Distinguished Engineering

Transformer 2/5
- Attention, please

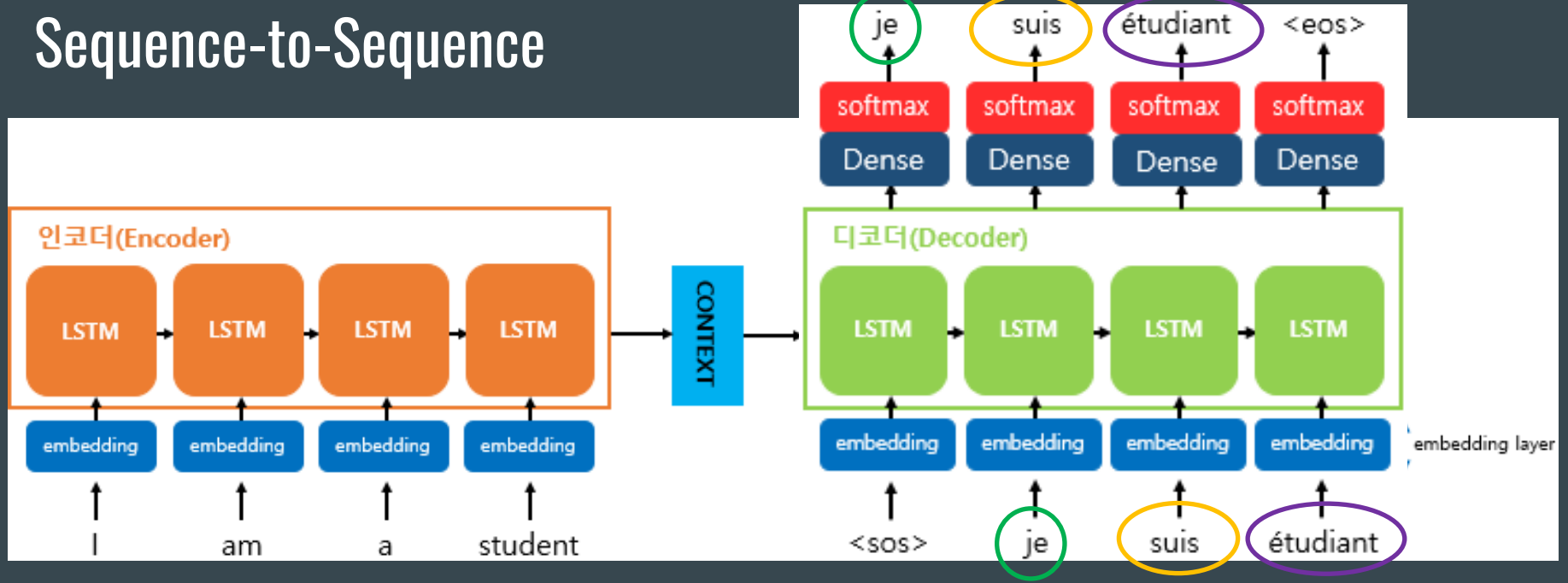
•••

BW

Plan

- Prologue, seq2seq
- **Attention, please**
- Transformer, a hew hope
- Transformer, revenge of the fallen
- Transformer, vision

