Attention based models in End-to-End ASR

Exploration of Attention in ESPNET toolkit

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International Institute of Information Technology - Bangalore

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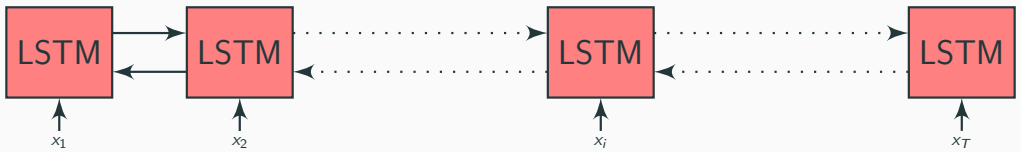
BLSTM



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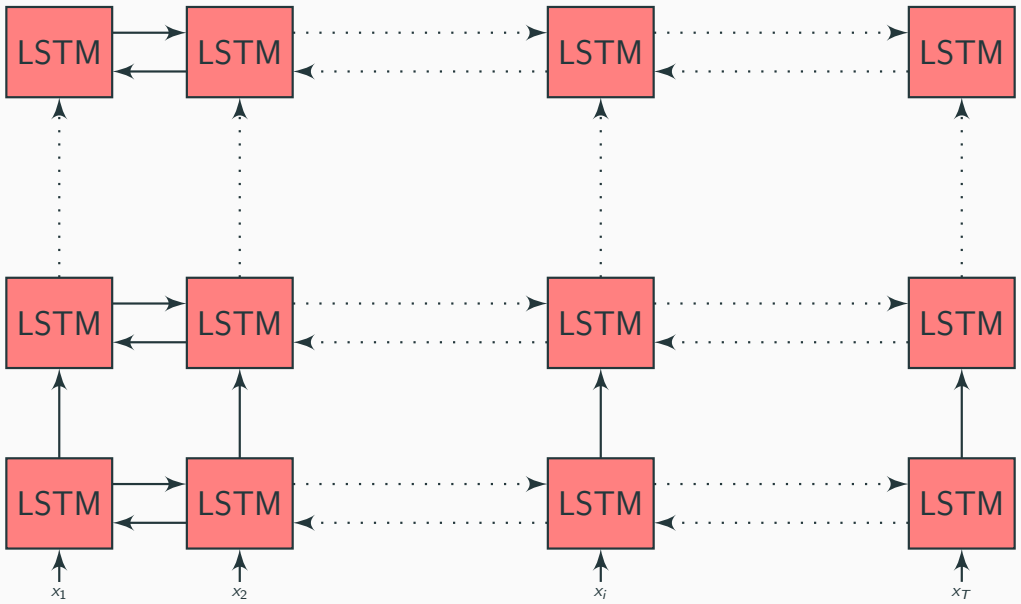
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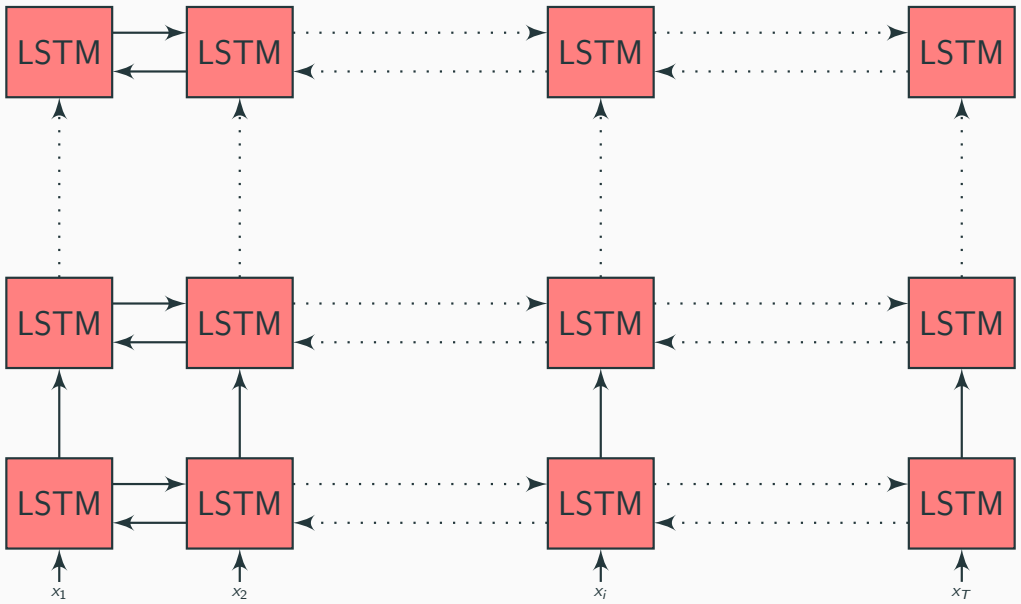
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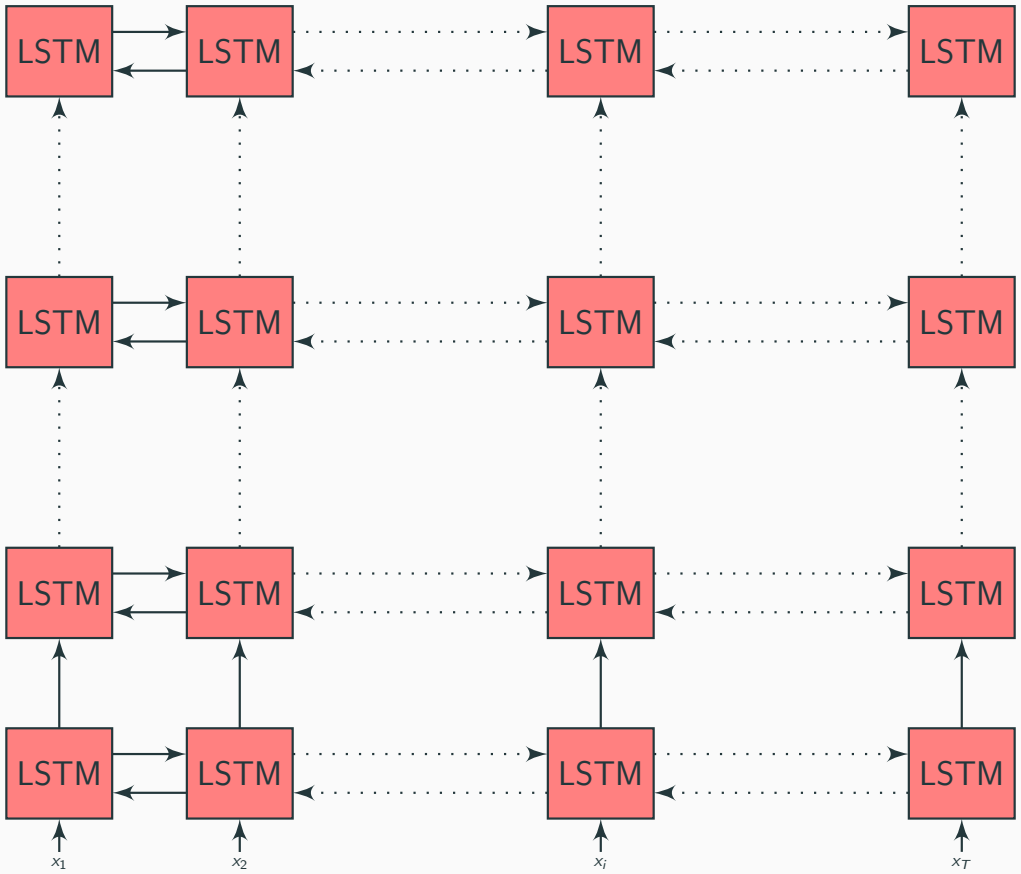
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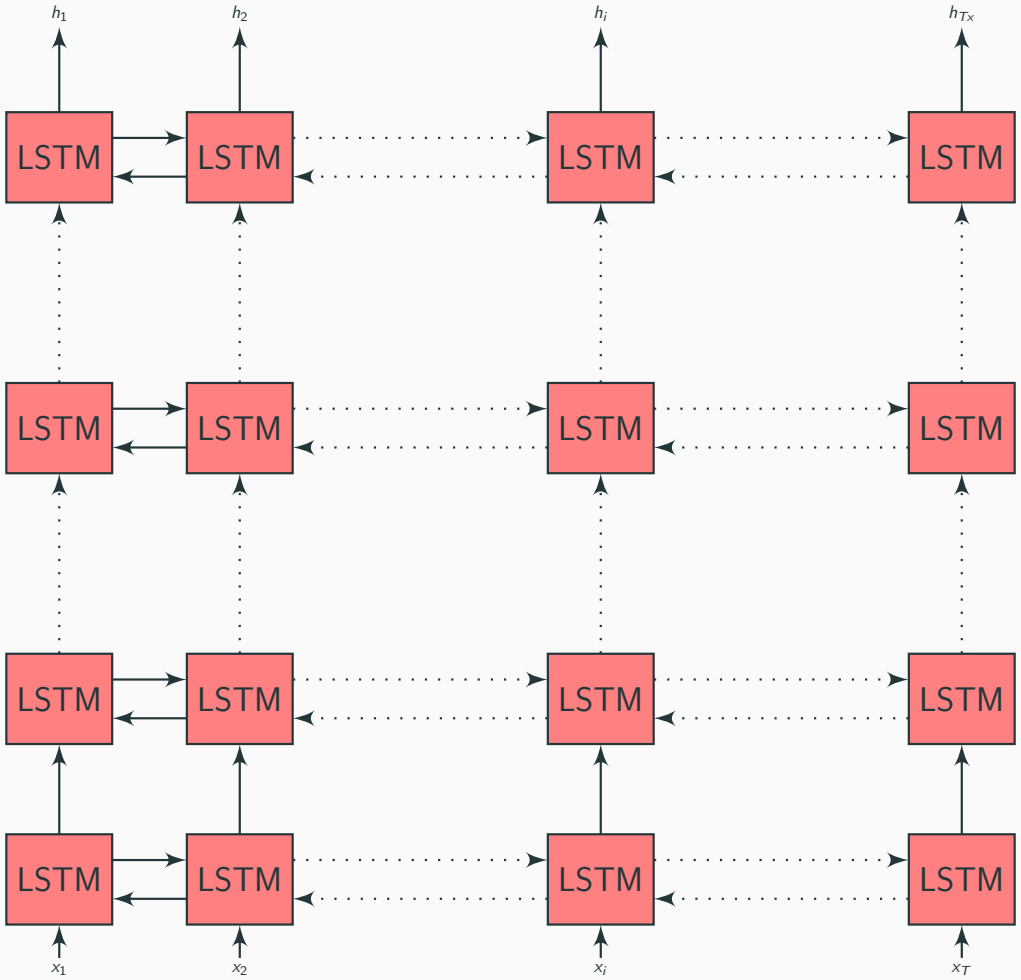

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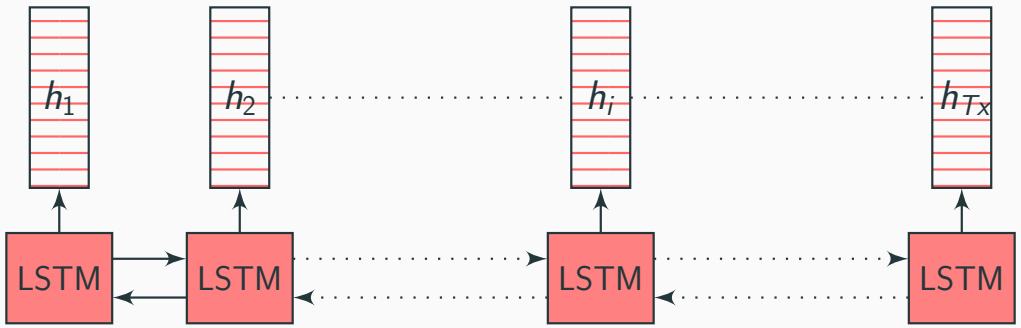

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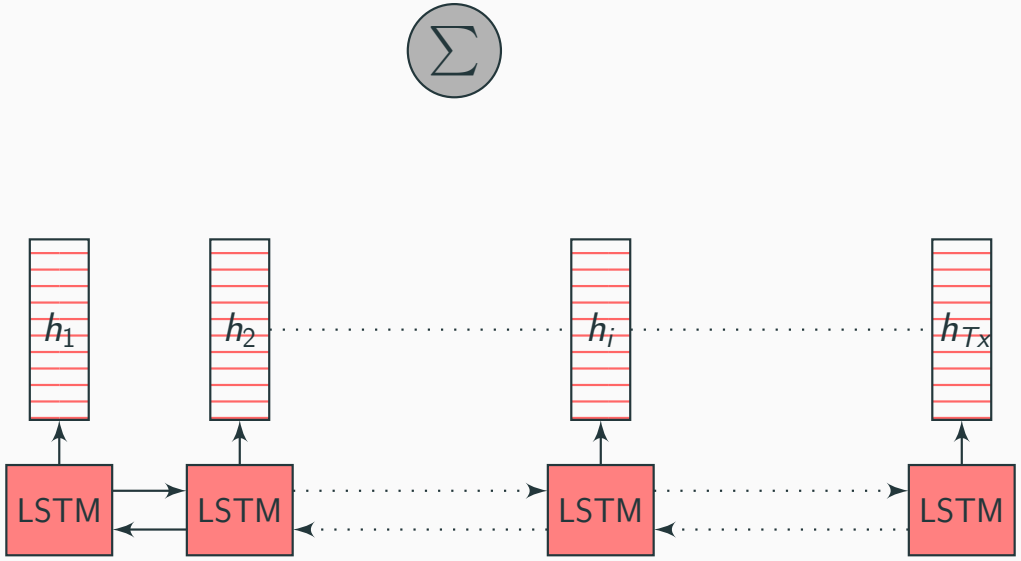

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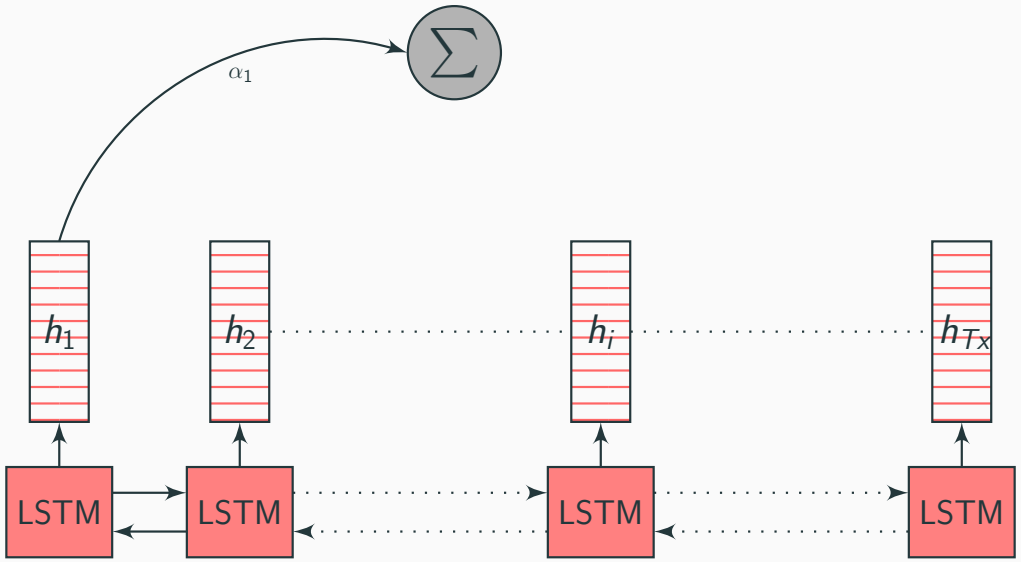

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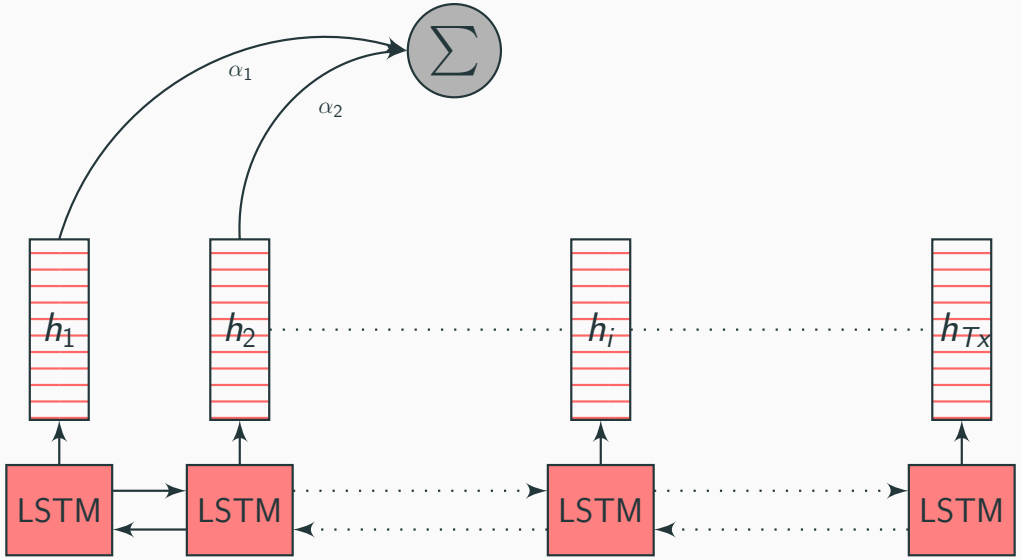

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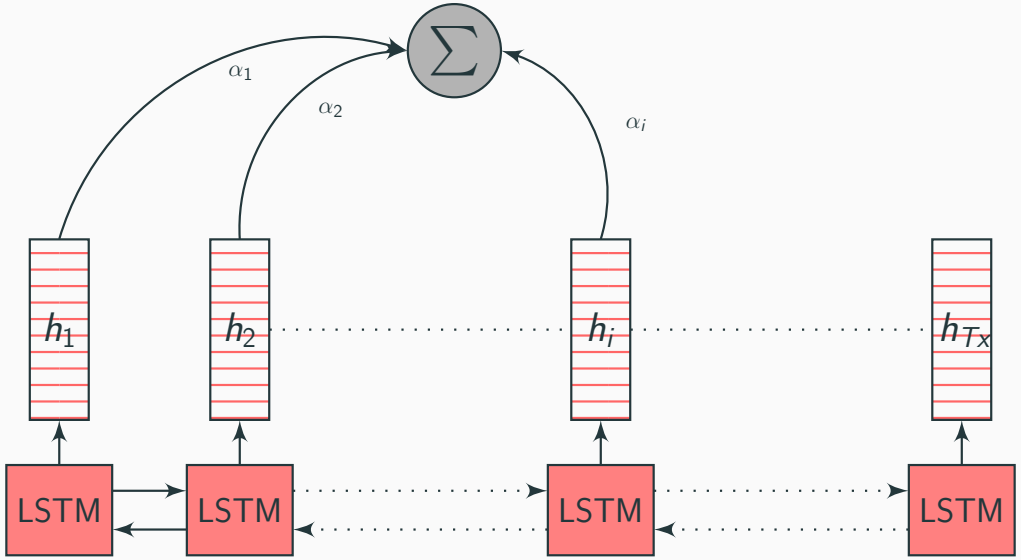

