
# Natural Language Processing

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Part 1: Neural Language Models

# Long distance dependencies

## Example

- He doesn't have very much confidence in himself
- She doesn't have very much confidence in herself

## n-gram Language Models: $P(w_i \mid w_{i-n+1}^{i-1})$

$$P(\text{himself} \mid \text{confidence, in})$$
$$P(\text{herself} \mid \text{confidence, in})$$

## What we want: $P(w_i \mid w_{<i})$

$$P(\text{himself} \mid \text{confidence}, \ldots, \text{him})$$
$$P(\text{herself} \mid \text{confidence}, \ldots, \text{her})$$

# Long distance dependencies

## Other examples

- **Selectional preferences**: *I ate lunch with a fork* vs. *I ate lunch with a backpack*
- **Topic**: *Babe Ruth was able to touch the home plate yet again* vs. *Lucy was able to touch the home audiences with her humour*
- **Register**: informal (Twitter) vs. formal (scientific articles)

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