Sequence-to-Sequence



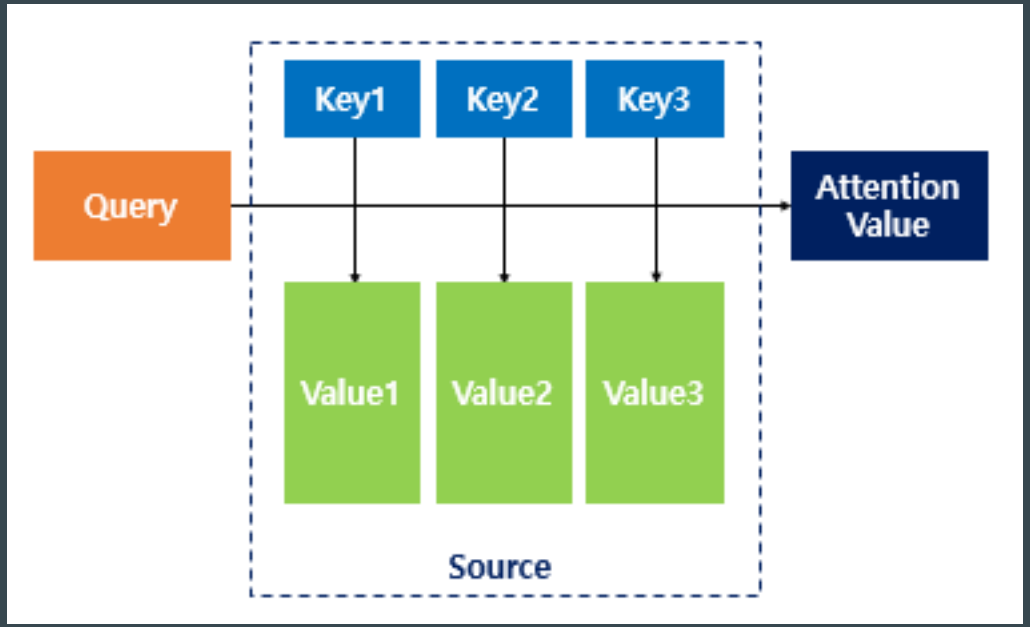
I		0.157
		-0.25
		0.478
		-0.78

am		0.78
		0.29
		-0.96
		0.52

a		0.75
		-0.81
		0.96
		0.12

student		0.88
		-0.17
		0.29
		0.48

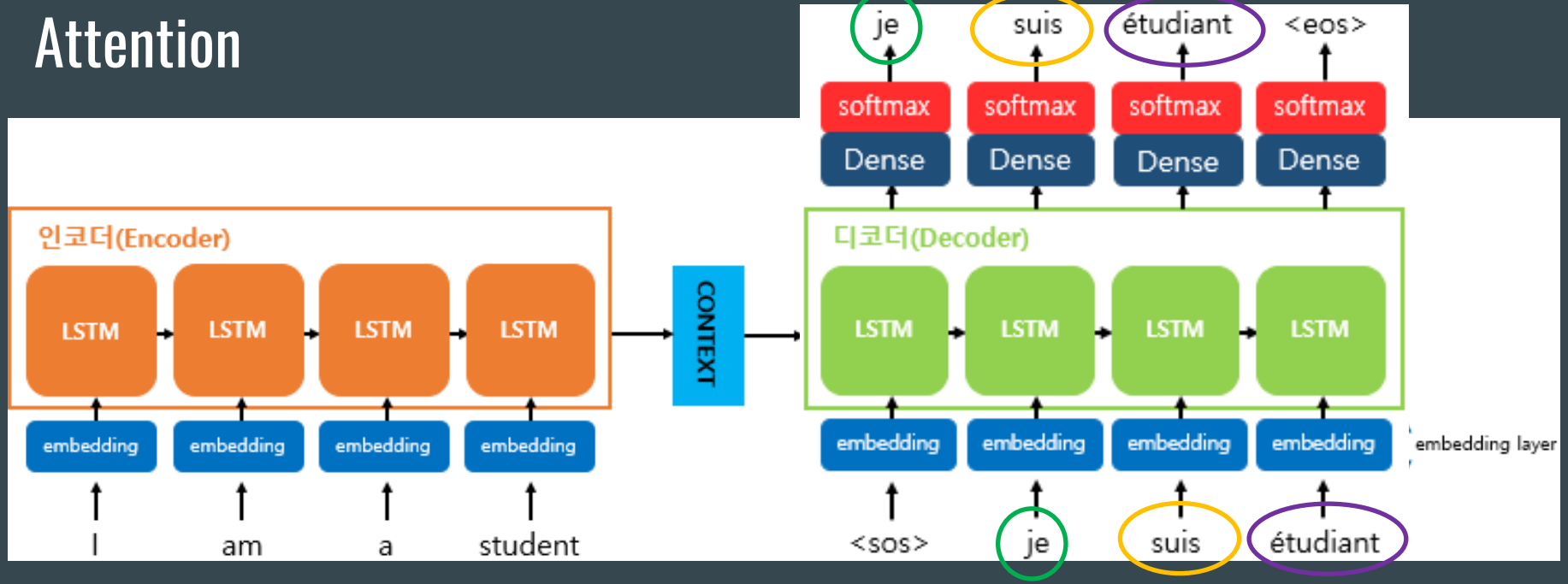
Attention



Attention(Q, K, V) = Attention Value

Q = Query : t 시점의 Decoder 셀에서의 은닉 상태
K = Keys : 모든 시점의 Encoder 셀의 은닉 상태들