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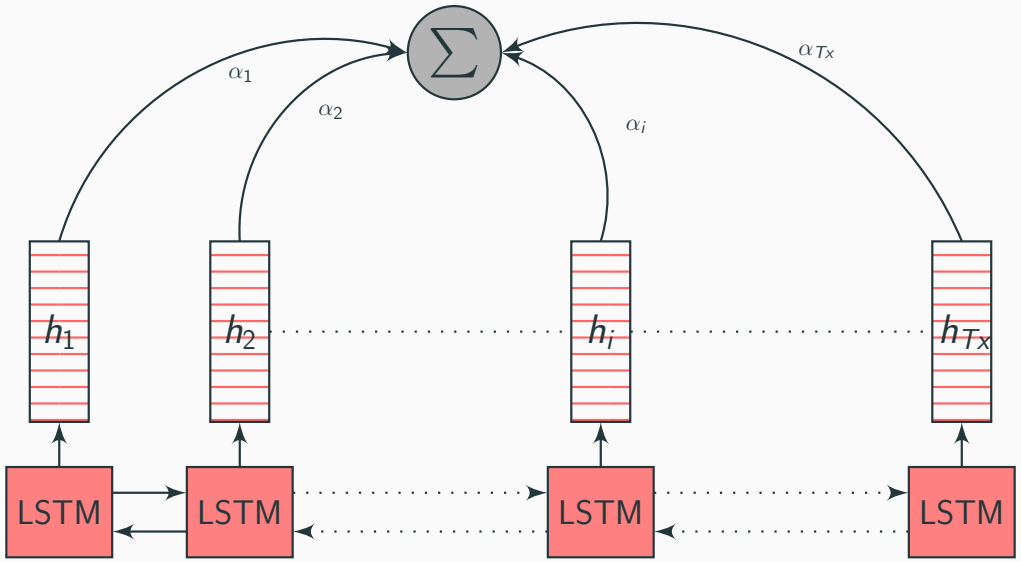

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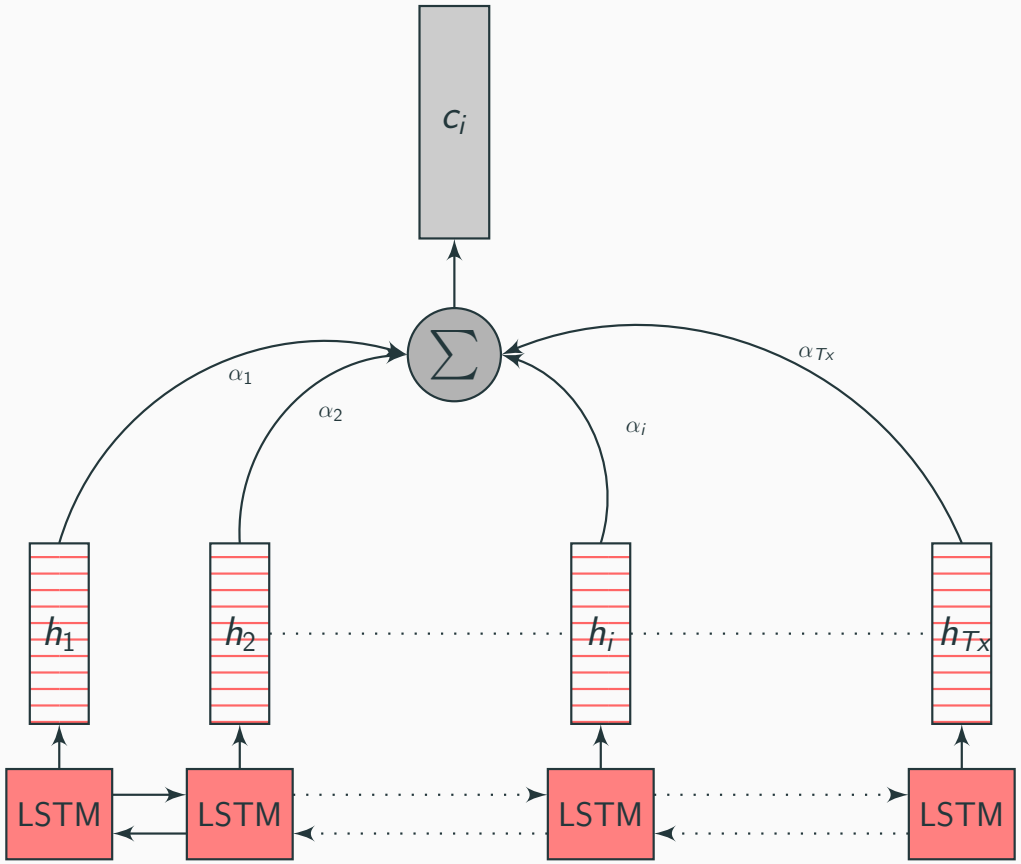

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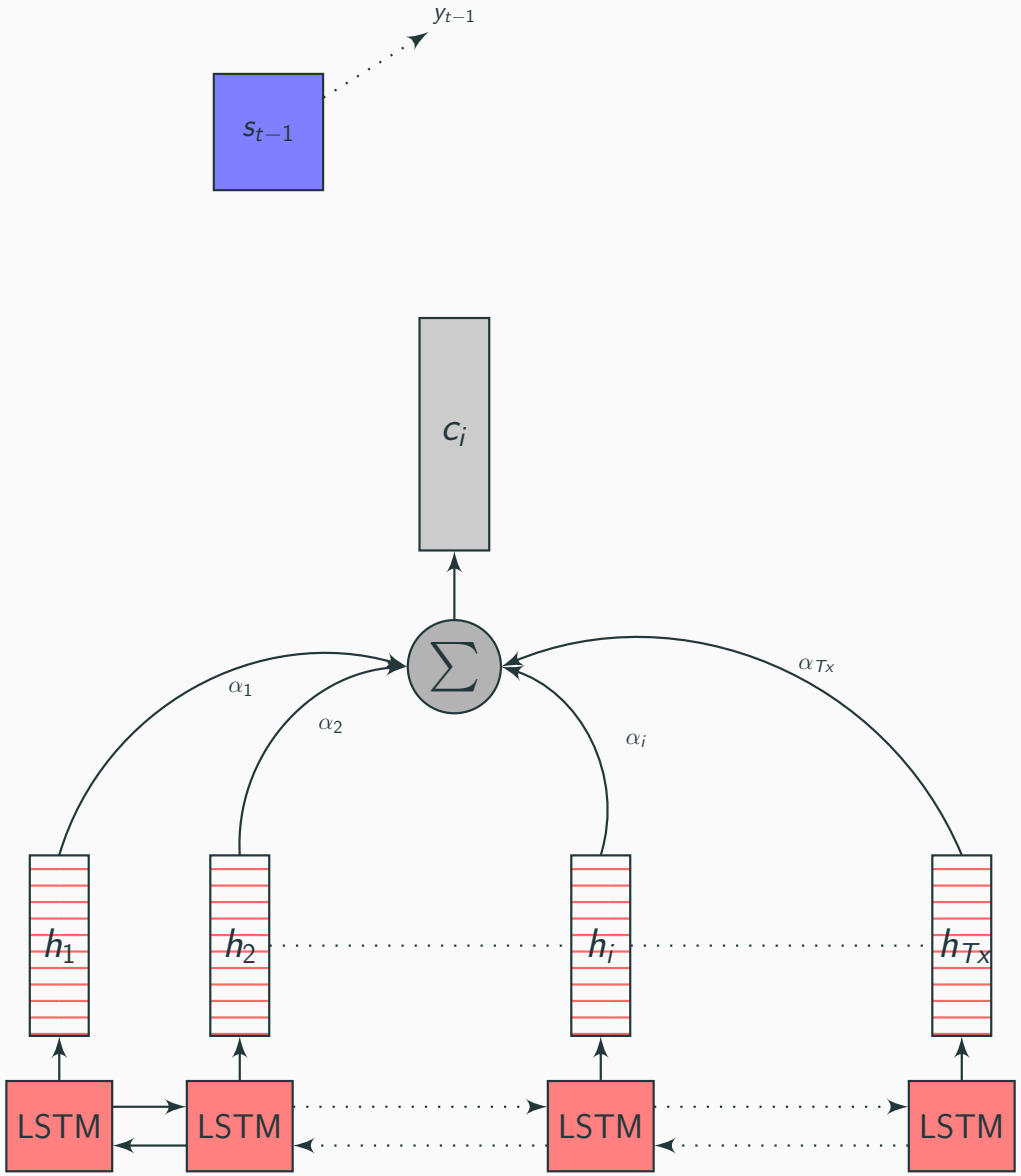

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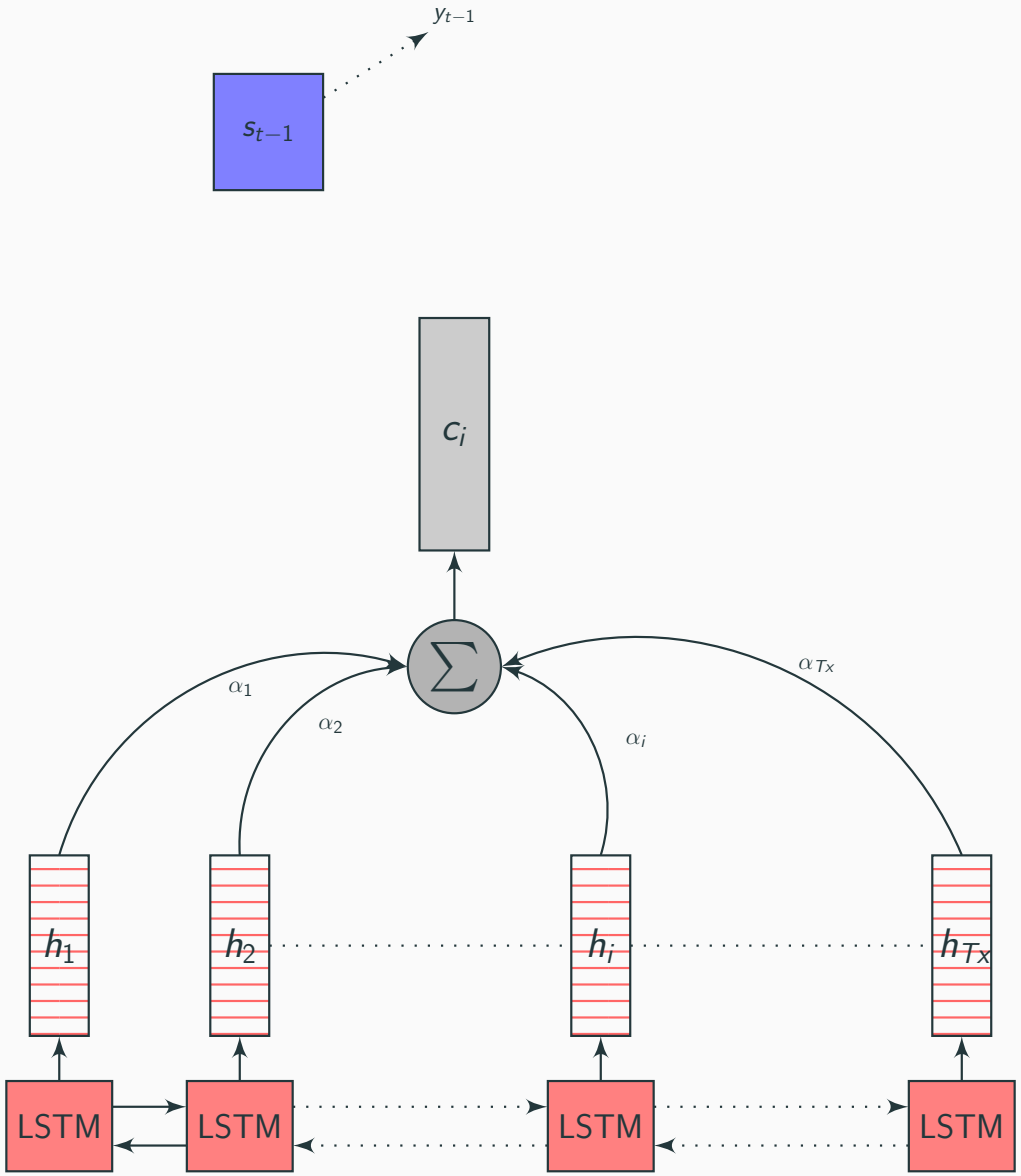

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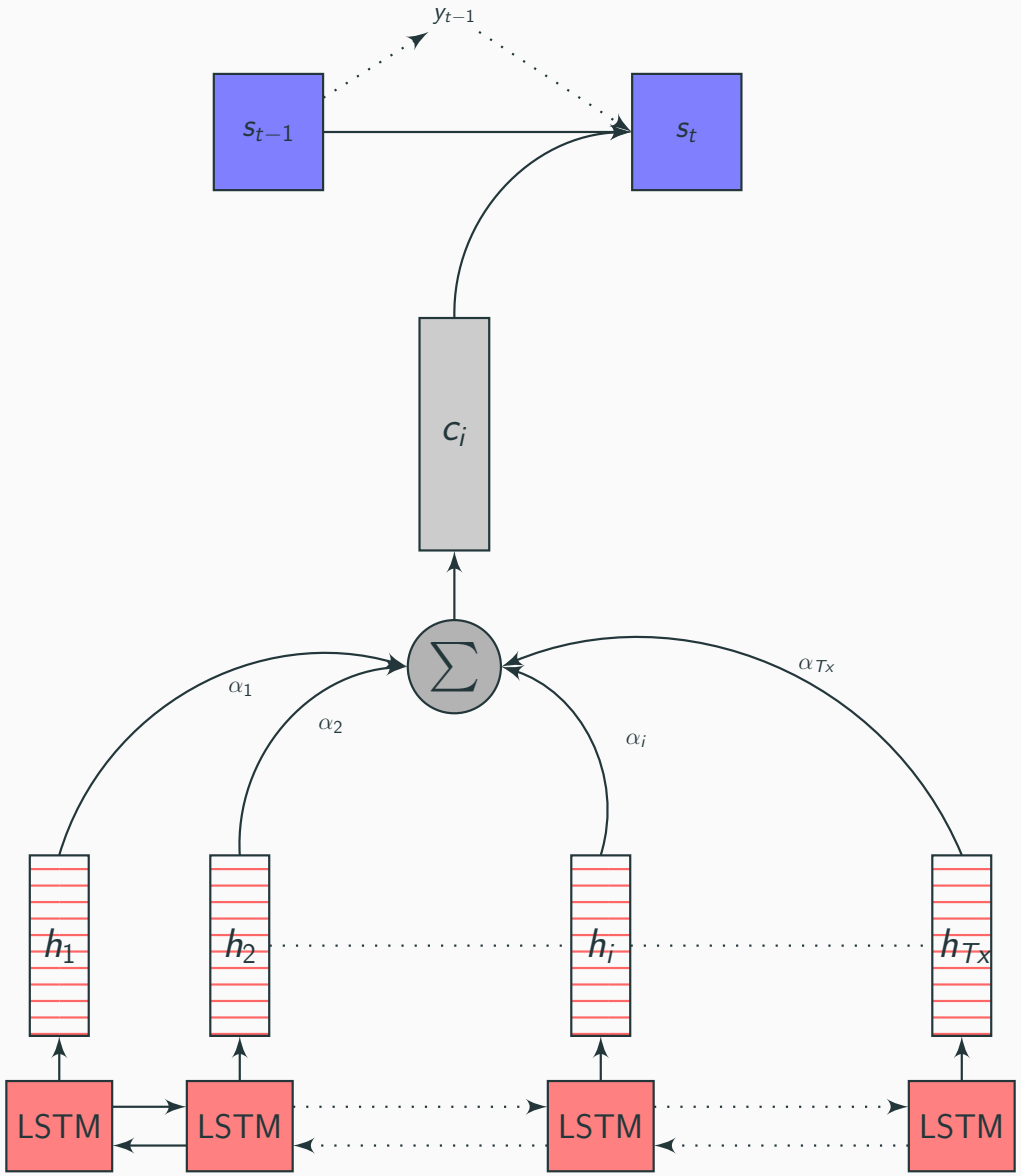

