LING 575K HW2

Due 11PM on Apr 15, 2021

In this assignment, you will answer some written questions about and then implement word2vec; in particular, the method *skip-gram with negative sampling (SGNS)*. By doing so you will:

- Count parameters
- Take derivatives of a loss
- Translate mathematics into implemented code
- Train your own set of word vectors and briefly analyze them

1 Understanding Word2Vec

Q1: Parameters How many parameters are there in the SGNS model? Write your answer in terms of V (the vocabulary) and d_e, the embedding dimension. [Hint: one parameter is *a single real number*.]

Q2: Sigmoid Sigmoid is the logistic curve $\sigma(x) = \frac{1}{1+e^{-x}}$.

- What is the range of $\sigma(x)$?
- How is it used in the SGNS model?
- Compute $\frac{d\sigma}{dx}$; show your work. [Hint: write your final answer in terms of $\sigma(x)$.]

Q3: Loss function

2 Implementing Word2Vec

Q1:

Submission Instructions

In your submission, include the following:

- readme.(txt|pdf) that includes your answers to §1.
- `hw2.tar.gz` containing:
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