

Context Limitations Make Neural Language Models More Human-Like

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Overview:

- Neural language models with limited context access successfully simulated human reading behavior
- This corroborates the theory of human (short-term) memory limitation during reading

Are modern language models with powerful context access (e.g., self-attention) cognitively plausible?



↑paper

Investigated what metrics computed from what models can successfully explain human reading behavior



This study: context limitation and cognitive plausibility of neural language models (LMs)

Does context limitation enhance psychometric predictive power of LMs?



...people wearing a red hat come...



modeling human gaze duration with $-\log p_{\theta}(\text{word}|\text{noise}(\text{context})))$

Why context access?

Transformer, LSTM...



people wearing a red hat come ...

people wearing a red hat come ... lossy context 1 compared *n*-gram surprisal with different *n* as a first step are used in cognitive modeling [Wilcox+`20,`21][Merkx&Frank`21][Kuribayashi+`21]

Psycholinguistics suggested humans' limited context use during reading [Lewis+`06][Futrell+`20]...

Results: context limitation enhanced LMs' cognitive plausibility

- **Context limitation was significantly effective** across languages
- Solution with the second secon



Long/short context mattered in specific constructions

Selective syntactic context will be needed to fill the gap

ap



residual errors decrease from 2-gram to full-context

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Fake-home messages

Revisiting memory-based theories on sentence processing with NLP tools is timely and interesting [Futrell+`20][Merkx+`21]

Successful solutions in NLP are not always cognitively plausible; uncovering the mechanism of human language processing is also this community's pivotal issue