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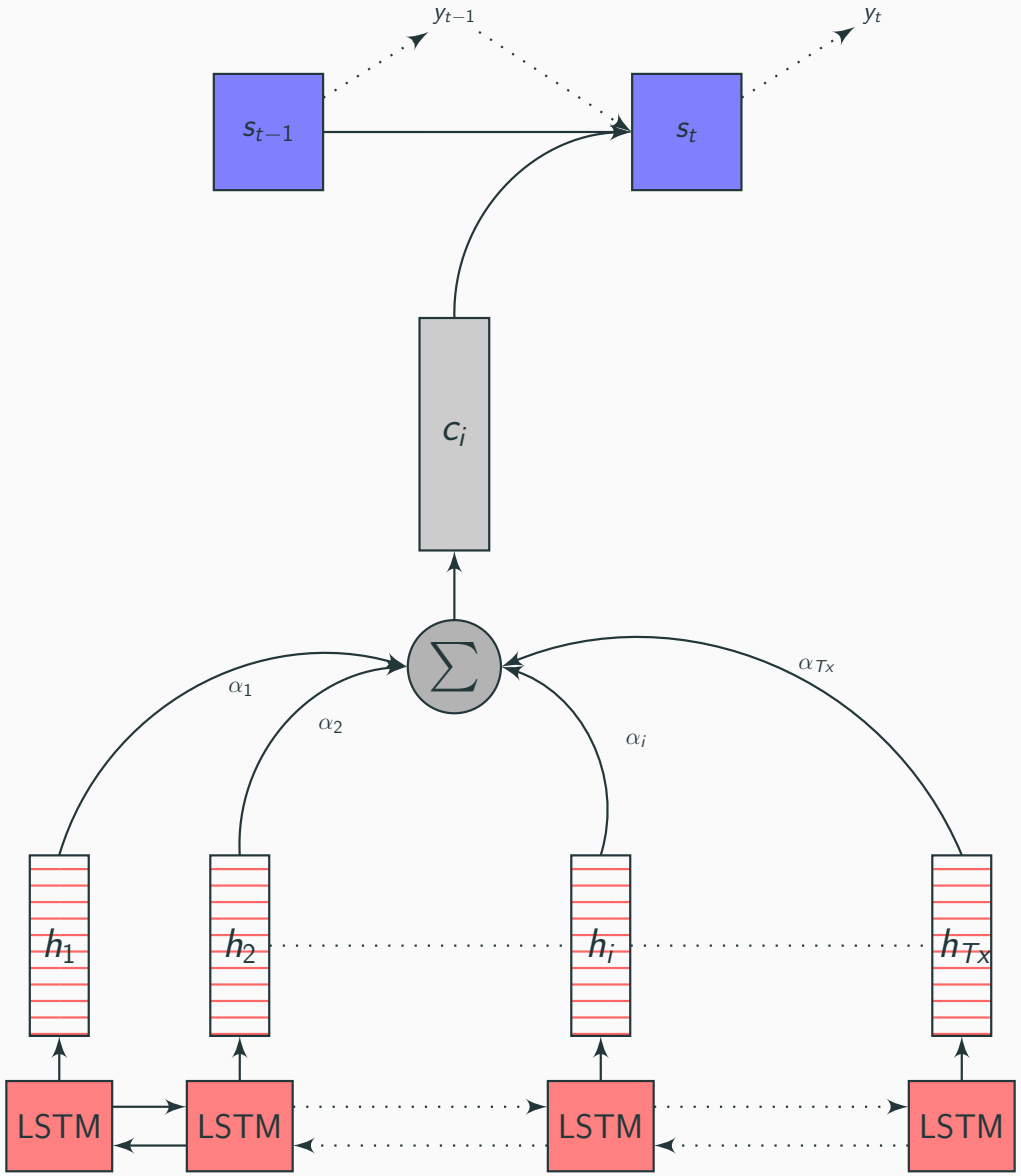
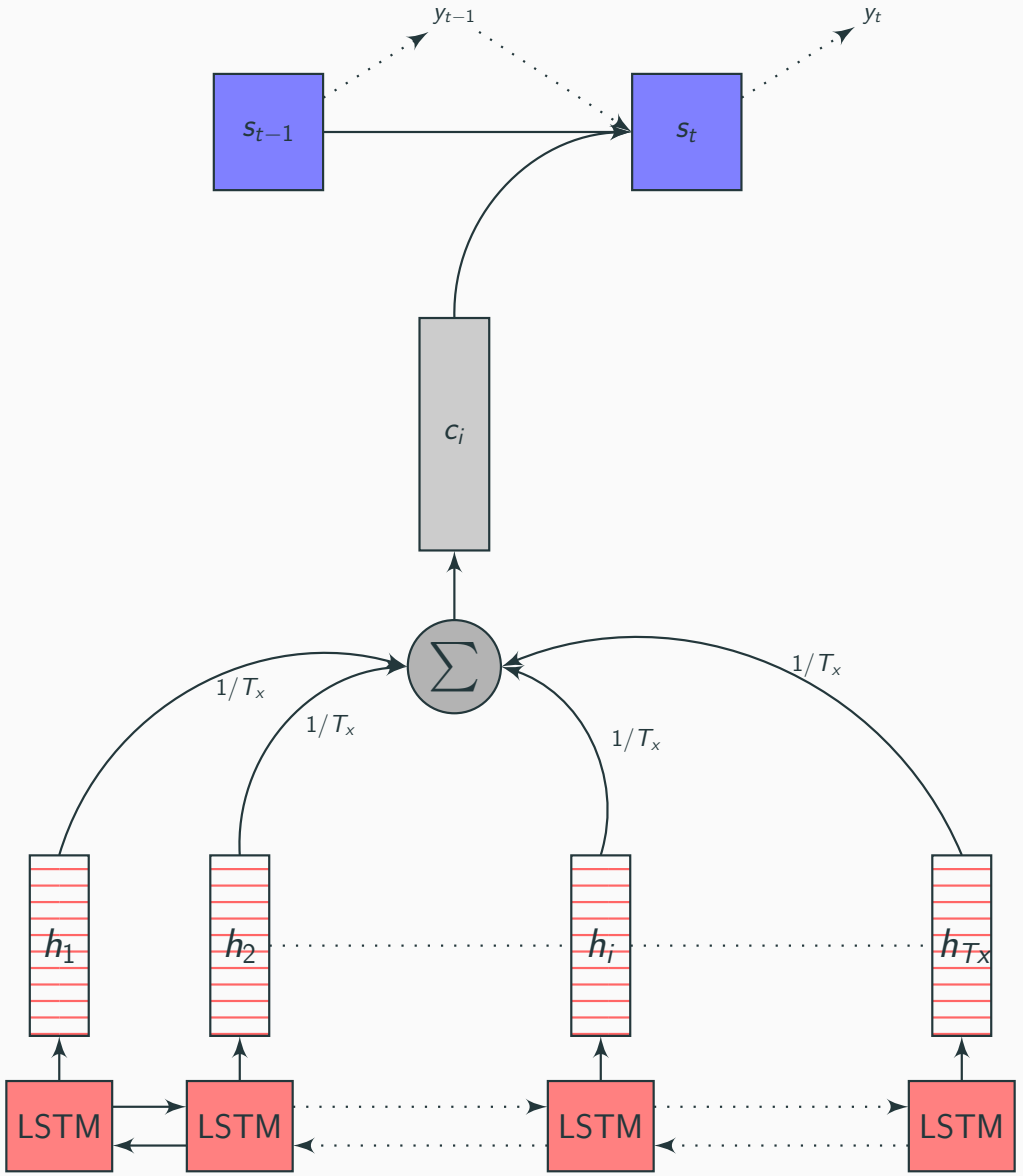
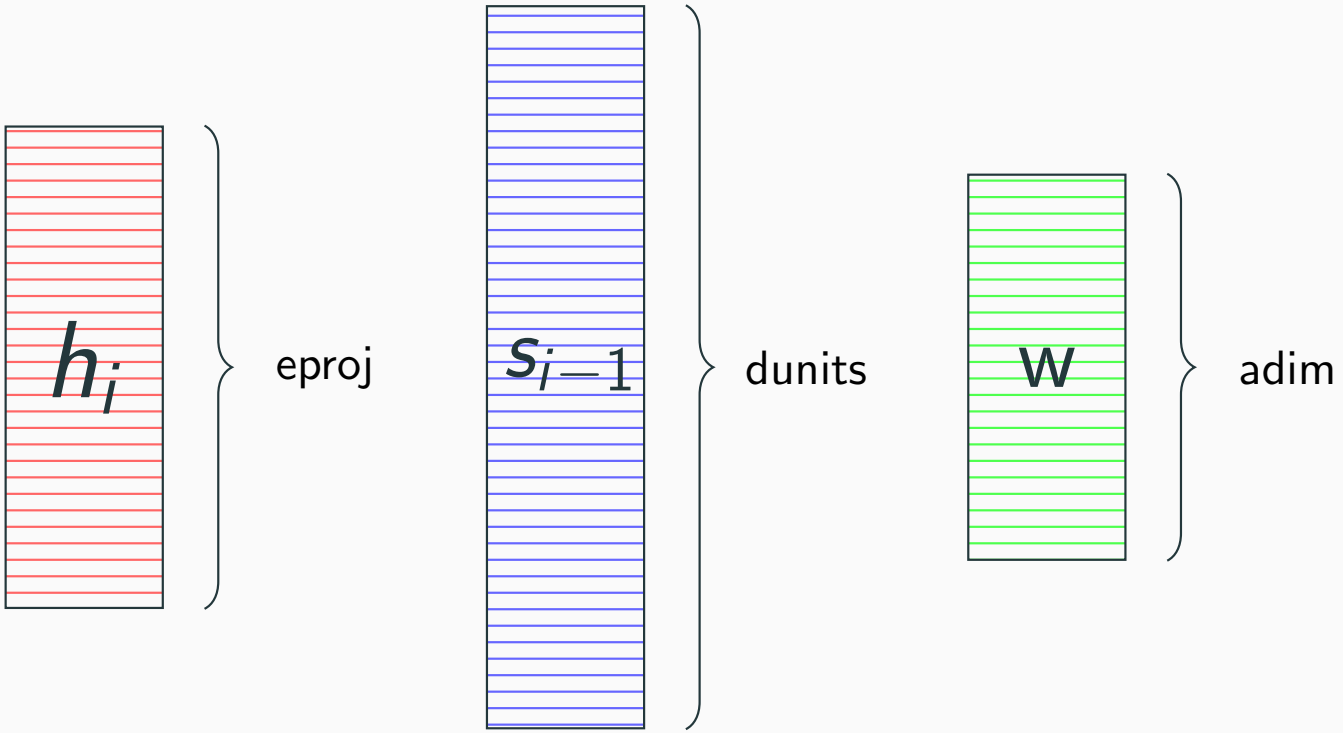


No Attention [Equal Attention?]

No Attention [Equal Attention?]

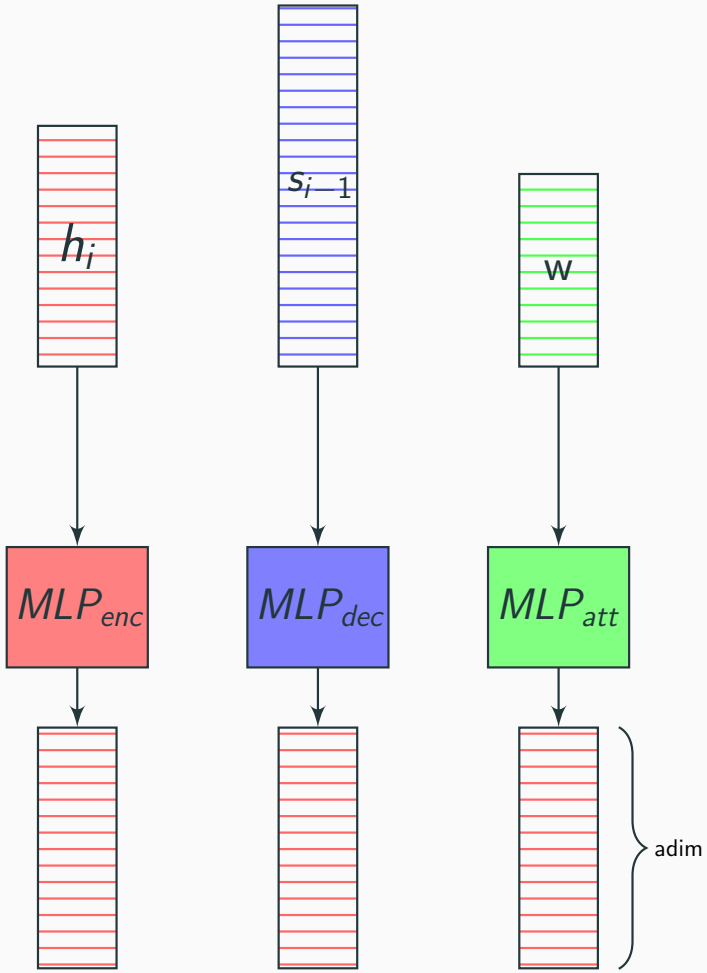


Dimensions of representations



Mostly *eproj* $\neq$ *dunits* $\neq$ *adim*

Matching the dimensions of representations



Dot product Attention

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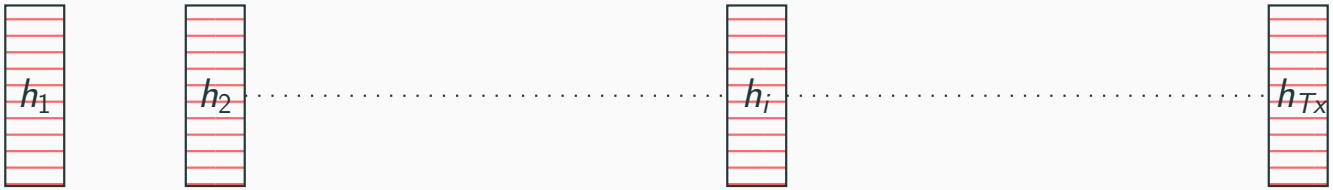

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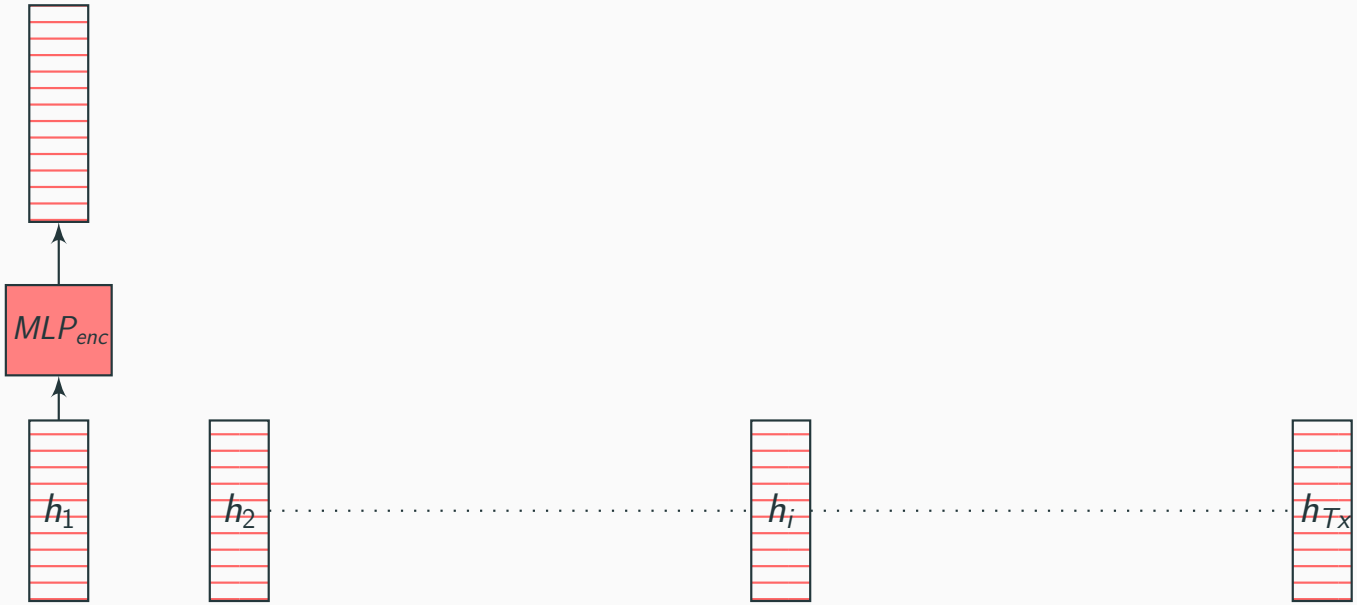

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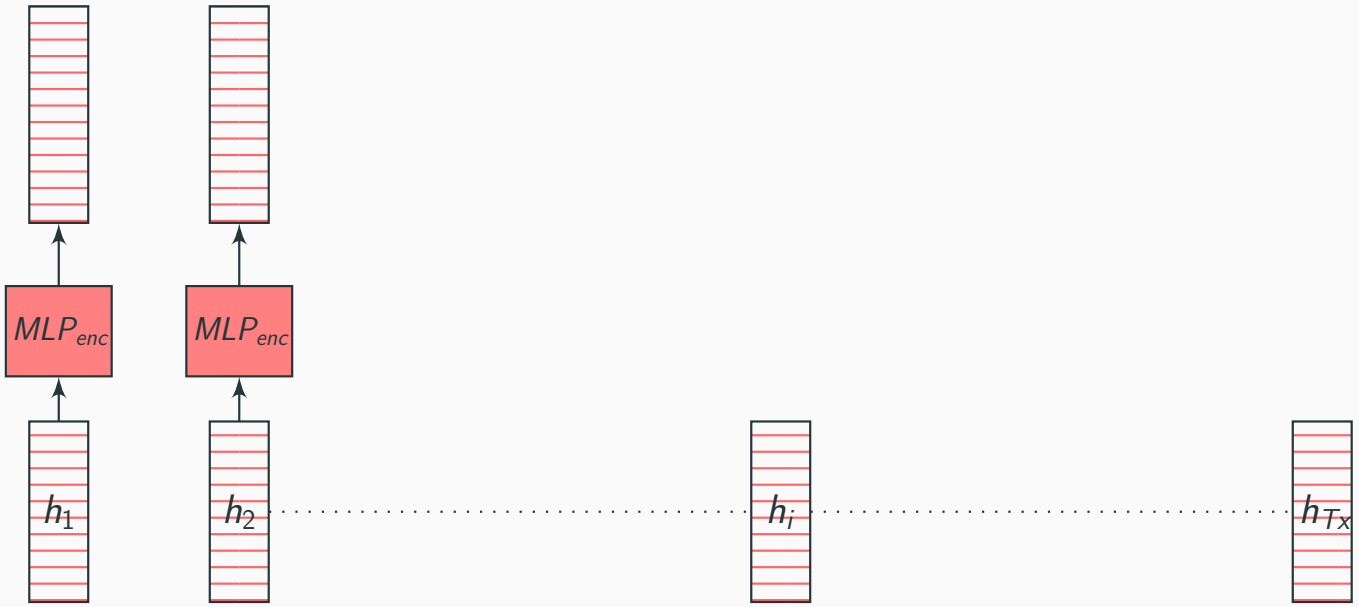

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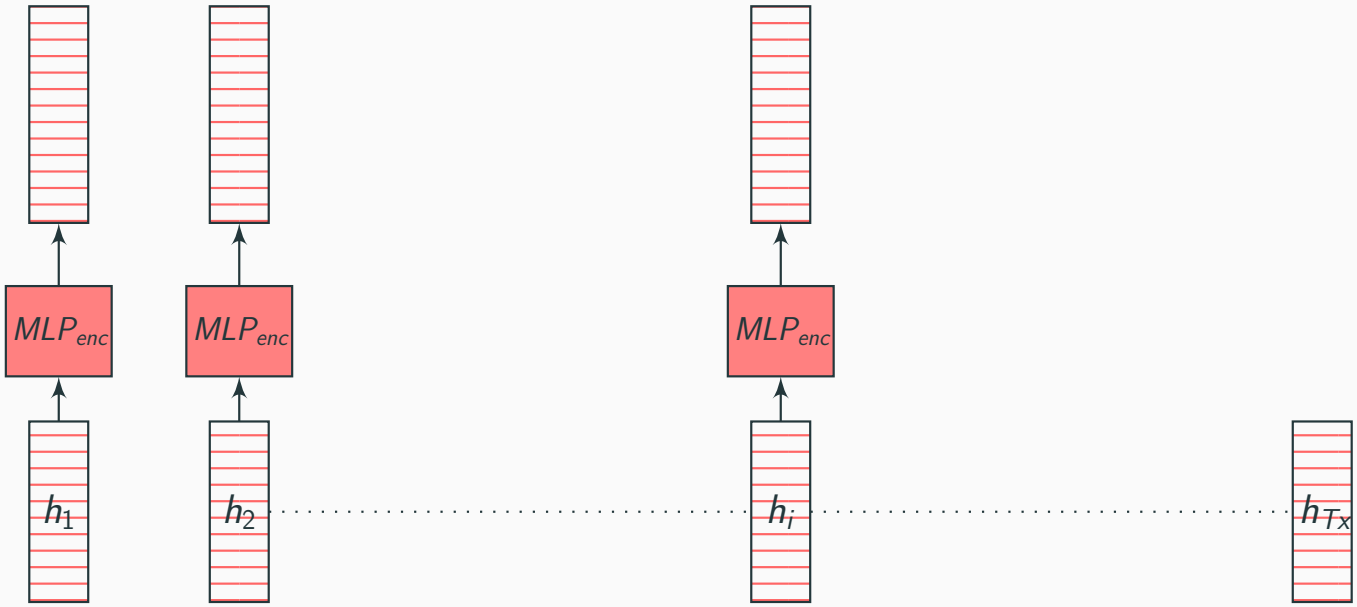