V = Values : 모든 시점의 Encoder 셀의 은닉 상태들

Attention



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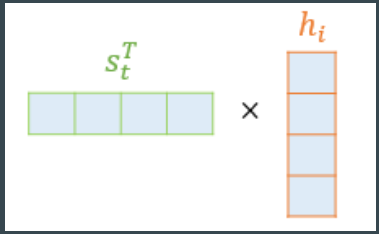
Attention

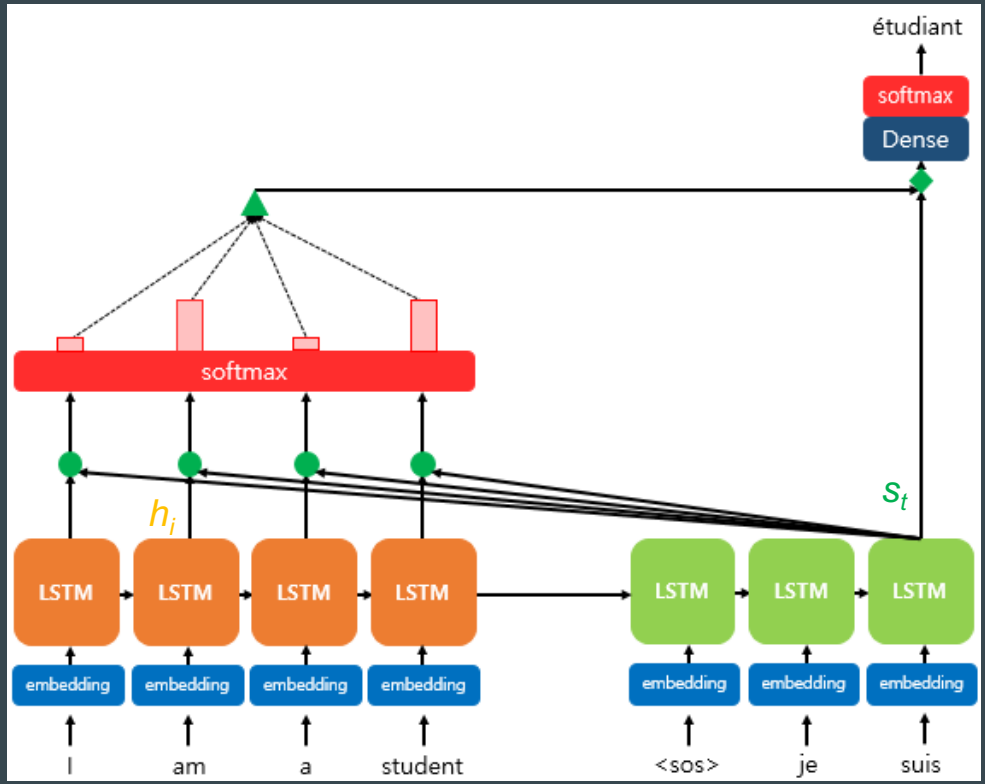
- Dot product attention

Attention score



$$score(s_t,\ h_i) = s_t^T h_i$$

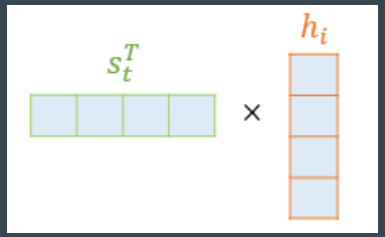
$$e^t = [s_t^T h_1, \ldots, s_t^T h_N]$$



