

Keyword-Constrained Natural Language Generation



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Introduction

Prior works on language modeling consider:

- Left to Right generation (*Write an essay starting with*)
- Masked generation (*Fill in the correct preposition*)
- ? ? ? (*Make sentences with these words*)



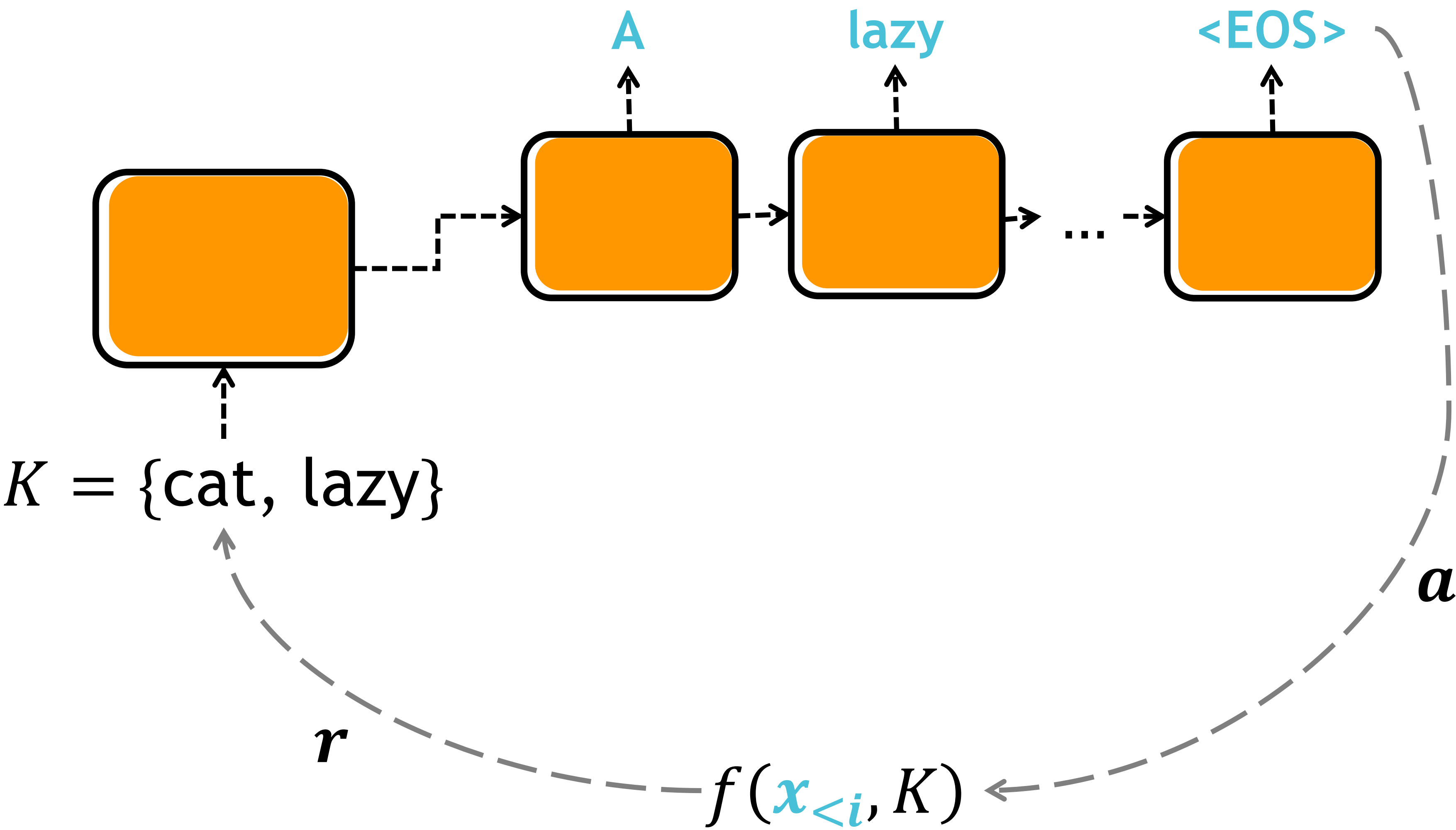
Methodology

$$p_{\theta}(w_i|w_{<i}, K)$$

$$\max_{\theta} \mathbb{E}_{p_{\theta}}[f(x, K)]$$

Generate sentences from left to right. Challenging when the value of i is small.

$f(x, K)$ is a keyword inclusion metric. Ensure sentence sampled from p_{θ} have high score on it.



- Action ($|V|$) and state space ($|V|^n * |K|$) is pretty large.
- Supervised learning to pre-train encoder-decoder architecture.
- End rewards are too sparse.
- Reward shaping. Reward phrases.
- Verbose generation.
- Interpolation with Language Model.

Experimental Results

MSCOCO Captions
Lin et. al. 2014

Better models →
(at training time)

Seq2Seq + Attn	Seq2Seq + Attn + REINFORCE	Seq2Seq + Attn + REINFORCE + LM
S: 84.5 %	+ 1.5 %	+1.1 %
H: 72.3 %	+ 1.6 %	+2 %
P: 89.186	- 20.33	- 1.54
+ CD	+ CD	+ CD
S: + 3.2 %	+6 %	+ 6.4 %
H: +4.2 %	+10.4 %	+ 10.8 %
P: -4.4	-10.9	-22.75

← Better Search methods
(at test time)

NLG Dataset for Dialog Systems
Dušek and Jurčiček 2016

Translation Sentences
Trang et. al. 2009

Seq2Seq + Attn	Our Method
S: 85.5 %	+ 4.9 %
H: 81.3 %	+ 9 %
S: 82.6 %	+ 4.2 %
H: 70.4 %	+ 4.7 %

Randomly sampled sentences:

[‘man’, ‘racquet’]| a man holding a tennis racquet standing on a tennis court <E>
[‘trash’]| a toilet seat next to a trash can in a bathroom <E>
[‘bed’, ‘laying’]| a woman laying on a bed with a cat laying on the floor <E>
[‘modern’, ‘shower’, ‘curtain’]| a modern bathroom with a toilet sink and shower curtain <E>