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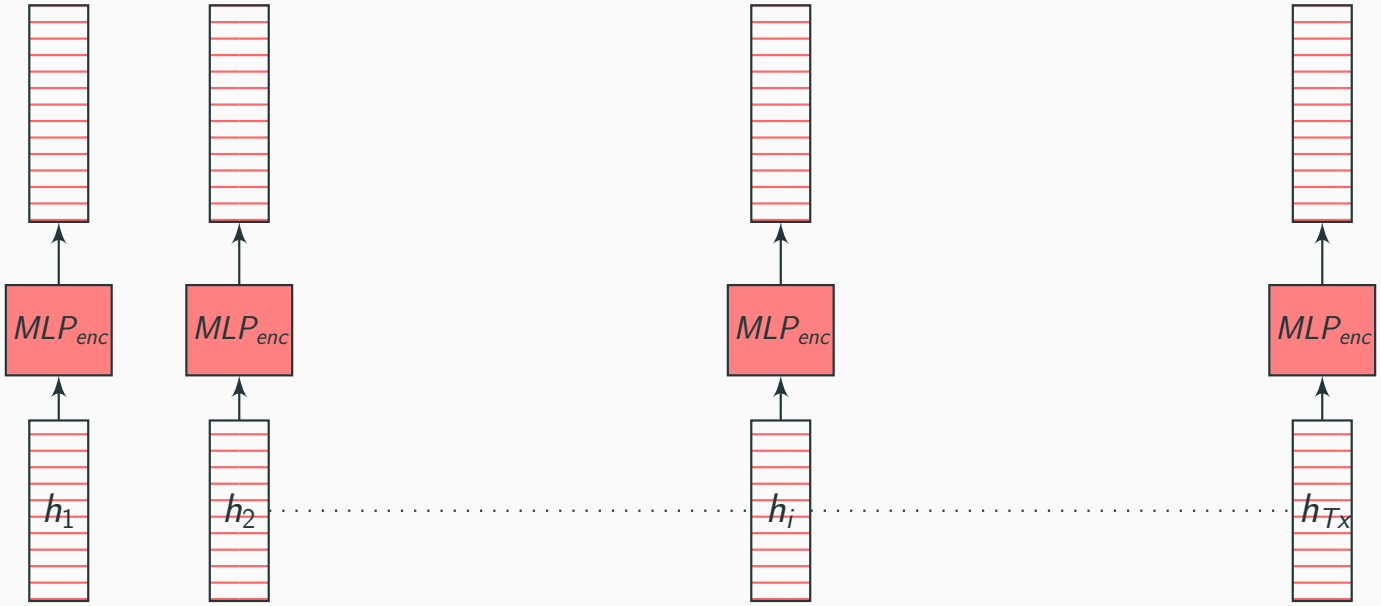

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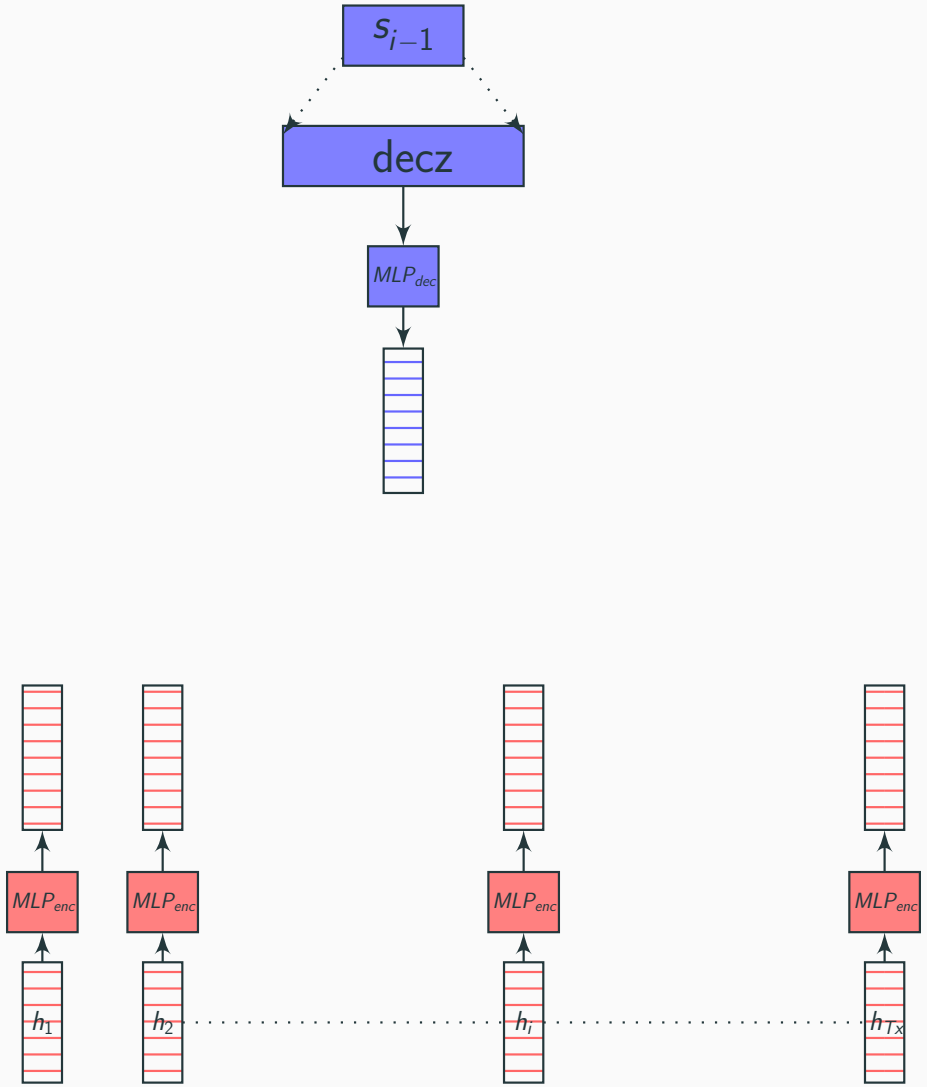

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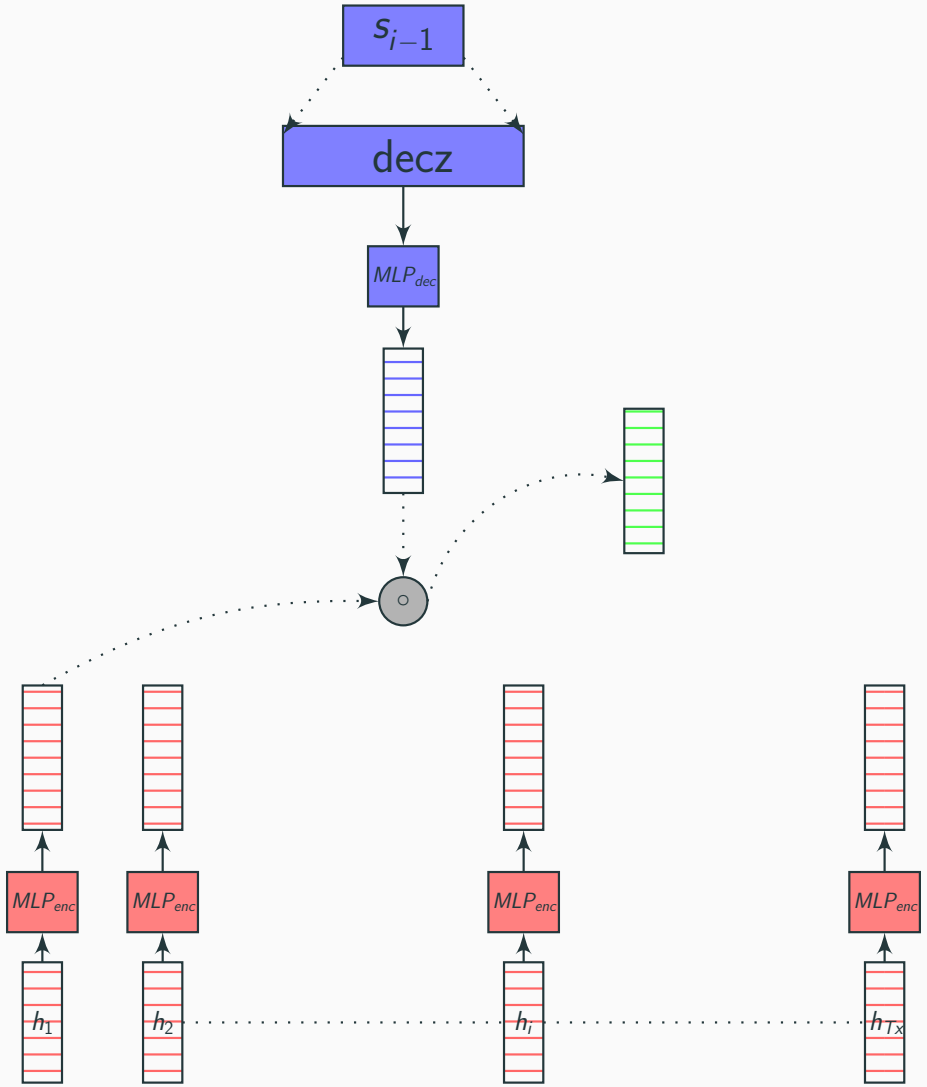

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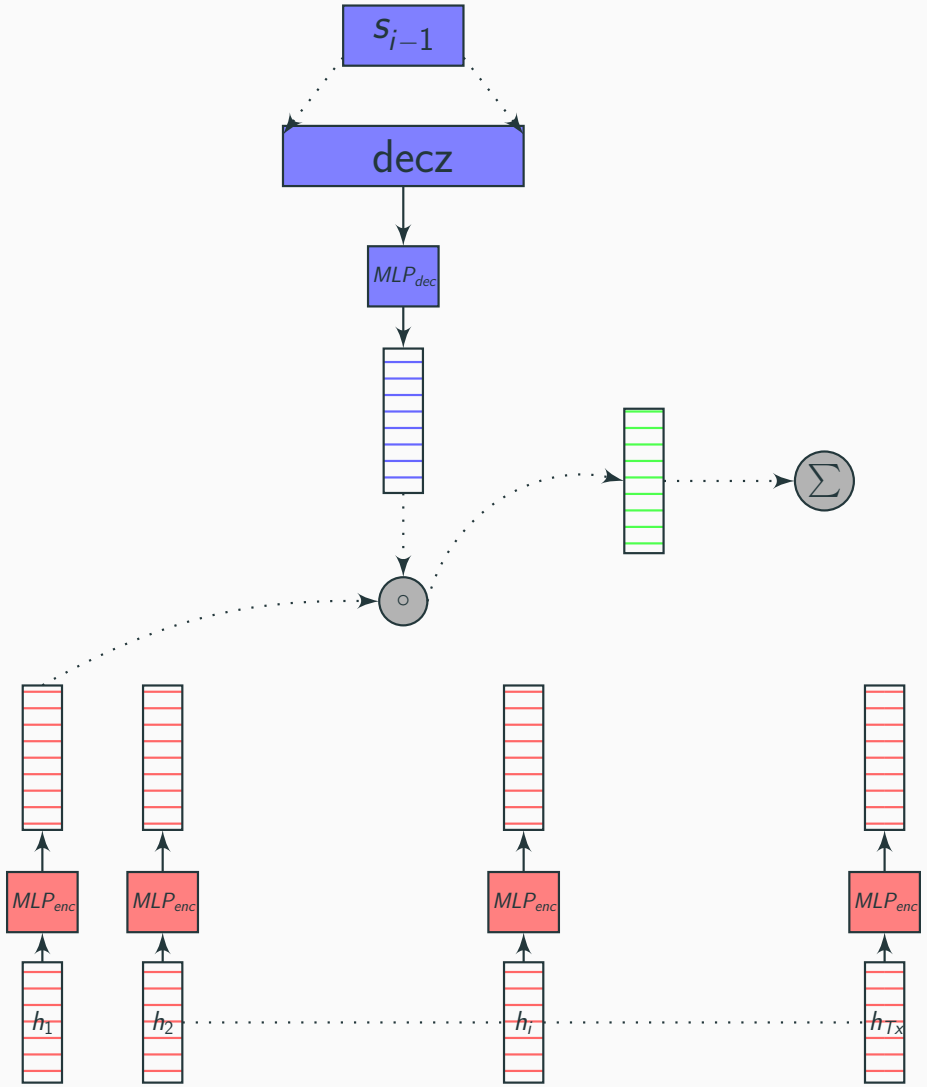

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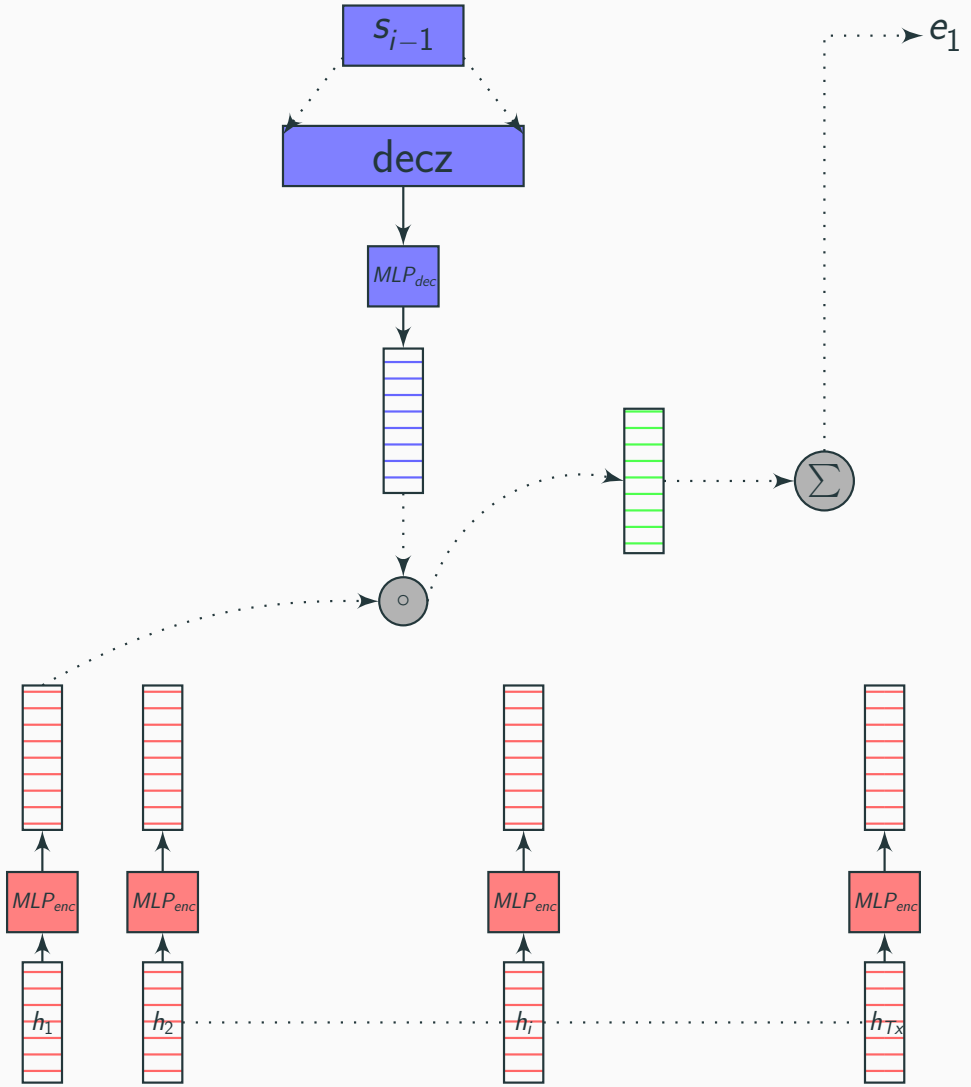

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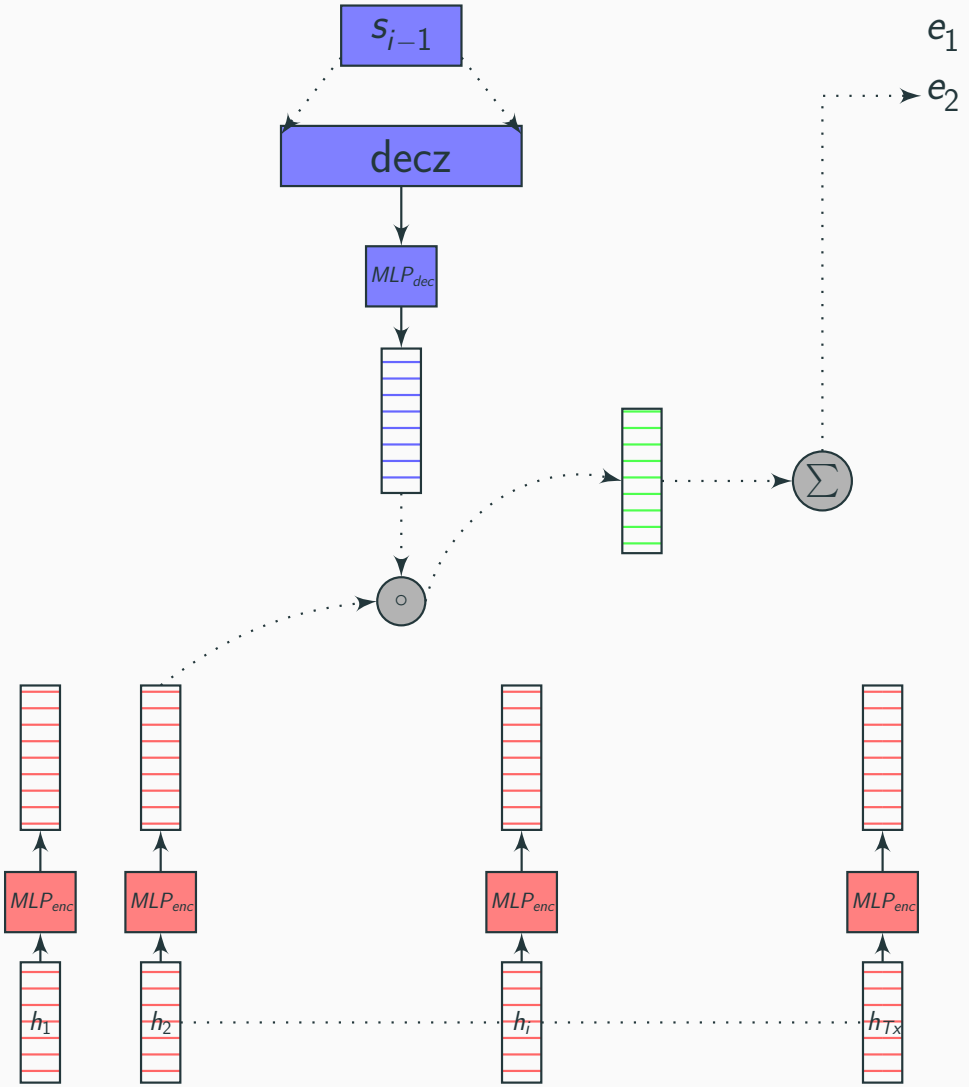