Attention

- Dot product attention

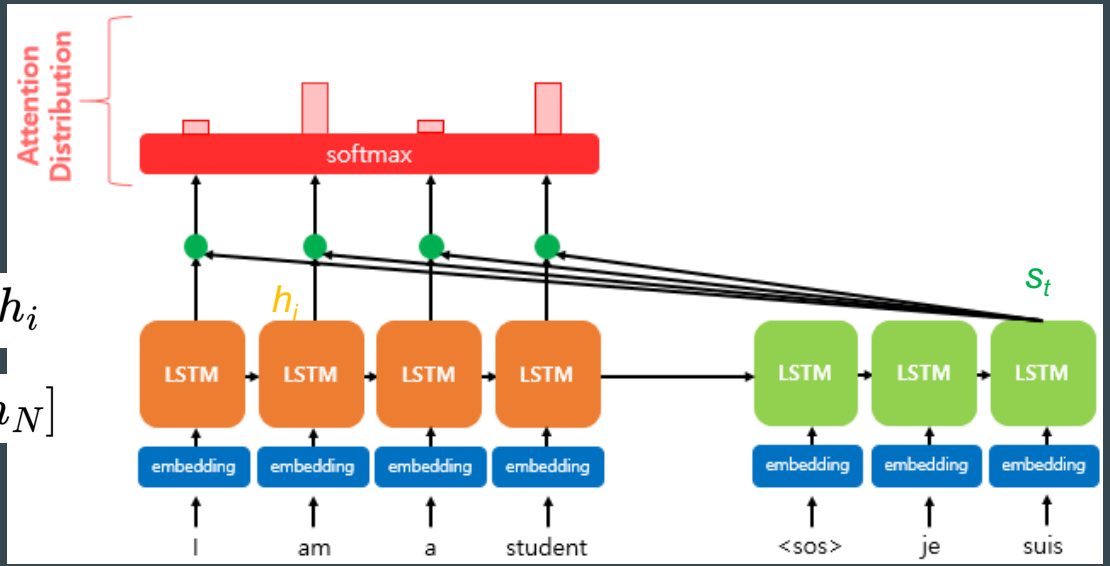
Attention score → Softmax



$$score(s_t,\ h_i) = s_t^T h_i$$

$$e^t = [s_t^T h_1, \ldots, s_t^T h_N]$$

$$\alpha^t = softmax(e^t)$$



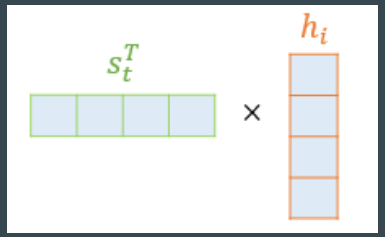
Attention

- Dot product attention

Attention value, context vector s_t

$$a_t = \sum_{i=1}^{N} \alpha_i^t h_i$$

Attention score → Softmax → Context vector



