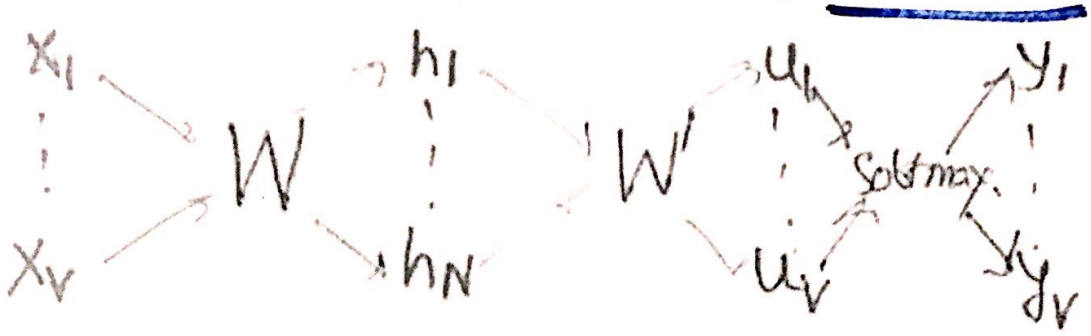
CSE 576 Quiz 8
Name:
ID:

1. Consider the following simplified word2vec neural network. CBOW



Assume that X denotes the vector $x_1, \ldots, x_v$, and h denotes the vector $h_1, \ldots, h_N$, and u denotes the vector $u_1, \ldots u_v$, and y denotes the vector $y_1, \ldots, y_v$. Answer the following questions about it.

(a) What is V?

Vocabulary size

(b) What is $x_1, \ldots, x_v$?

input to neural network i.e. 1-hot representation of a word

(c) What is the dimension of the matrix W and what does it contain.

W_{VXN} V- Vocab. size N- Vector length W- weight matrix

(d) What is the dimension of the matrix W'.

W'_{NXV} V- vocab size N- Vector length W'- updated weight matrix

(e) How is $h_1, \ldots, h_N$ related to $x_1, \ldots, x_V$?

$h = W^T \cdot x$

$$\begin{bmatrix} h_1 \\ \vdots \\ h_N \end{bmatrix} = \begin{bmatrix} w_{11} & \cdots & w_{V1} \\ \vdots & & \\ w_{1N} & \cdots & w_{VN} \end{bmatrix} \begin{bmatrix} x_1 \\ \vdots \\ x_V \end{bmatrix}$$

(f) What is the meaning of u_j?

u_j - score of the jth word in the vocabulary

(g) What is the meaning of y_j?

y_j - probability of occurrence of word w_j given context

(h) Give the formula of h in terms of W and x?

$h = W^T x$

(i) Give the formula of h_i?

$$h_i = \begin{bmatrix} w_{1i} & \cdots & w_{Vi} \end{bmatrix} \begin{bmatrix} x_i \end{bmatrix} = \begin{bmatrix} w_{ki} \end{bmatrix}$$

(j) Give the formula of y_j in terms of u?

$$y_j = \max P(w_j \mid w_I) = \frac{e^{u_j}}{\sum_{j'=1}^{V} e^{u_j}}$$

context