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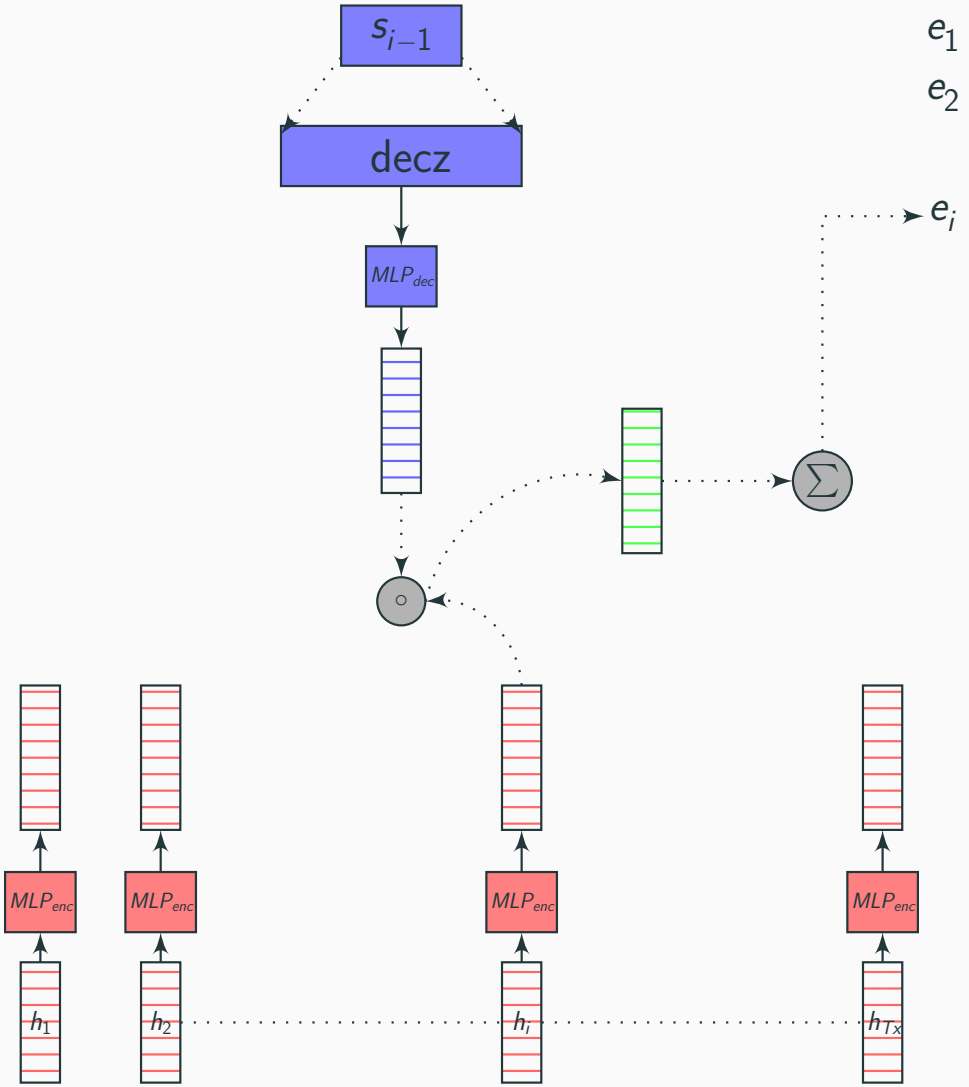

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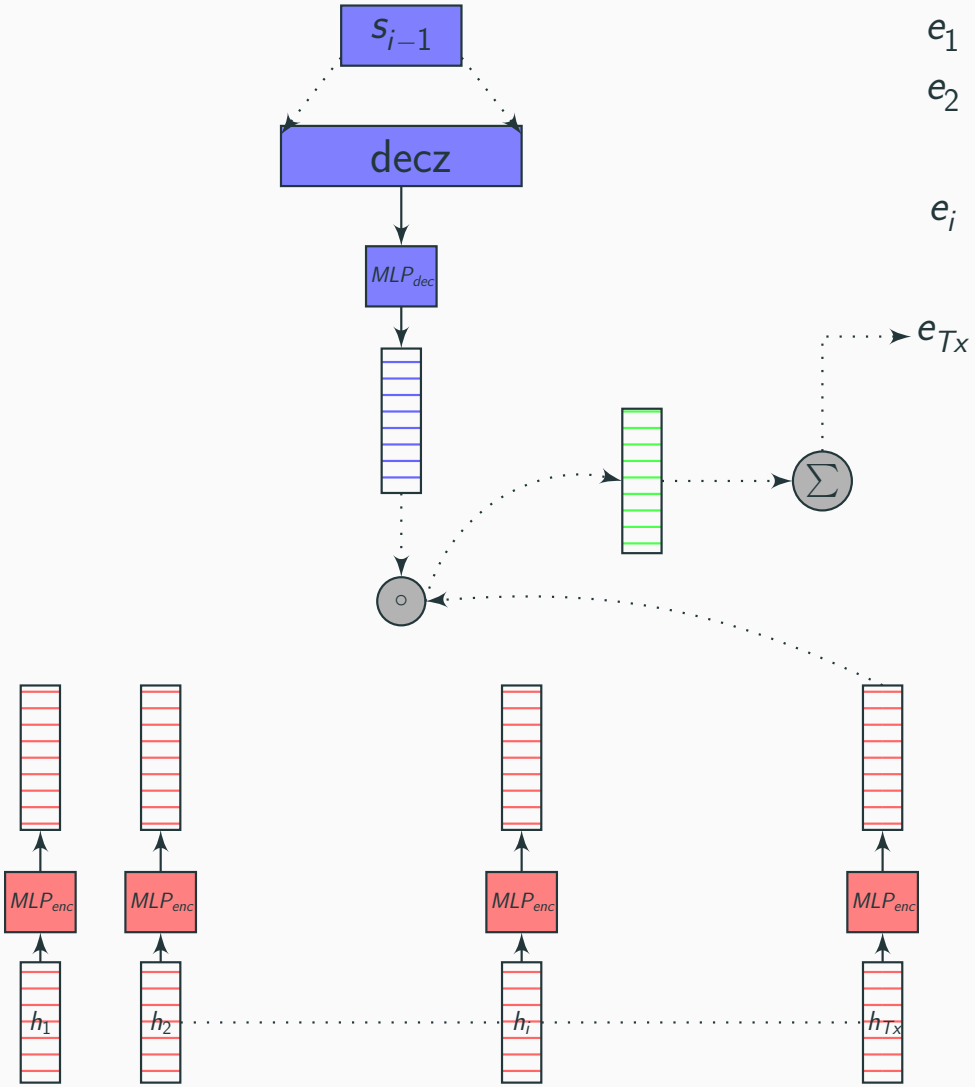

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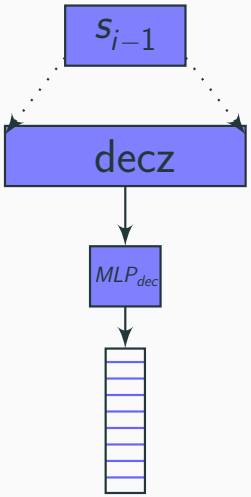

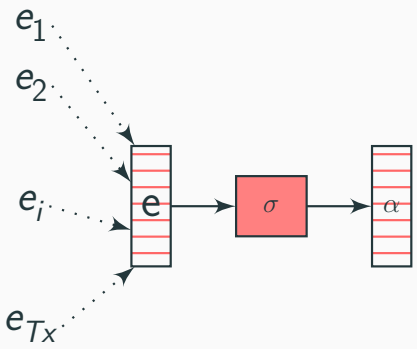

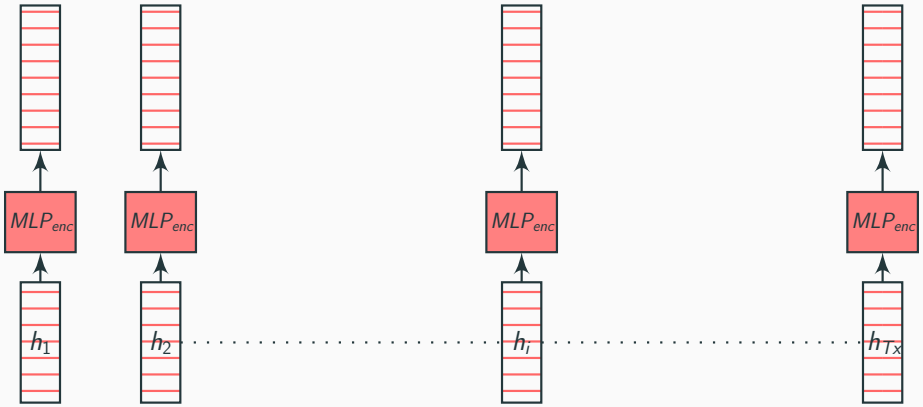

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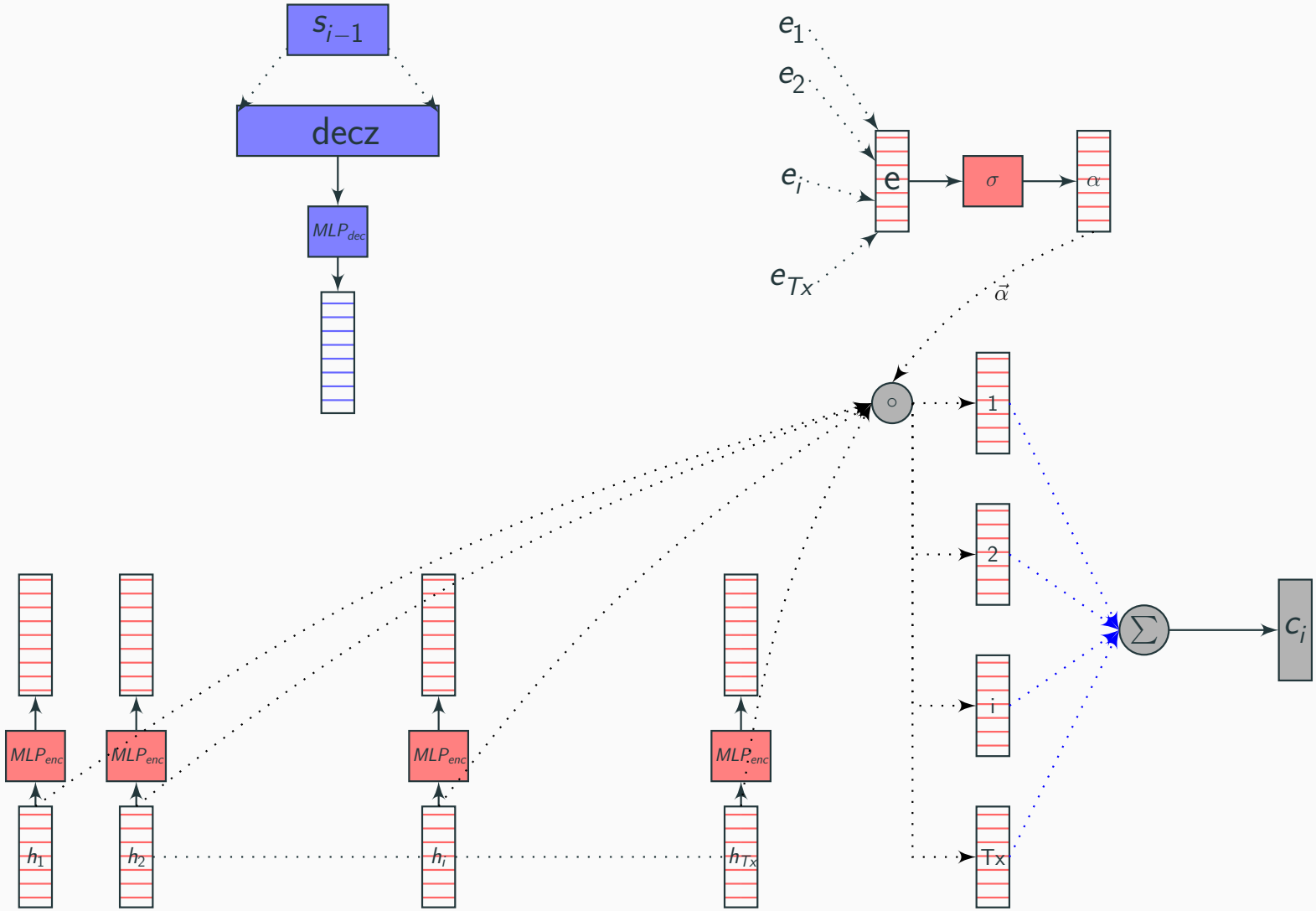

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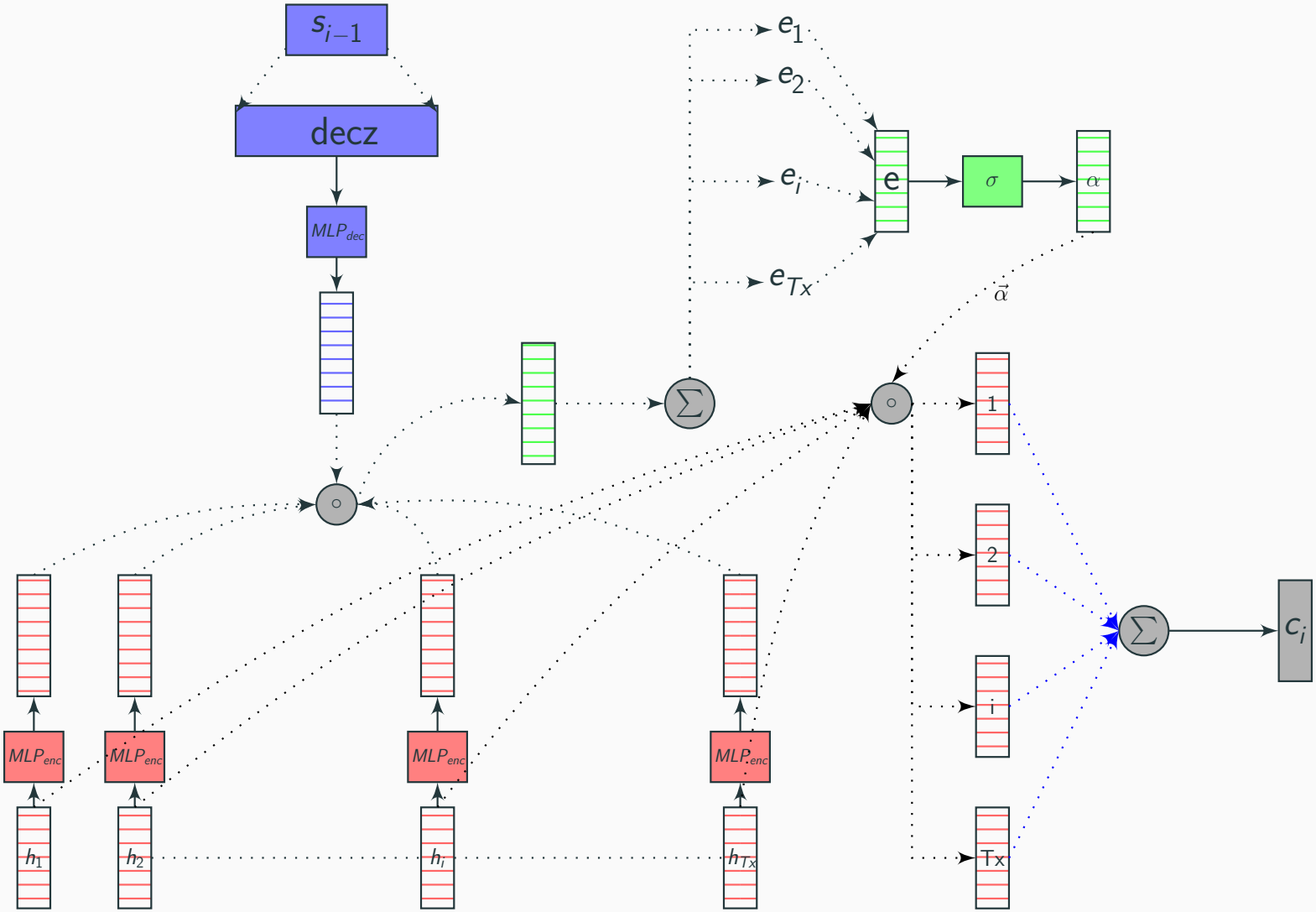

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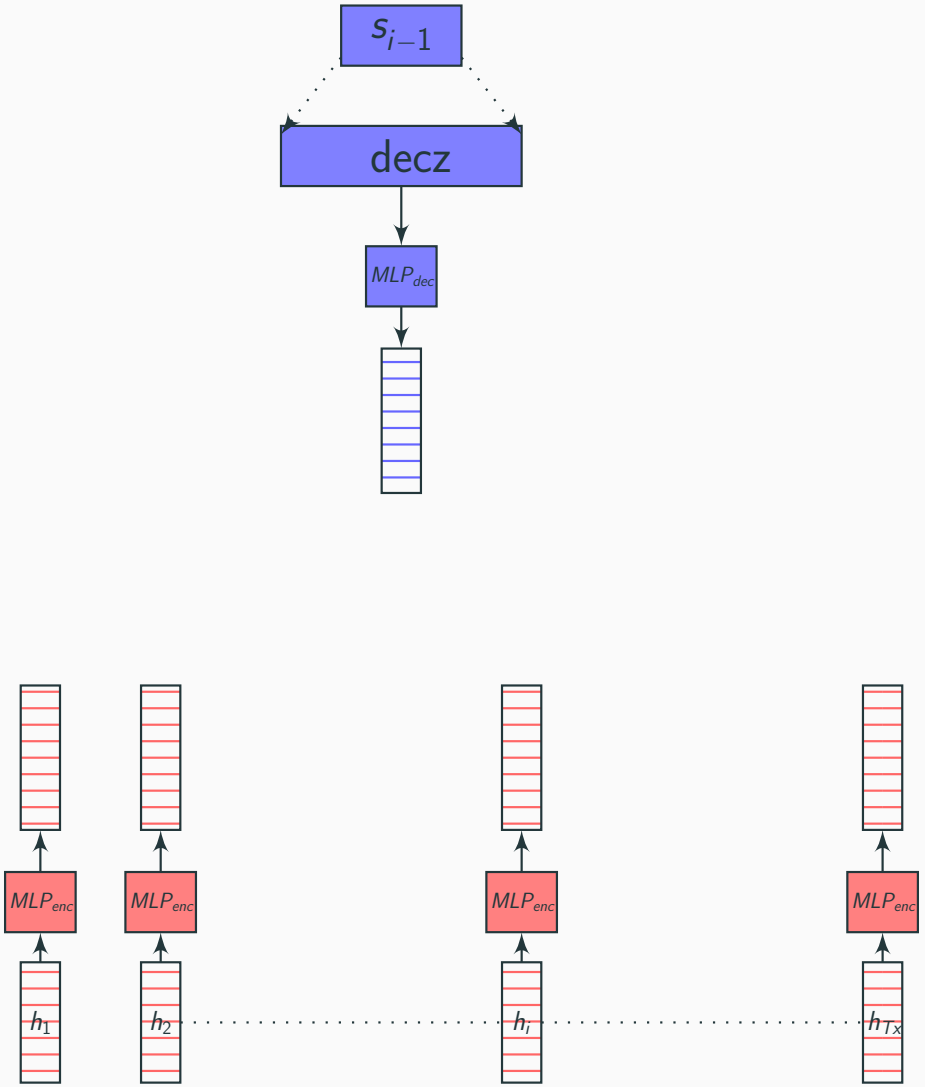

