Machine Translation 2
Neural Machine Translation

CS 287

Quiz:

Neural Machine Translation

$$p(w^t|w^s) = p(w_i^t|w^s, \theta)$$

Babbler

- $$p(w_i | w_1, \ldots, w_{i-1}) = \text{softmax}(RNN()) = \hat{y}_{w_i}$$

True Encoder-Decoder

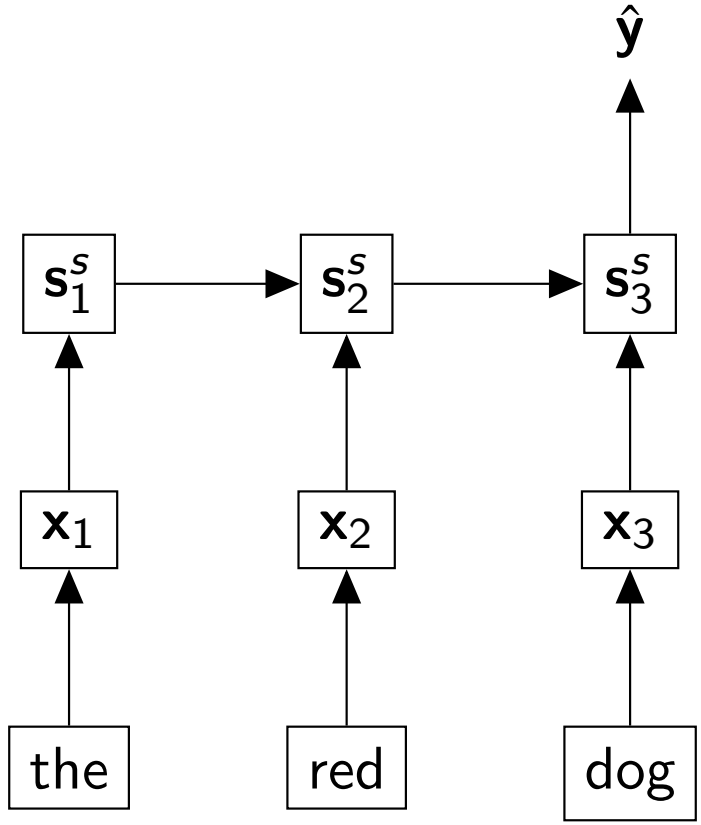
Compute a single vector $\mathbf{x}$ representing the source.

- $$p(w_i | w_1, \ldots, w_{i-1}, \mathbf{x}) = \hat{y}_{w_i}$$

Compute output $\mathbf{y}$

Bottleneck here $\mathbf{x}$ full representation of source.

Acceptor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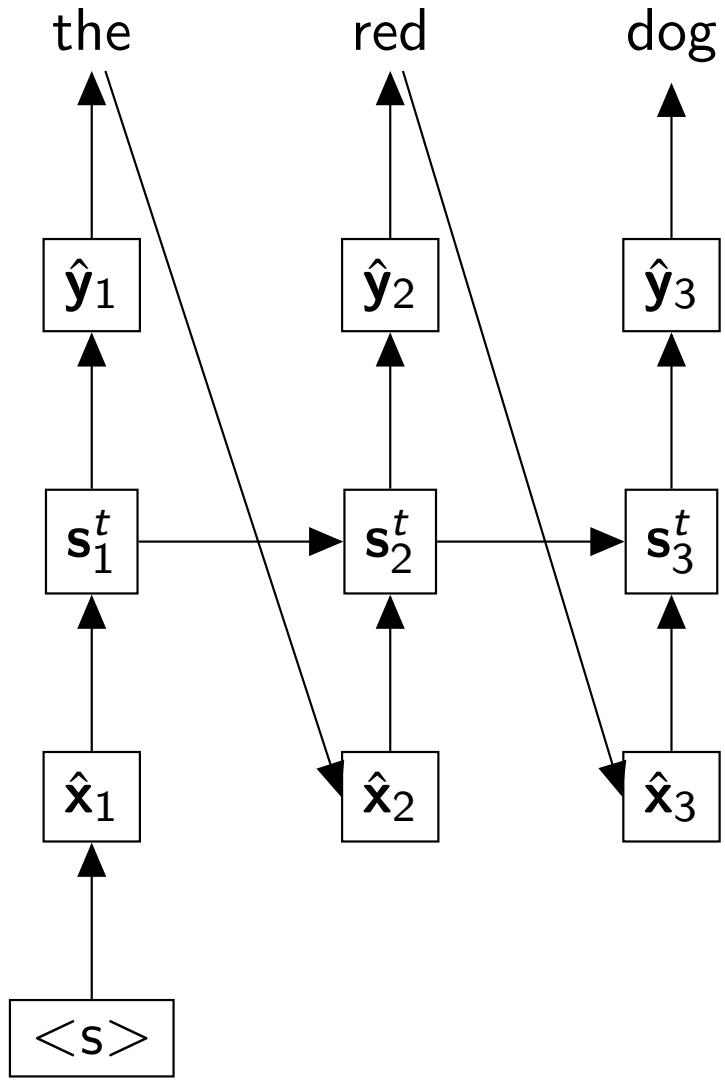
the
red
dog