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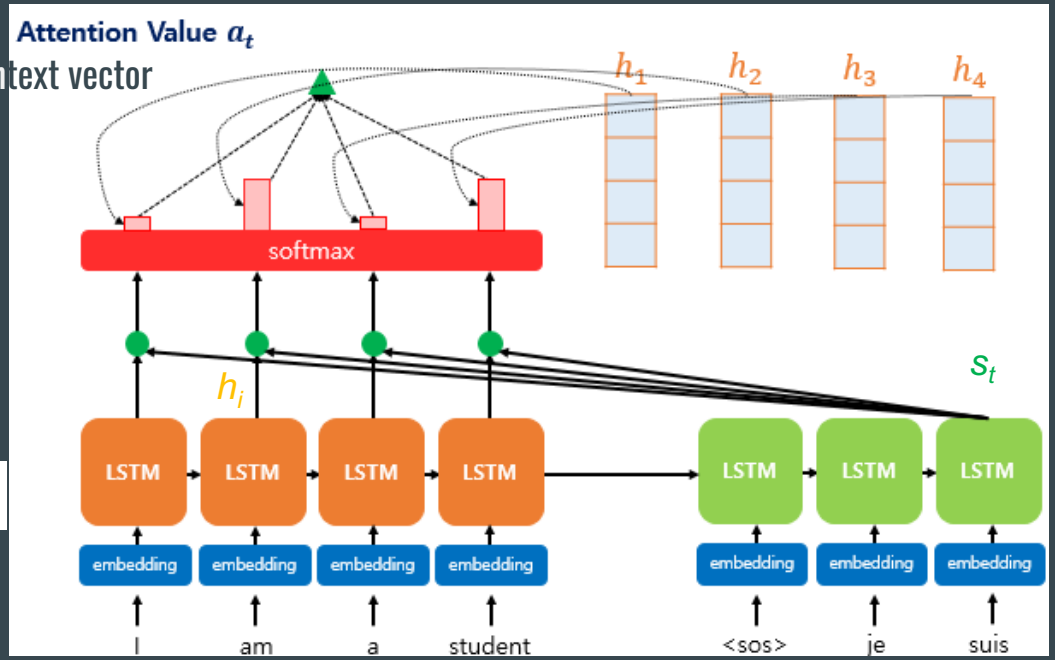
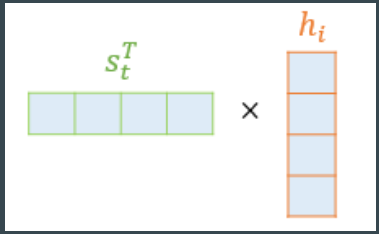


Attention

- Dot product attention

Attention score → Softmax → Context vector



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$$e^t = [s_t^T h_1, \ldots, s_t^T h_N]$$

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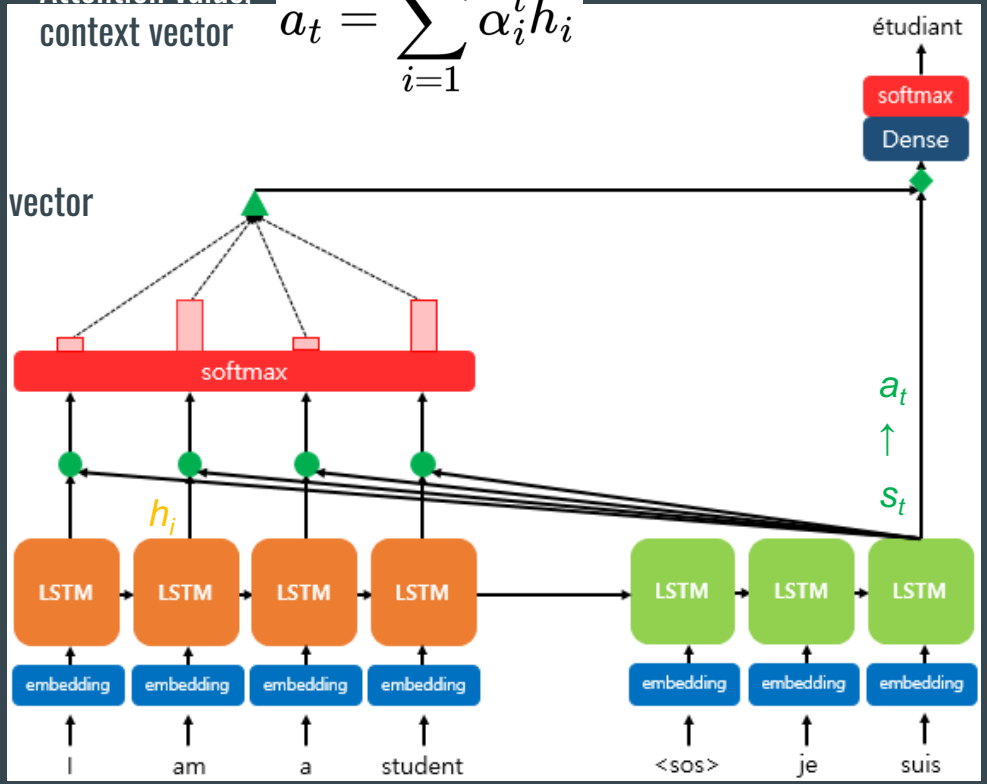
Attention value, context vector

