MATHS ☺

Named Entity Recognition (NER)

The task: find and classify name in text

simple NER: Window classification using binary logistic class

Idea: classify each word in its context window of neighbouring words

Train logistic classifier to classify a center word

$$f(x_1, \dots, x_n) = (f_1(x_1, \dots, x_n), \dots, f_m(x_1, \dots, x_n))$$

$$\frac{\partial f}{\partial x} = \begin{matrix} \\ m \end{matrix} \overset{n}{\begin{pmatrix} \frac{\partial f_1}{\partial x_1} & \frac{\partial f_1}{\partial x_2} & \cdots & \frac{\partial f_1}{\partial x_n} \\ \vdots & & & \vdots \\ \frac{\partial f_m}{\partial x_1} & & \cdots & \frac{\partial f_m}{\partial x_n} \end{pmatrix}}$$

$$\frac{\partial (Wx+b)}{\partial x} = W$$

$$\frac{\partial (Wx+b)}{\partial b} = I$$

$$\frac{\partial (u^T h)}{\partial u} = h^T$$

$$W \quad \begin{matrix} \\ m \end{matrix} \overset{n}{\begin{pmatrix} W_{11} & \cdots & W_{1n} \\ \vdots & & \\ W_{m1} & \cdots & W_{mn} \end{pmatrix}} \qquad x \quad n \begin{pmatrix} x_1 \\ \vdots \\ x_n \end{pmatrix} \qquad b \quad m \begin{pmatrix} b_1 \\ \vdots \\ b_m \end{pmatrix}$$

$$z = \begin{pmatrix} w_{11}x_1 + w_{12}x_2 + \cdots + w_{1n}x_n + b_1 \\ w_{21}x_1 + w_{22}x_2 + \cdots + w_{2n}x_n + b_2 \\ \vdots \\ w_{m1}x_1 + w_{m2}x_2 + \cdots + w_{mn}x_n + b_n \end{pmatrix}$$

$$f(w_{11}, \cdots, w_{mn}) = \begin{pmatrix} w_{11}x_1 + \cdots + w_{1n}x_n + b_1 \\ \vdots \end{pmatrix}$$

mn inputs

m outputes

$$\frac{\partial z_i}{\partial w_{ij}} = \frac{w_{i1}x_1 + \cdots + w_{in}x_n + b_i}{x_j}$$