Babbler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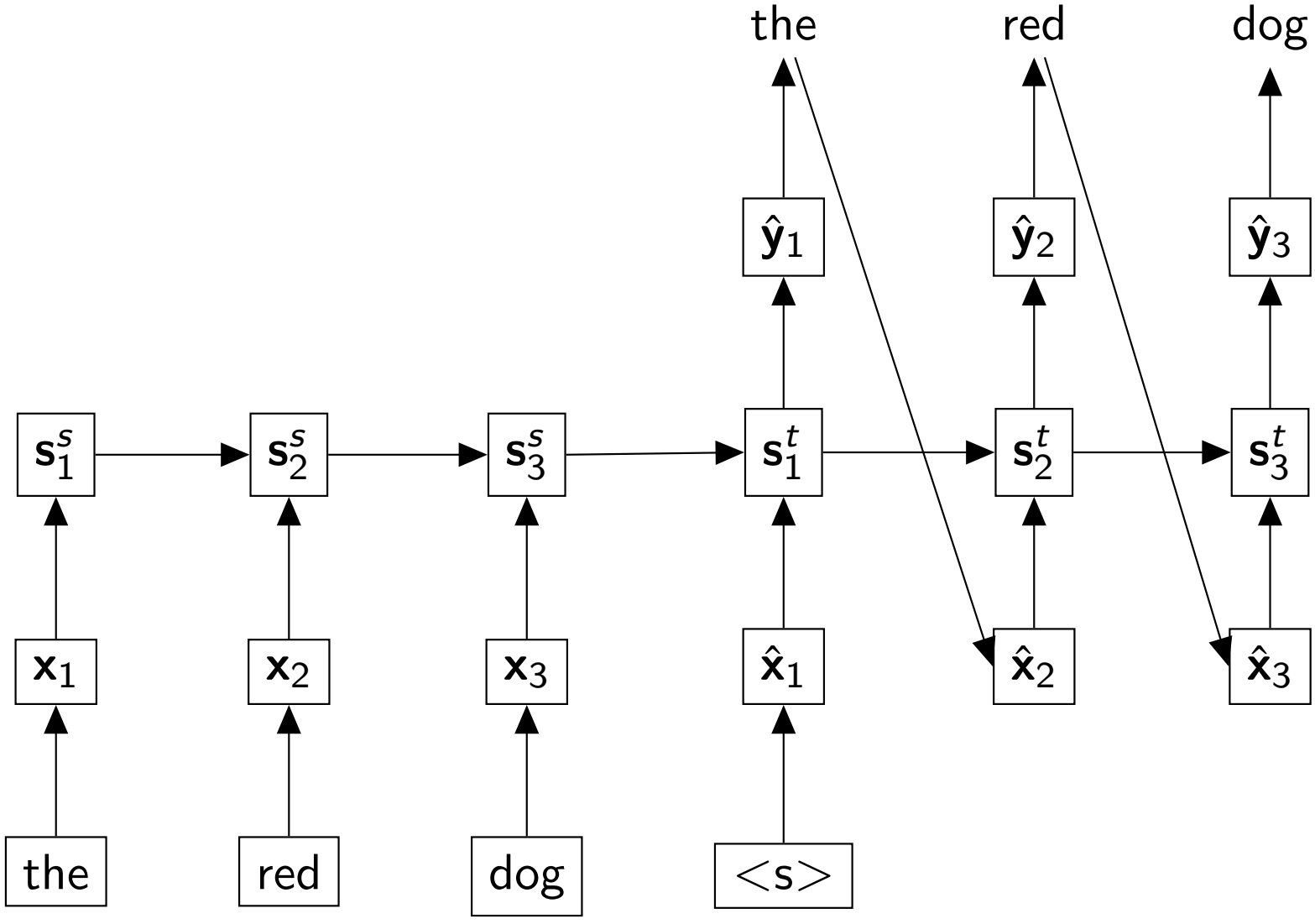
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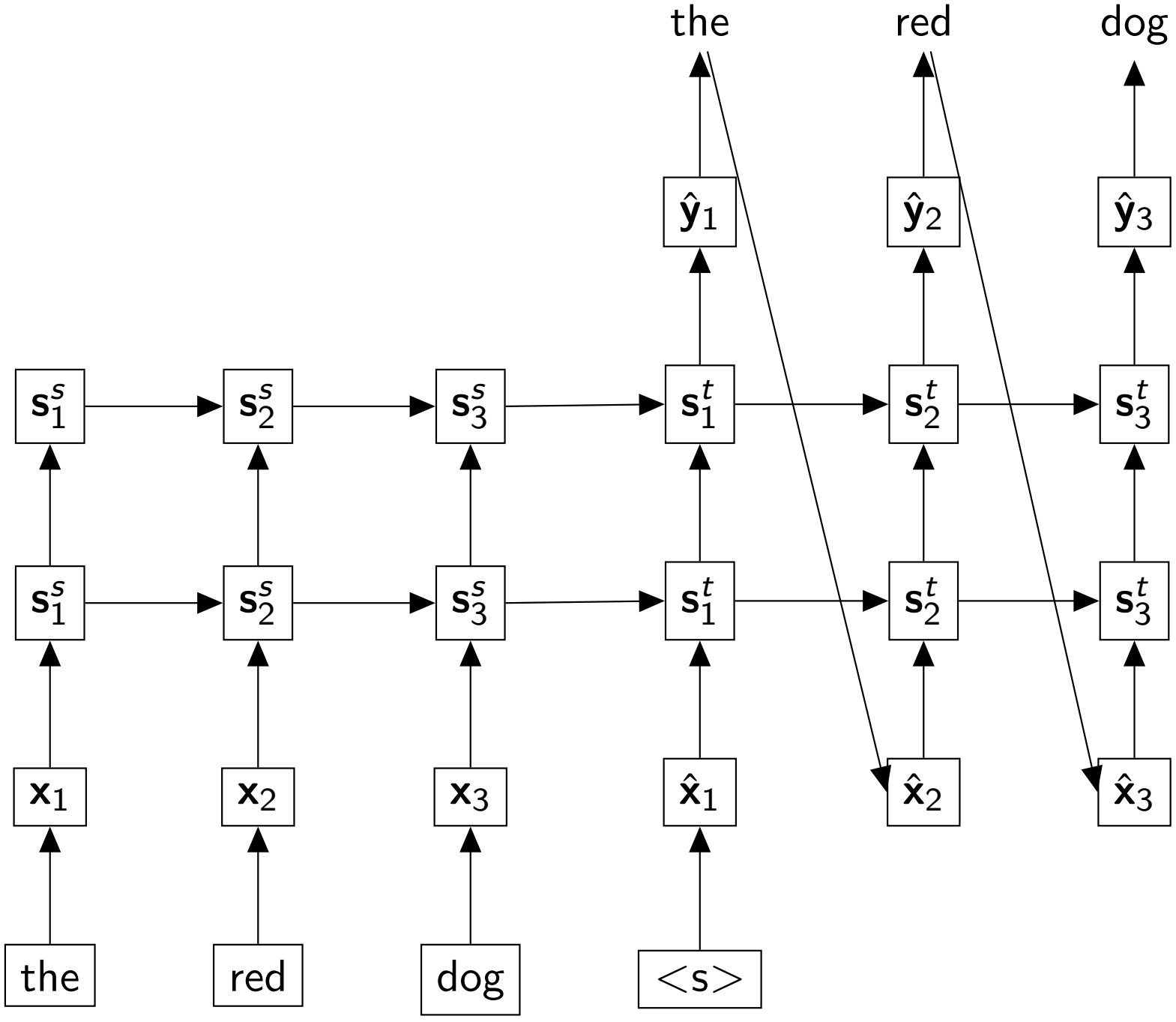
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Which word should we translate next?

Alignment

- Pick a source word.
- Pick a translation.
- Score placing that as next word.

$$i = \arg\max p(;\theta)$$

$$p(w_i^s)$$

- What is the issue here?

Argmax

Can't backprop over the argmax

The Attention Mechanism

Idea: Replace internal argmax with softmax

- Similar to the

Attention-Based Encoder-Decoder

At timestep i,

$$\hat{\mathbf{a}} = \text{softmax}(\mathbf{S}^s \mathbf{s}_i^t)$$

Soft-alignment over source.

$$p(a = |\mathbf{x}) = \hat{\mathbf{a}}_i$$

Neural Machine Translation