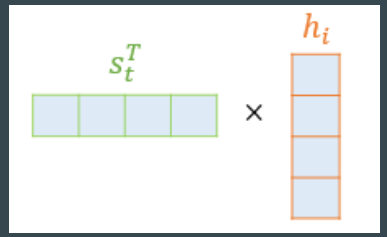
$$a_t = \sum_{i=1}^{N} \alpha_i^t h_i$$



Attention

- Dot product attention

Attention score → Softmax → Context vector → Predict



$$score(s_t,\ h_i) = s_t^T h_i$$

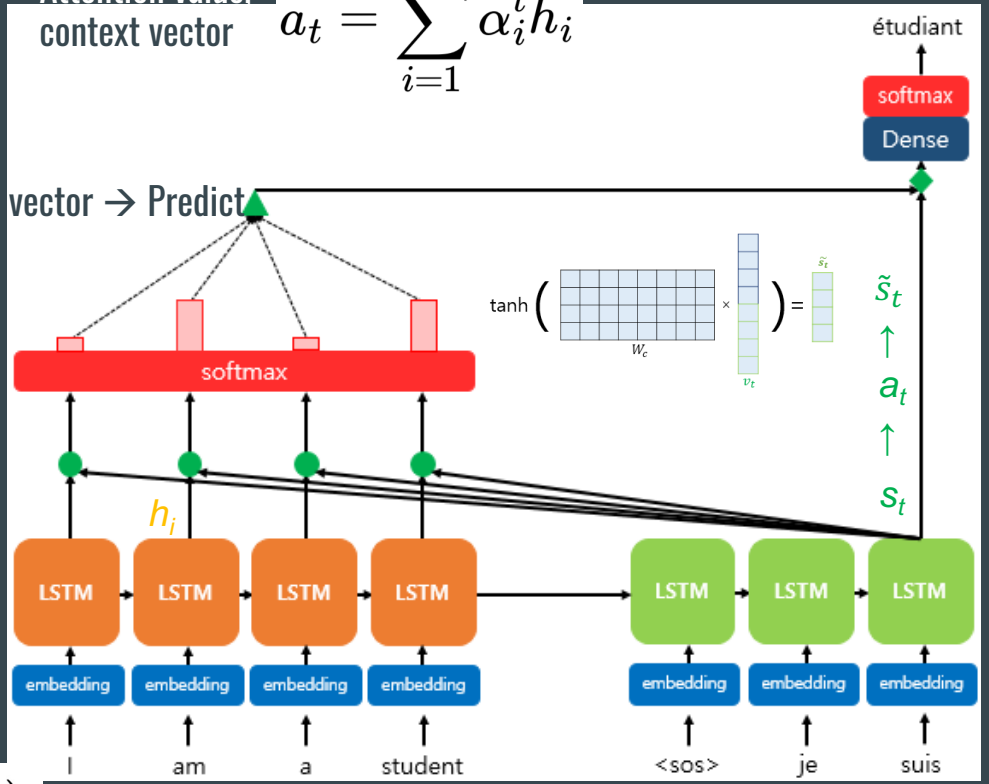
$$e^t = [s_t^T h_1, \ldots, s_t^T h_N]$$

$$\alpha^t = softmax(e^t)$$

$$\tilde{s}_t = \tanh(\mathbf{W_c}[a_t; s_t] + b_c)$$

Attention value, context vector

$$a_t = \sum_{i=1}^{N} \alpha_i^t h_i$$



Everything can be found in
https://wikidocs.net/book/2155
https://github.com/ukairia777/tensorflow-nlp-tutorial