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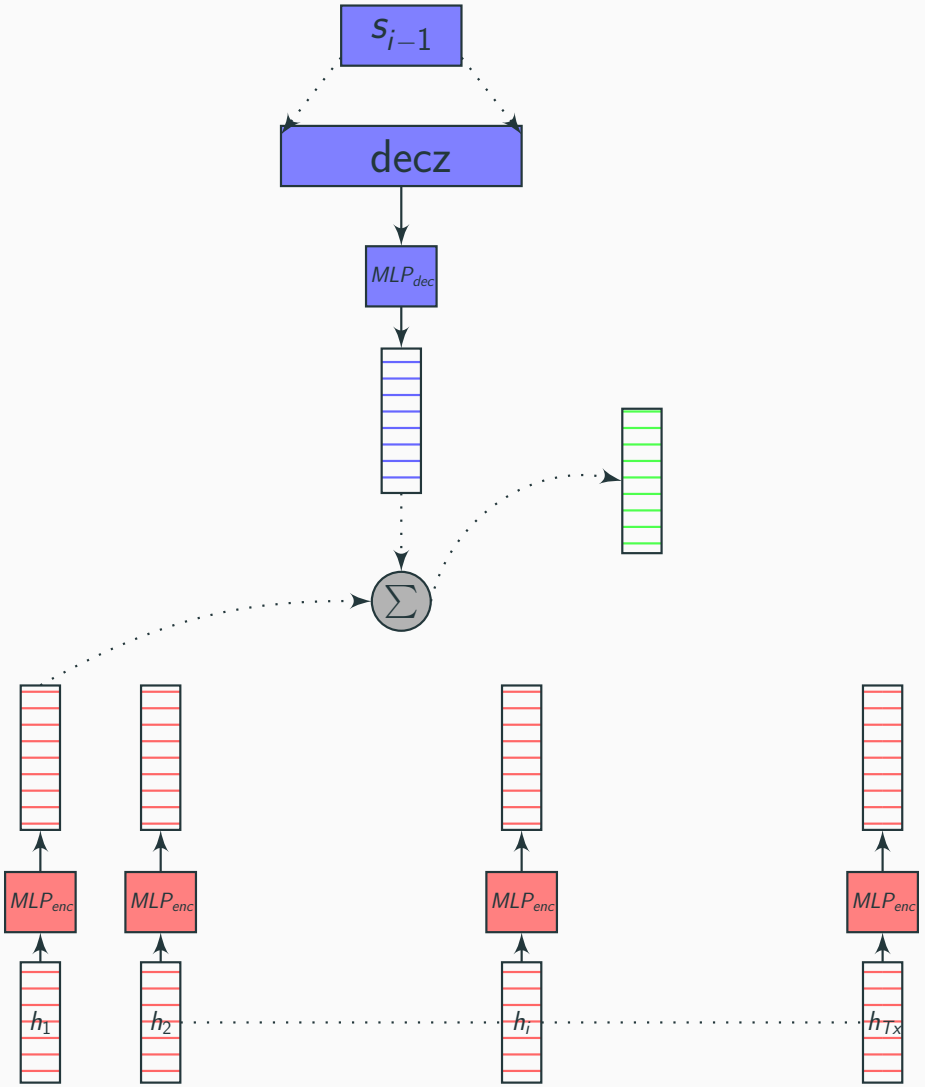

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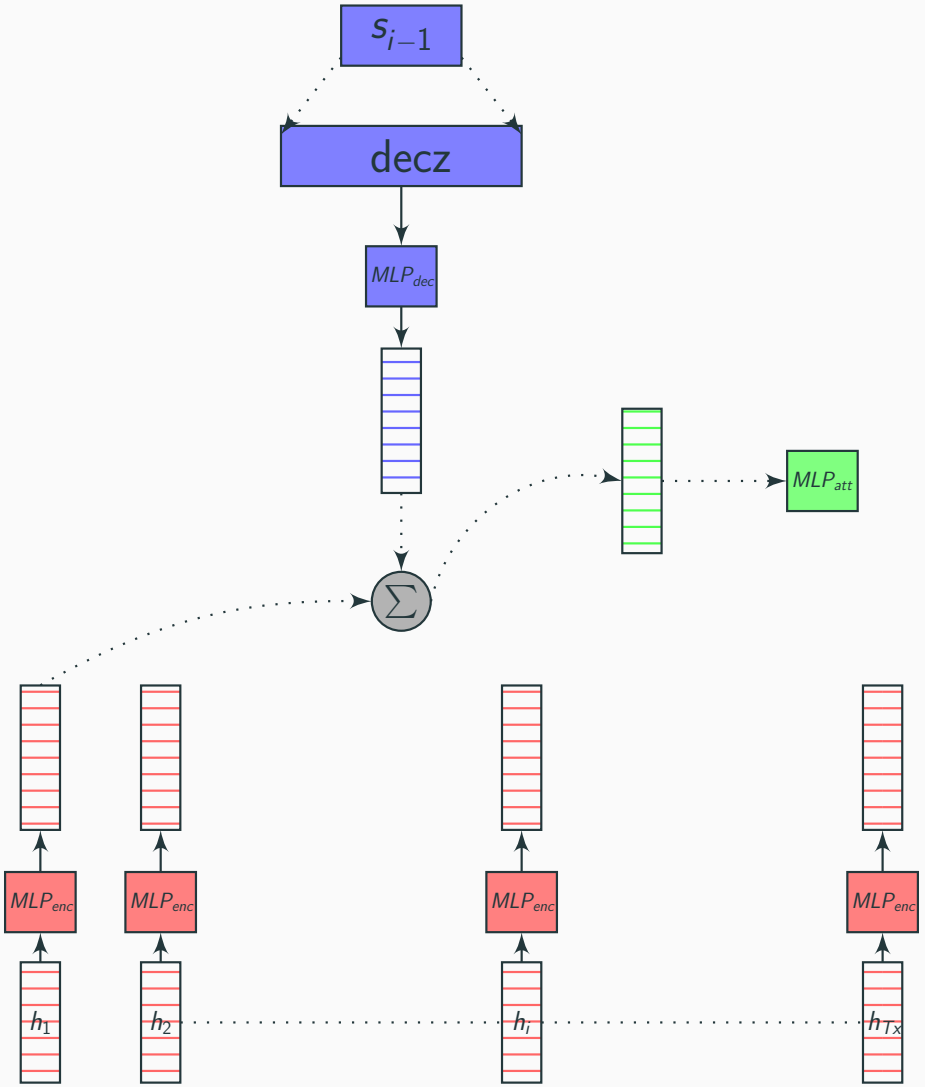

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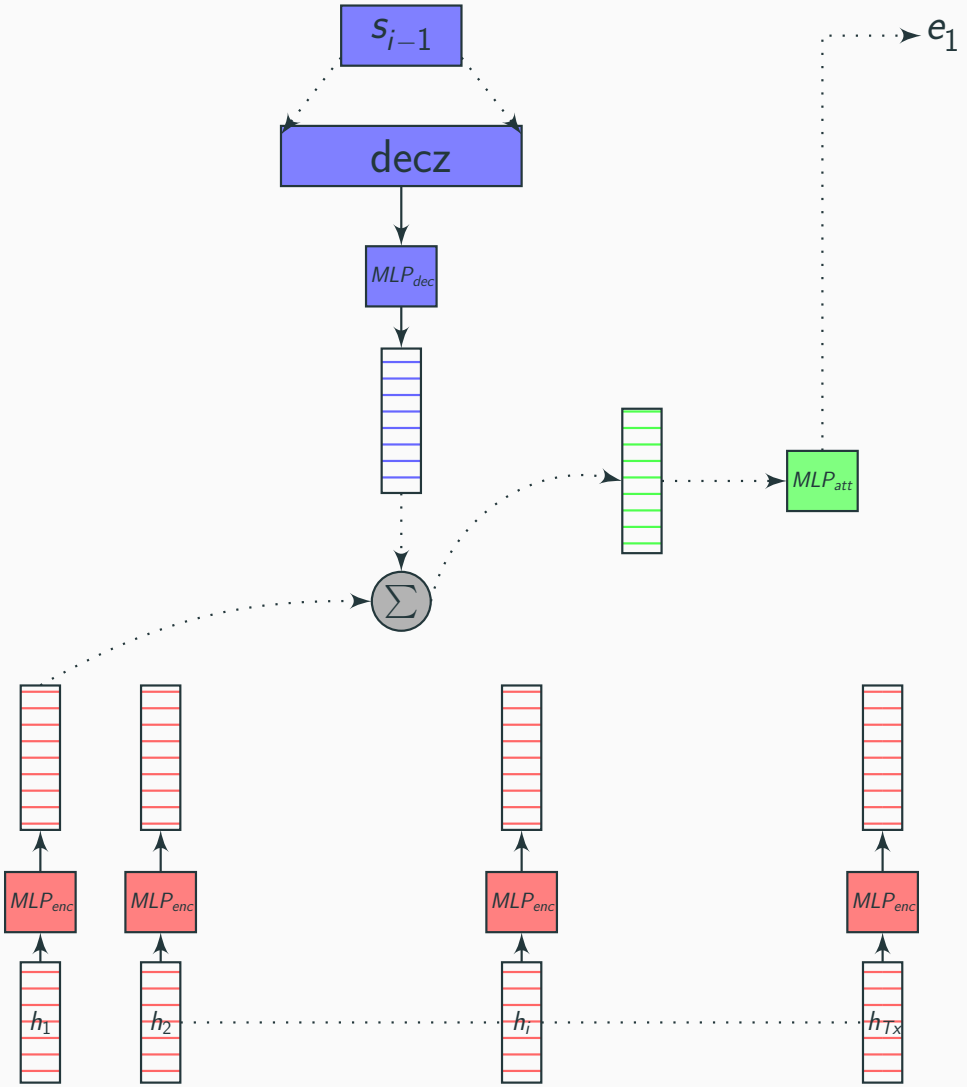

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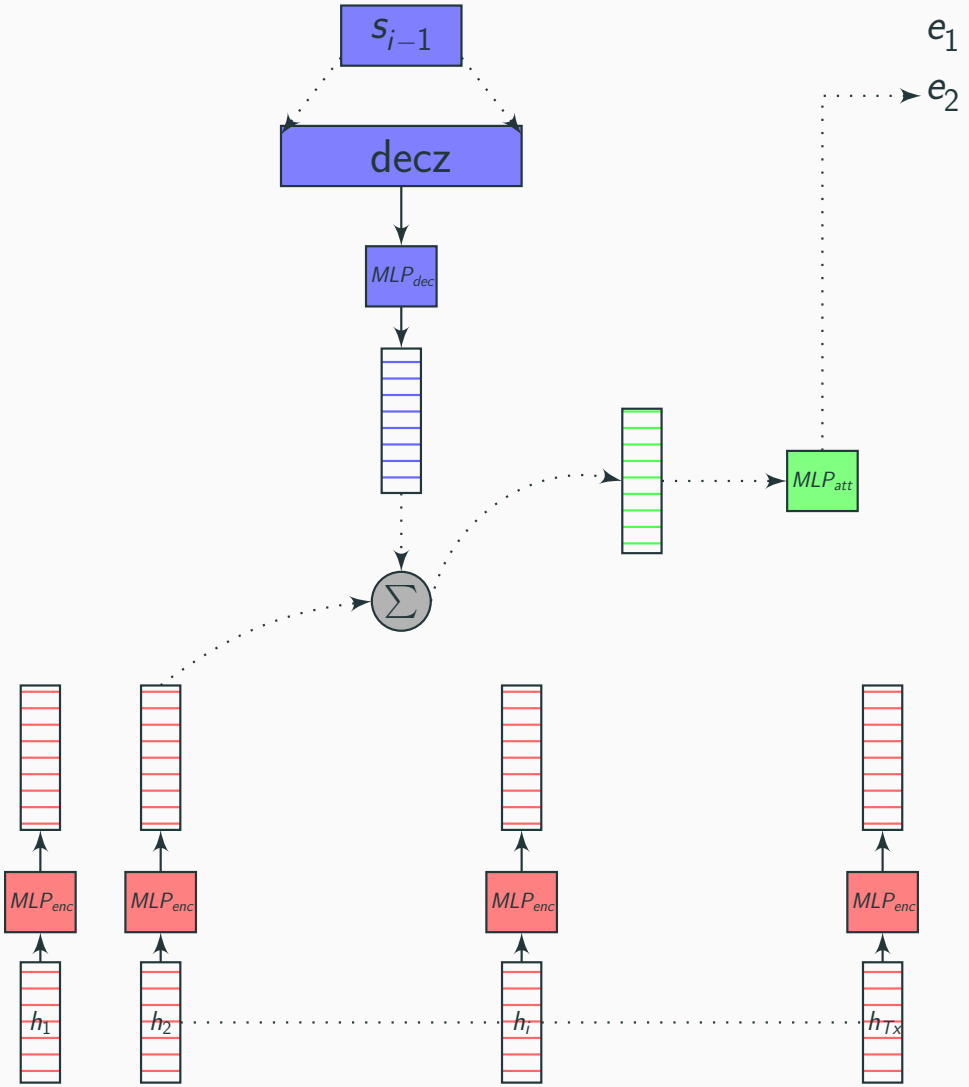

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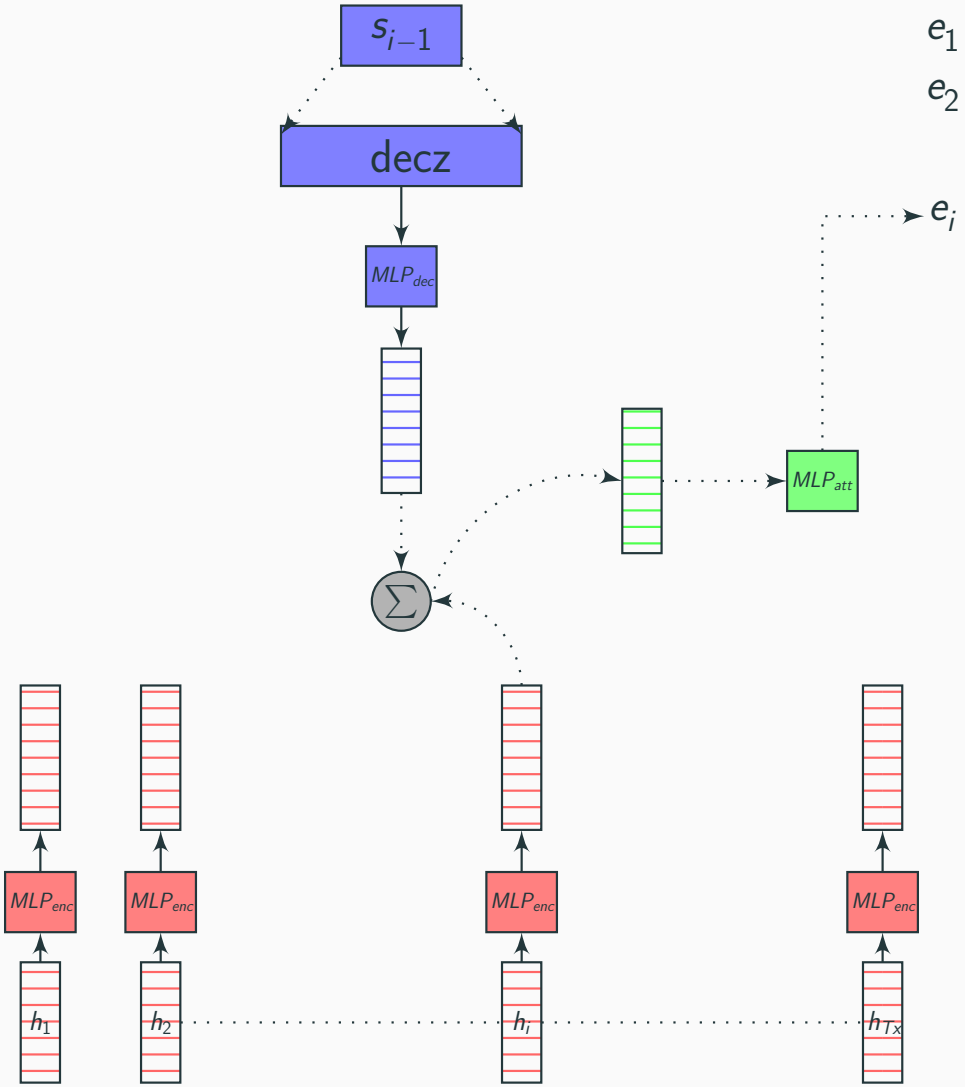

