deeplearning.ai

NLP and Word Embeddings

Properties of word embeddings

Analogies 类比推理

	Man (5391)	Woman (9853)	King (4914)	Queen (7157)	Apple (456)	Orange (6257)
Gender	−1	1	-0.95	0.97	0.00	0.01
Royal	0.01	0.02	0.93	0.95	-0.01	0.00
Age	0.03	0.02	0.70	0.69	0.03	-0.02
Food	0.09	0.01	0.02	0.01	0.95	0.97

e_{5391} e_{man} e_{woman}

Man → Woman as King → ? Queen

$e_{man} - e_{woman} \approx \begin{bmatrix} -2 \\ 0 \\ 0 \\ 0 \end{bmatrix}$

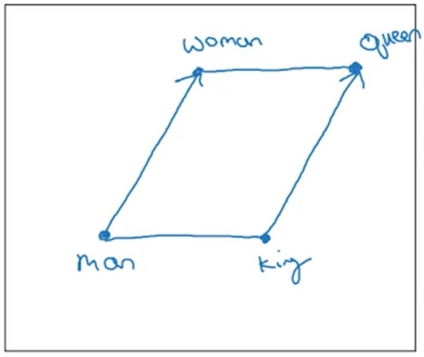
$e_{king} - e_{queen} \approx \begin{bmatrix} -2 \\ 0 \\ 0 \\ 0 \end{bmatrix}$

$e_{man} - e_{woman} \approx e_{king} - e_?$

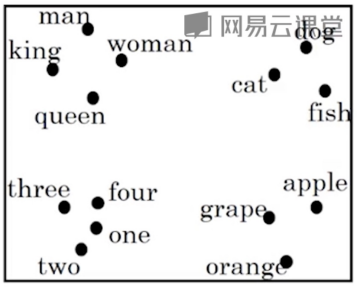
$e_?$ ≈ e_{queen}

[Mikolov et. al., 2013, Linguistic regularities in continuous space word representations]

Analogies using word vectors



300D



300 → 2D

t-SNE

$$e_{man} - e_{woman} \approx e_{king} - e_?$$

Find word w: $\arg\max_w \; sim(e_w, e_{king} - e_{man} + e_{woman})$

30 - 75% accuracy

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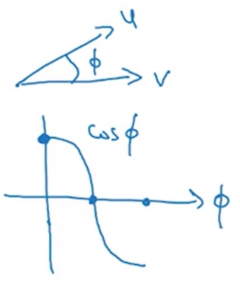
Cosine similarity

$$sim(e_w, e_{king} - e_{man} + e_{woman})$$

$$Sim(u, v) = \frac{u^T v}{\|u\|_2 \|v\|_2}$$



$\|u - v\|^2$

Man:Woman as Boy:Girl
Ottawa:Canada as Nairobi:Kenya
Big:Bigger as Tall:Taller
Yen:Japan as Ruble:Russia

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