediately before t.

○ c is a sequence of several words immediately before t.

○ c is the sequence of all the words in the sentence before t.

✗ 0 / 1 points

8.

Suppose you have a 10000 word vocabulary, and are learning 500-dimensional word embeddings. The word2vec model uses the following softmax function:

$$P(t \mid c) = \frac{e^{\theta_t^T e_c}}{\sum_{t'=1}^{10000} e^{\theta_{t'}^T e_c}}$$

Which of these statements are correct? Check all that apply.

□ θ_t and e_c are both 500 dimensional vectors.

This should be selected

□ θ_t and e_c are both 10000 dimensional vectors.

This should not be selected

□ θ_t and e_c are both trained with an optimization algorithm such as Adam or gradient descent.

This should be selected

□ After training, we should expect θ_t to be very close to e_c when t and c are the same word.

This should not be selected

✓ 1 / 1 points

9.

Suppose you have a 10000 word vocabulary, and are learning 500-dimensional word embeddings.The GloVe model minimizes this objective:

$$\min \sum_{i=1}^{10,000} \sum_{j=1}^{10,000} f(X_{ij})(\theta_i^T e_j + b_i + b_j' - logX_{ij})^2$$

Which of these statements are correct? Check all that apply.

□ θ_i and e_j should be initialized to 0 at the beginning of training.

Un-selected is correct

□ θ_i and e_j should be initialized randomly at the beginning of training.

Correct

□ X_{ij} is the number of times word i appears in the context of word j.

Correct

□ The weighting function $f(.)$ must satisfy $f(0) = 0$.

Correct

The weighting function helps prevent learning only from extremely common word pairs. It is not necessary that it satisfies this function.

✓ 1 / 1 points

10.

You have trained word embeddings using a text dataset of m_1 words. You are considering using these word embeddings for a language task, for which you have a separate labeled dataset of m_2 words. Keeping in mind that using word embeddings is a form of transfer learning, under which of these circumstance would you expect the word embeddings to be helpful?

○ m_1 >> m_2

Correct

○ m_1 << m_2

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