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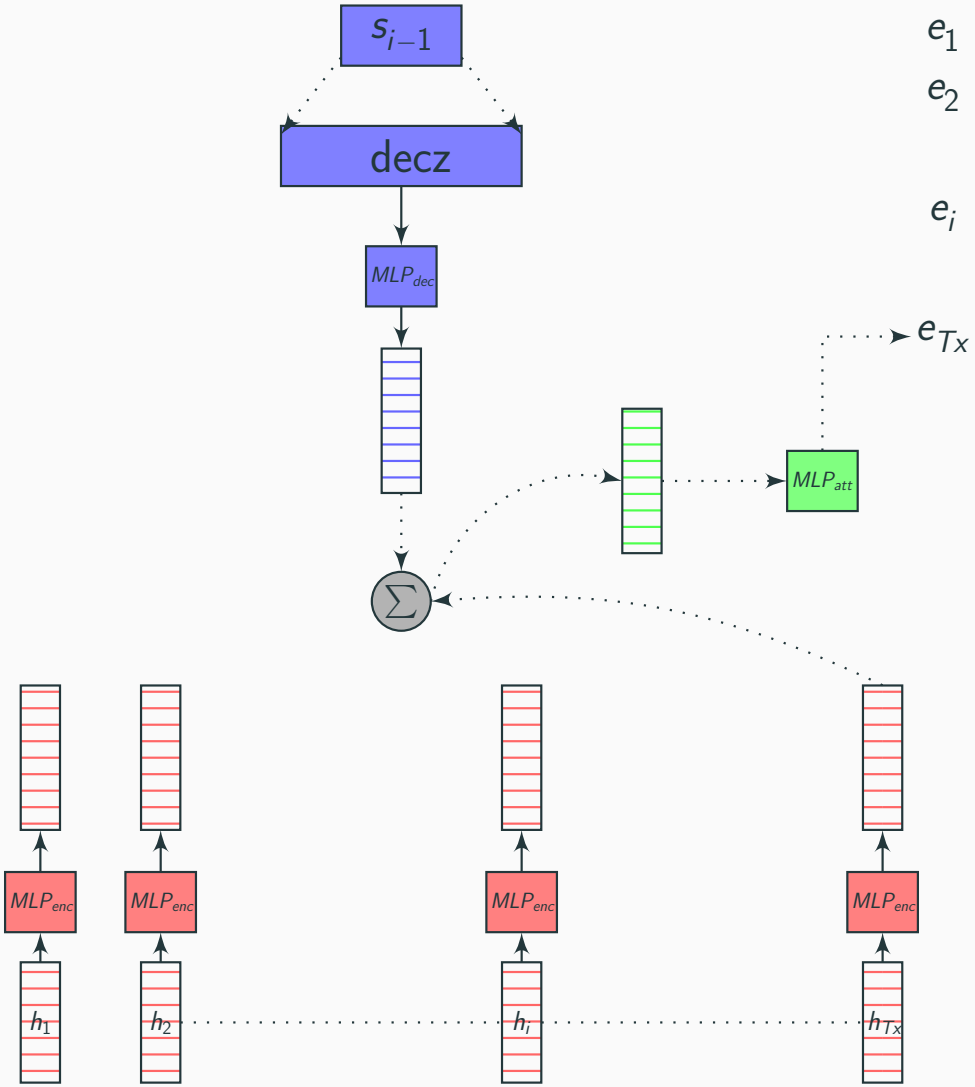

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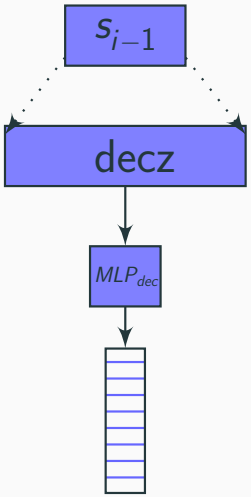

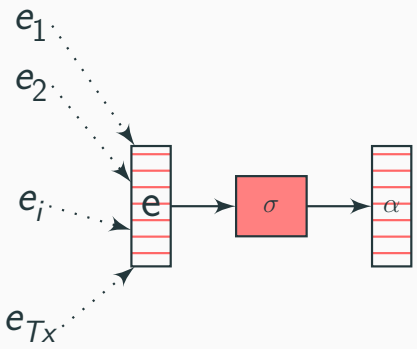

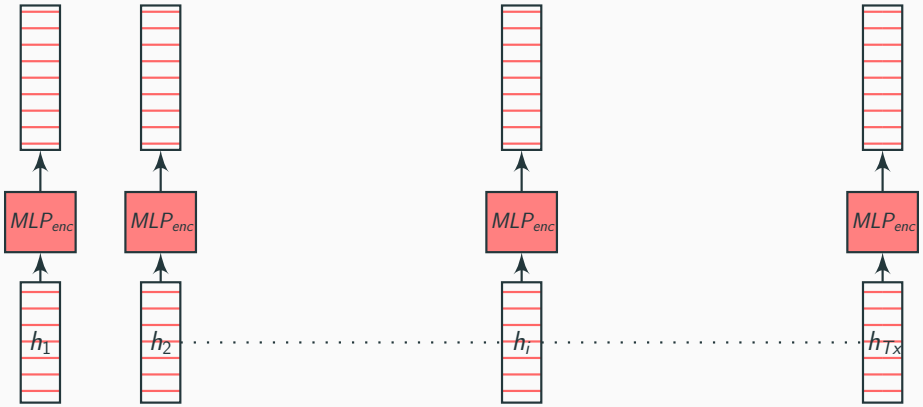

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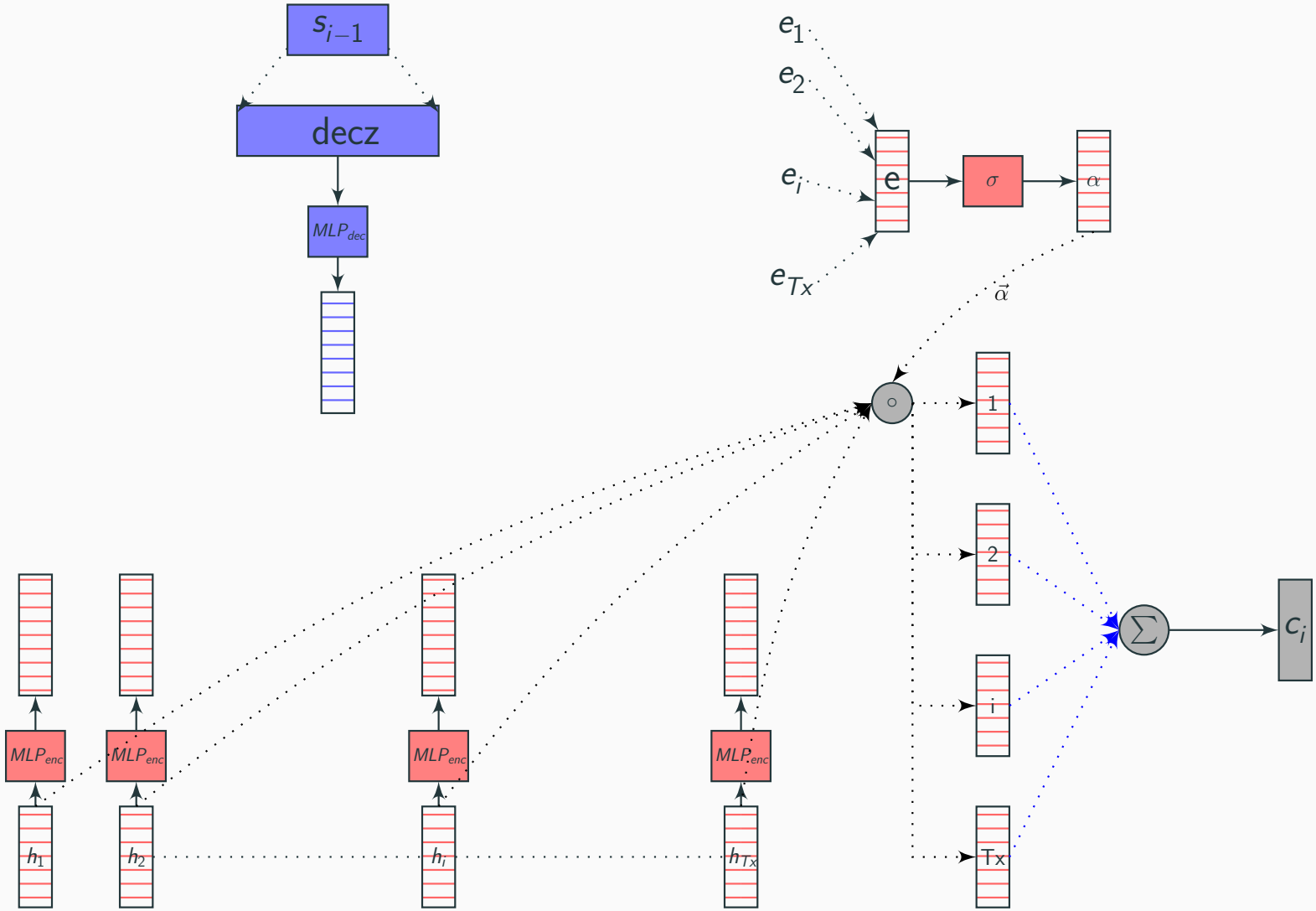

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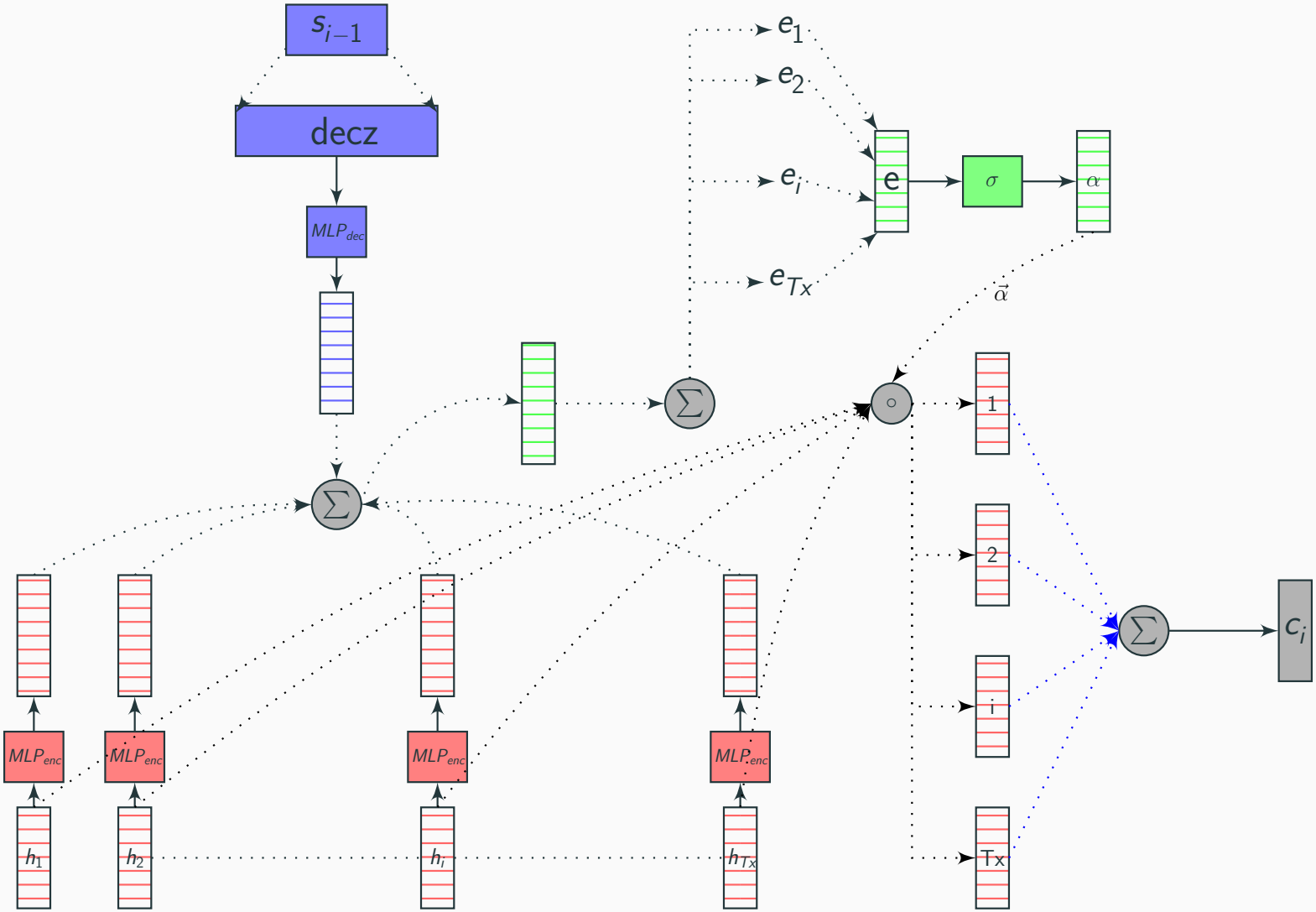

Location Aware Attention

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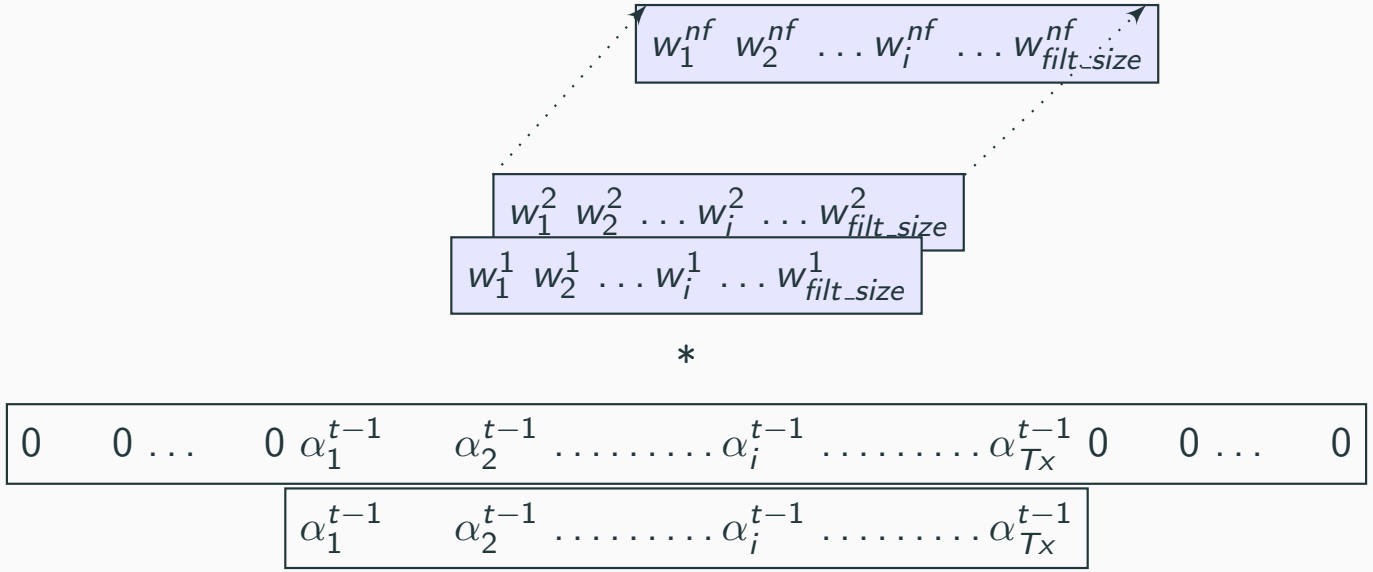

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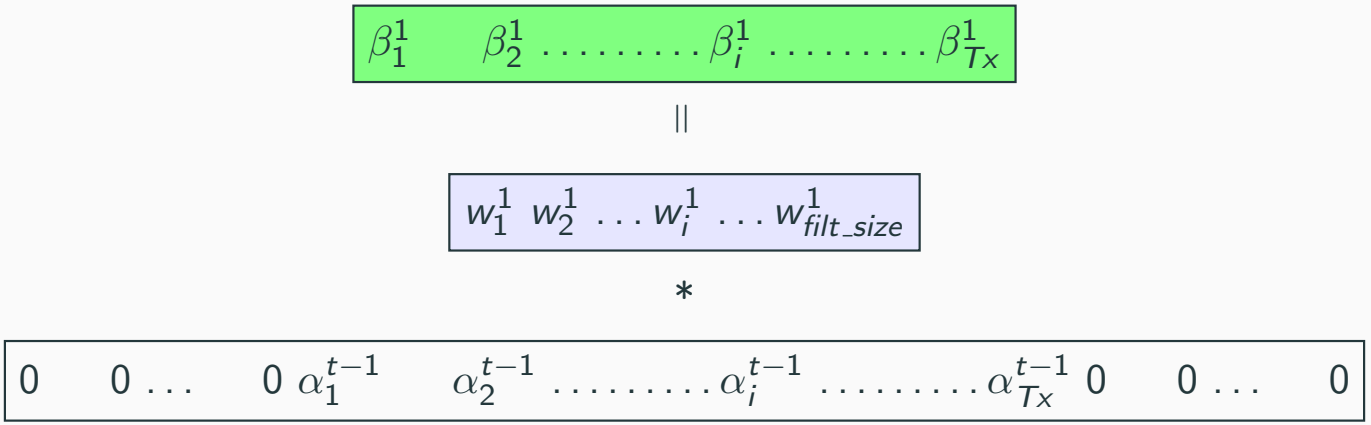
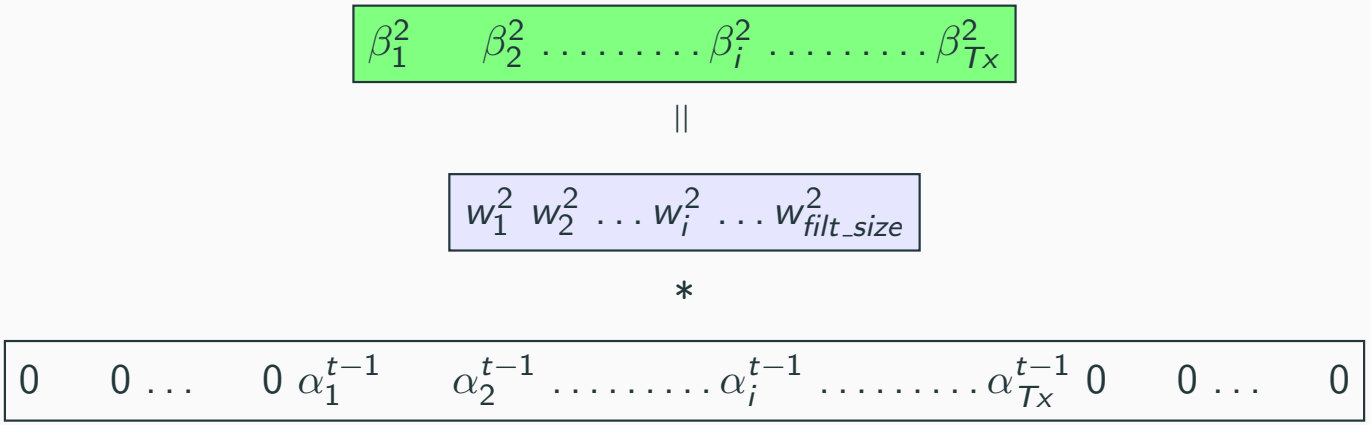
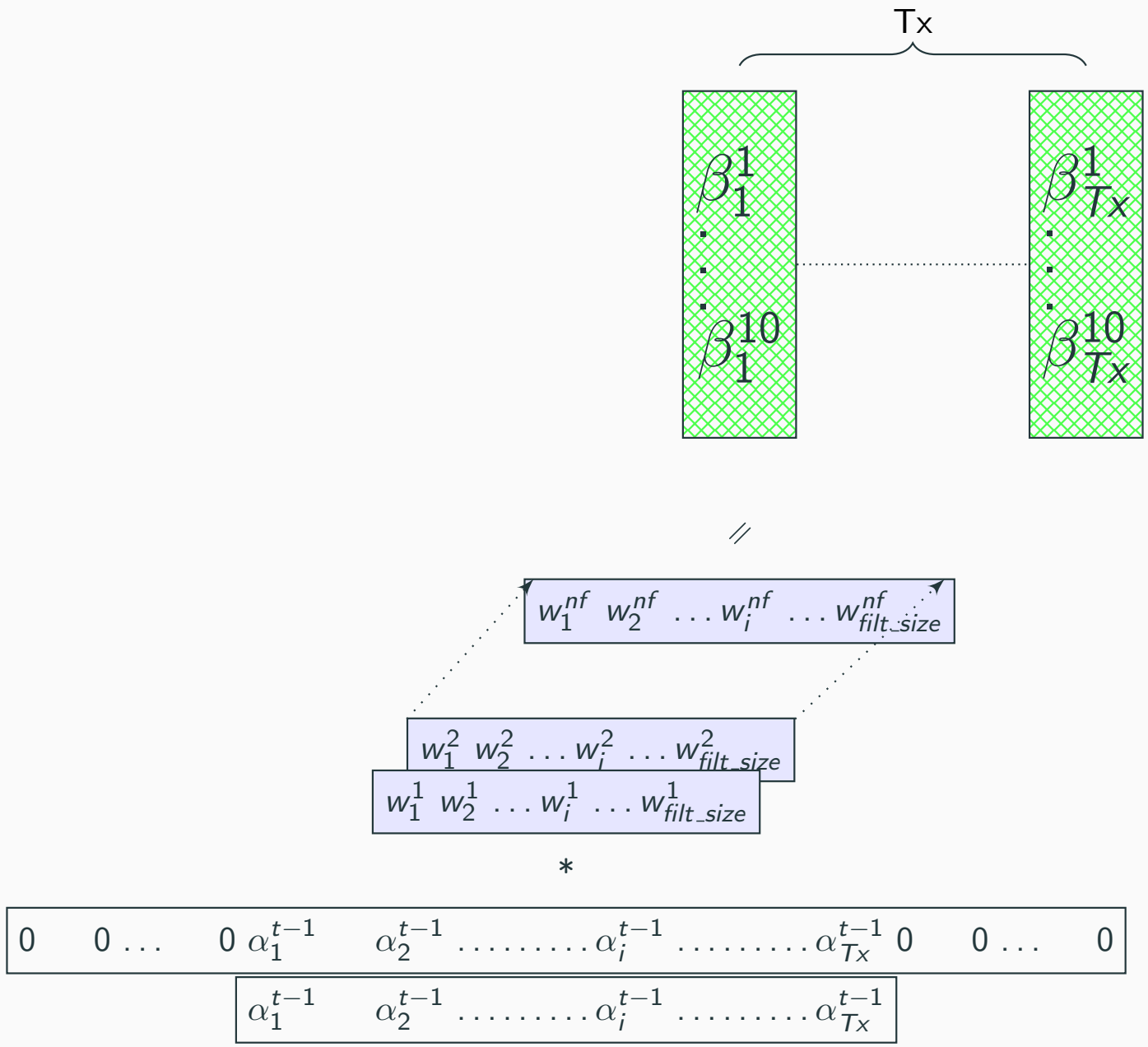


