cs224d Notations

mxn

Contents

1 Basic Notations

- Vector: $\boldsymbol{v} \in \mathbb{R}^n$ or $\boldsymbol{v} \in \mathbb{R}^{n \times 1}$ — n rows and 1 column.

- Matrix: $\mathbf{M} \in \mathbb{R}^{n \times m}$ — n rows and m columns.

1.1 Common Network Variable and Dimension Notations

- n: Dimension of embeddings space

- V: Vocabulary with $|V|$ words

- w_i: Word i from vocabulary V

- $\boldsymbol{x}$: Input vectors (usually one-hot vectors)

- $\boldsymbol{y}$: Output vectors (usually one-hot vectors, or vectors of probabilities (after softmax))

- 1 layer network:

  - Input dimension: D_x ($\boldsymbol{x} \in [N, D_x]$)
  - Hidden units: H ($\mathbf{W}_1 \in [D_x, H]$, $\boldsymbol{b}_1 \in [H]$)
  - Ouput dimension: D_y ($\mathbf{W}_2 \in [H, D_y]$, $b_2 \in [D_y]$)

- Continuous Bag of Words (CBOW):

  - $\mathbf{V} \in \mathbb{R}^{n \times |V|}$: Input word matrix
  - $\mathbf{U} \in \mathbb{R}^{|V| \times n}$: Output word matrix
  - $\boldsymbol{v}_i \in \mathbb{R}^{n \times 1}$: i-th column of $\mathbf{V}$, the input vector representing word w_i
  - $\boldsymbol{u}_i \in \mathbb{R}^{n \times 1}$: i-th row of $\mathbf{U}$, the output vector representing word w_i

2 Useful Math Relationships

3 NumPy

- Vector $\boldsymbol{v} \in \mathbb{R}^n$ or $\boldsymbol{v} \in \mathbb{R}^{n \times 1}$ with n rows and 1 column: `v.shape == (n,)` or `(n,1)`

- Matrix $\mathbf{M} \in \mathbb{R}^{n \times m}$ with n rows and m columns: `M.shape == (n, m)`

3.0.1 numpy revision

- column vectors (n rows, 1 column): `v = np.c_[:n]`; `v = np.c_(x)`

- row vectors (1 row, m columns): `v = np.r_[:n]`