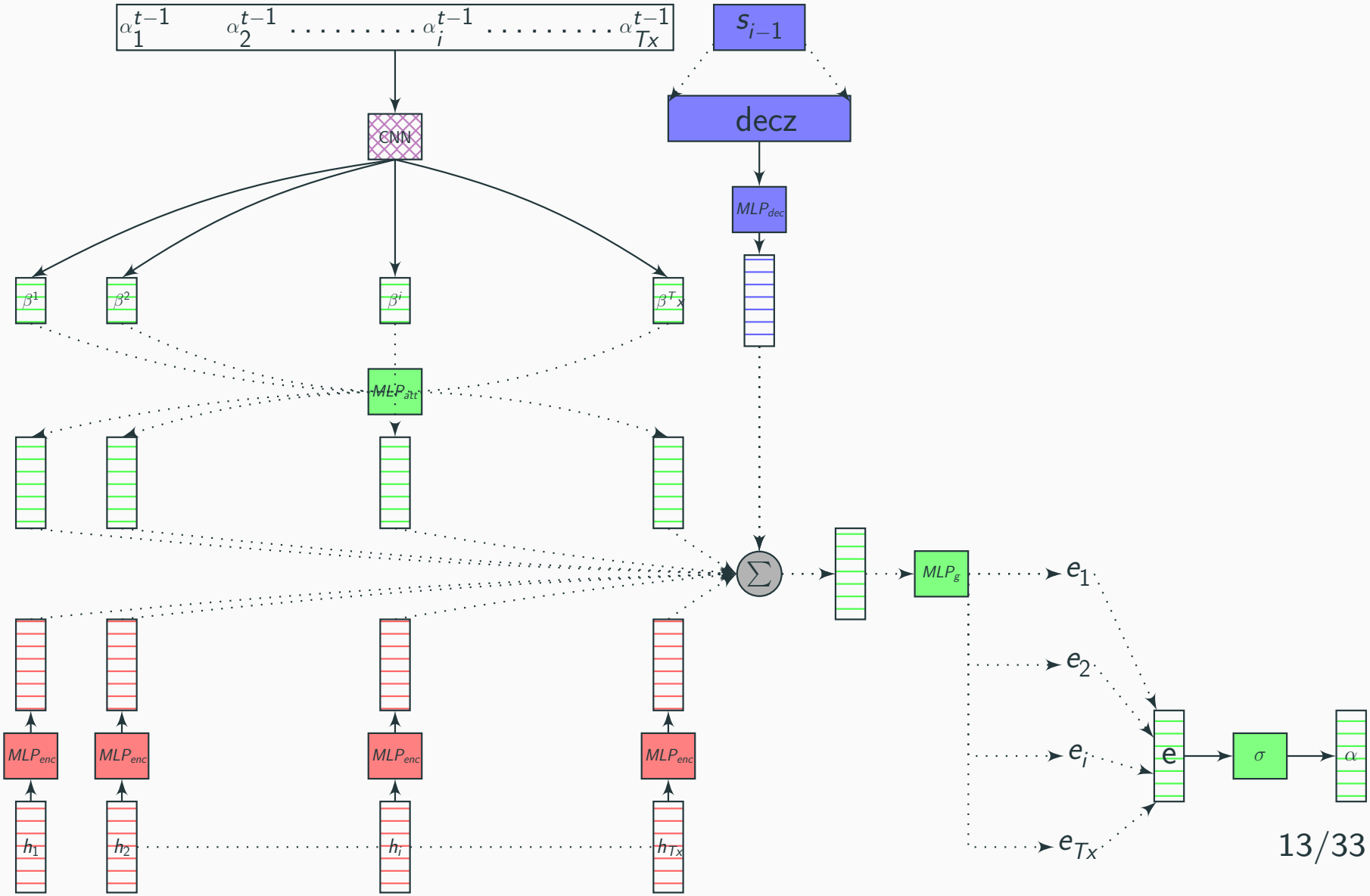
Location Aware Attention



Location Aware Attention

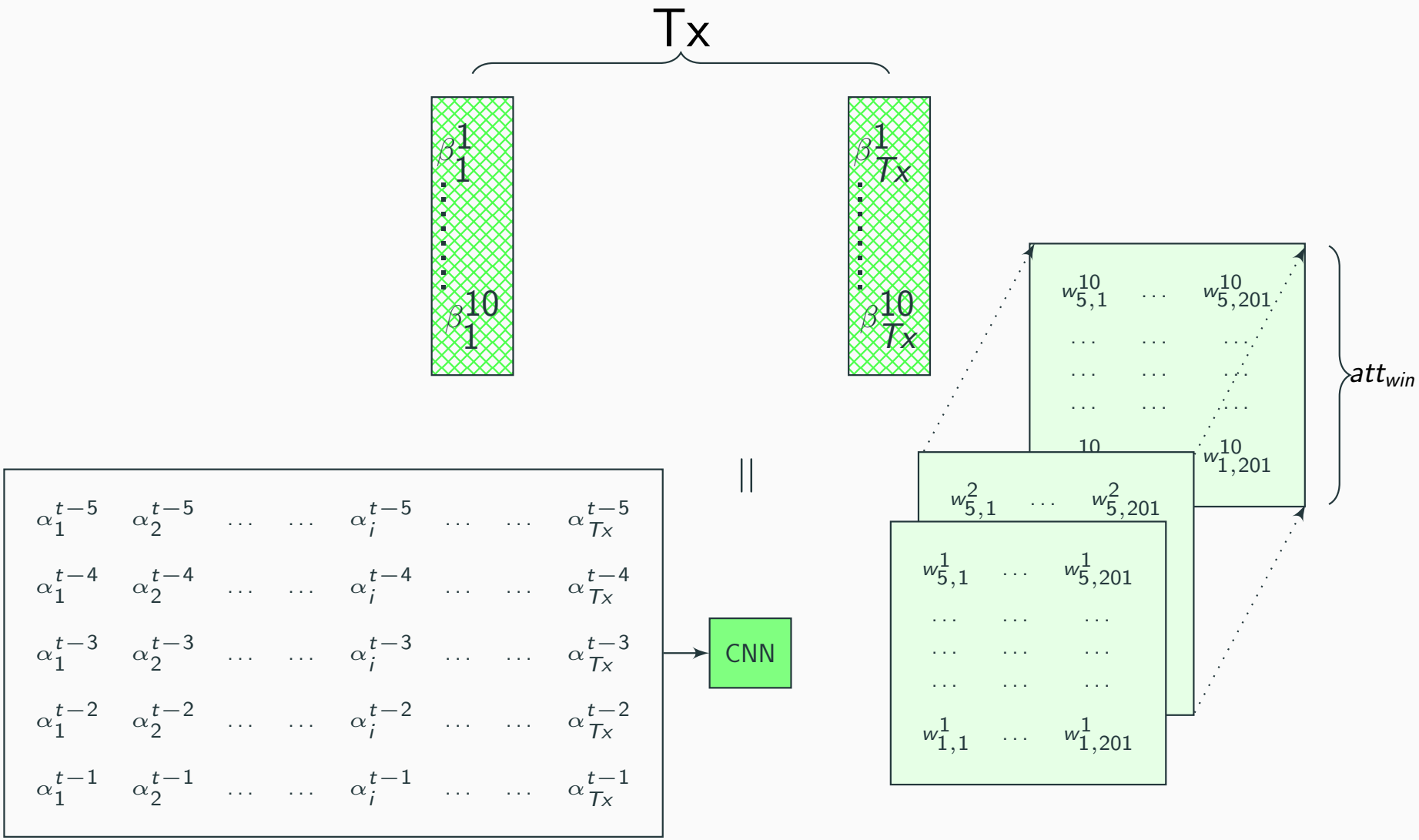


Location Aware Attention - Full picture

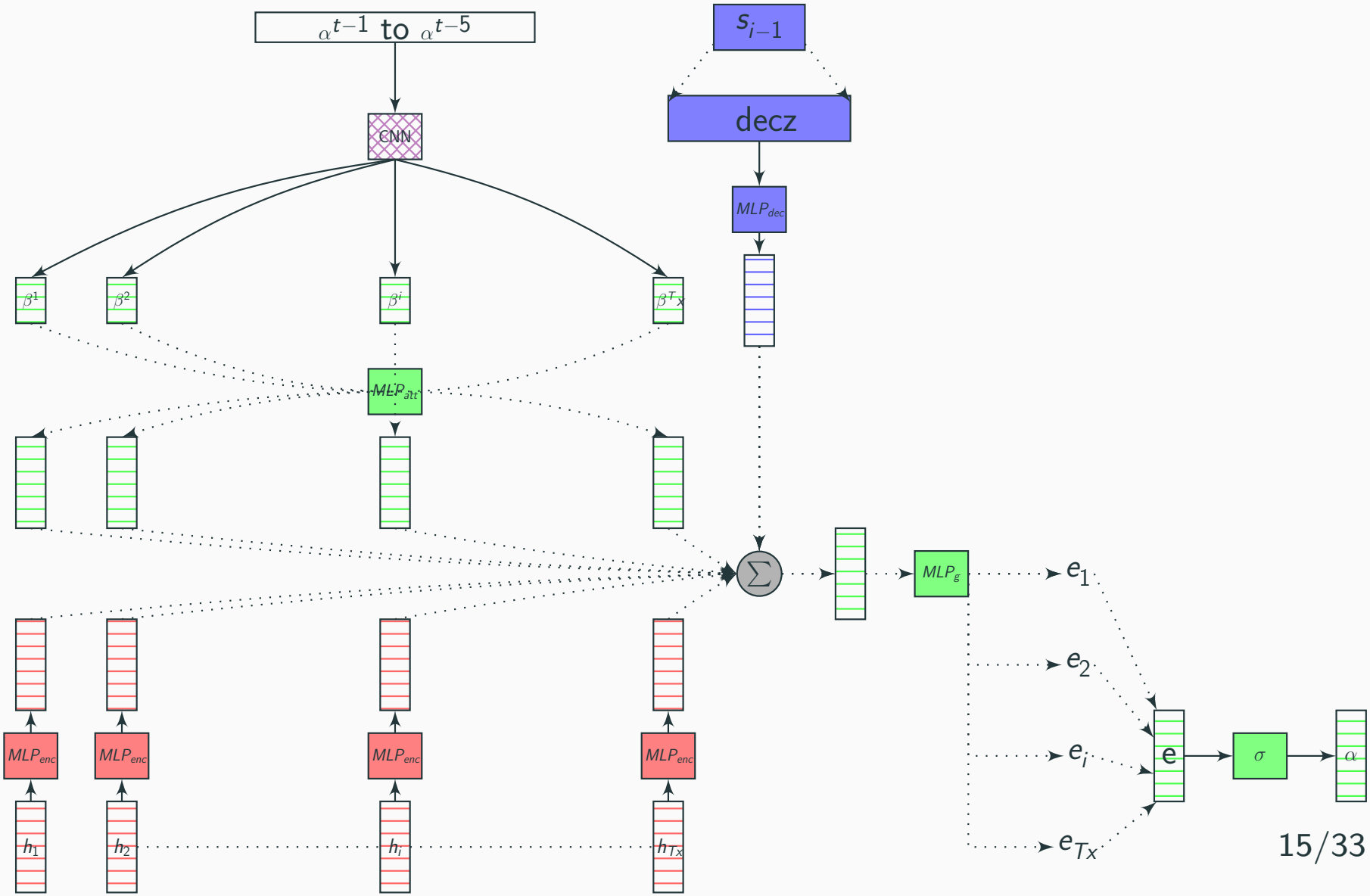


2D Location Aware Attention

2D Location Aware Attention

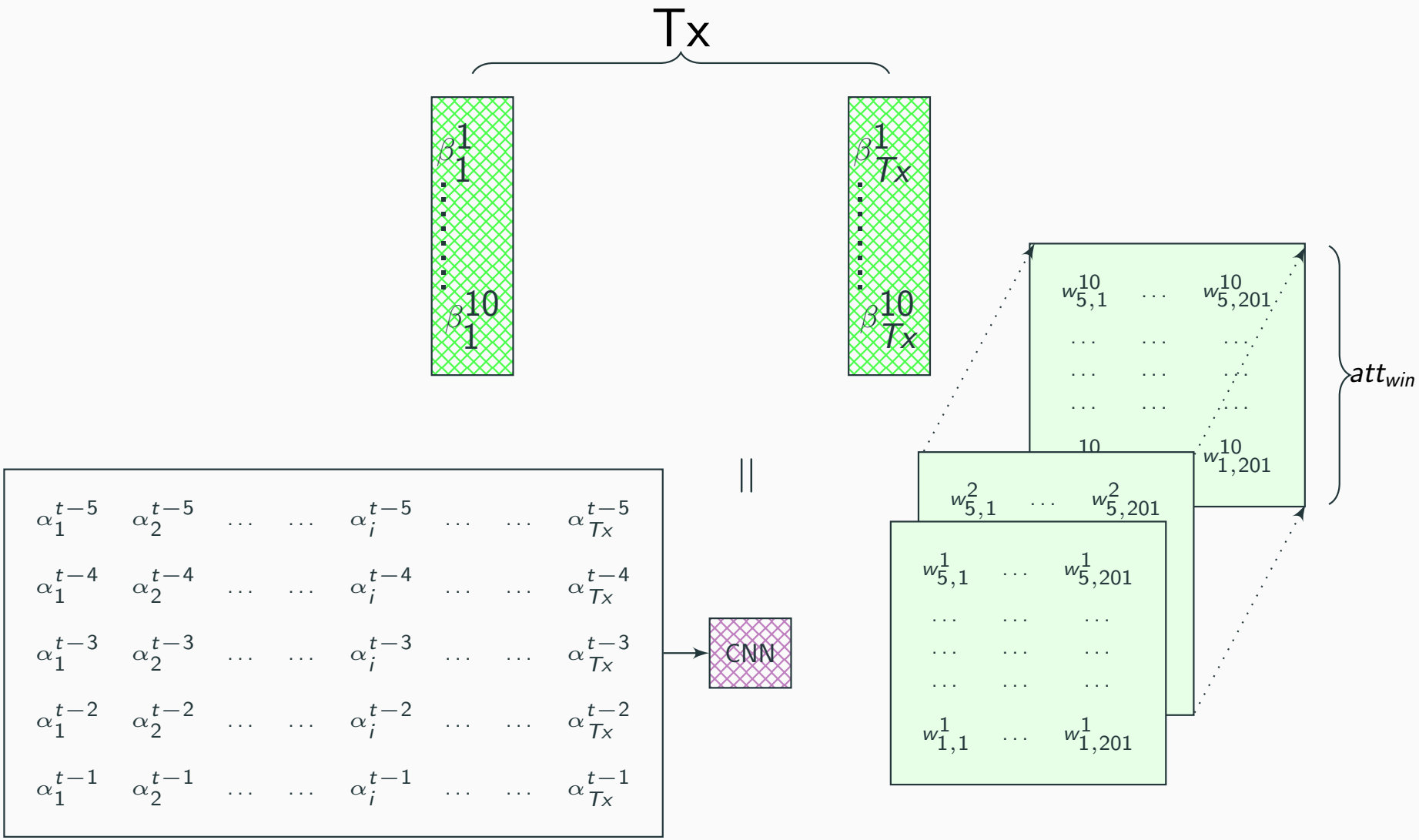


2D Location Aware Attention - Full picture

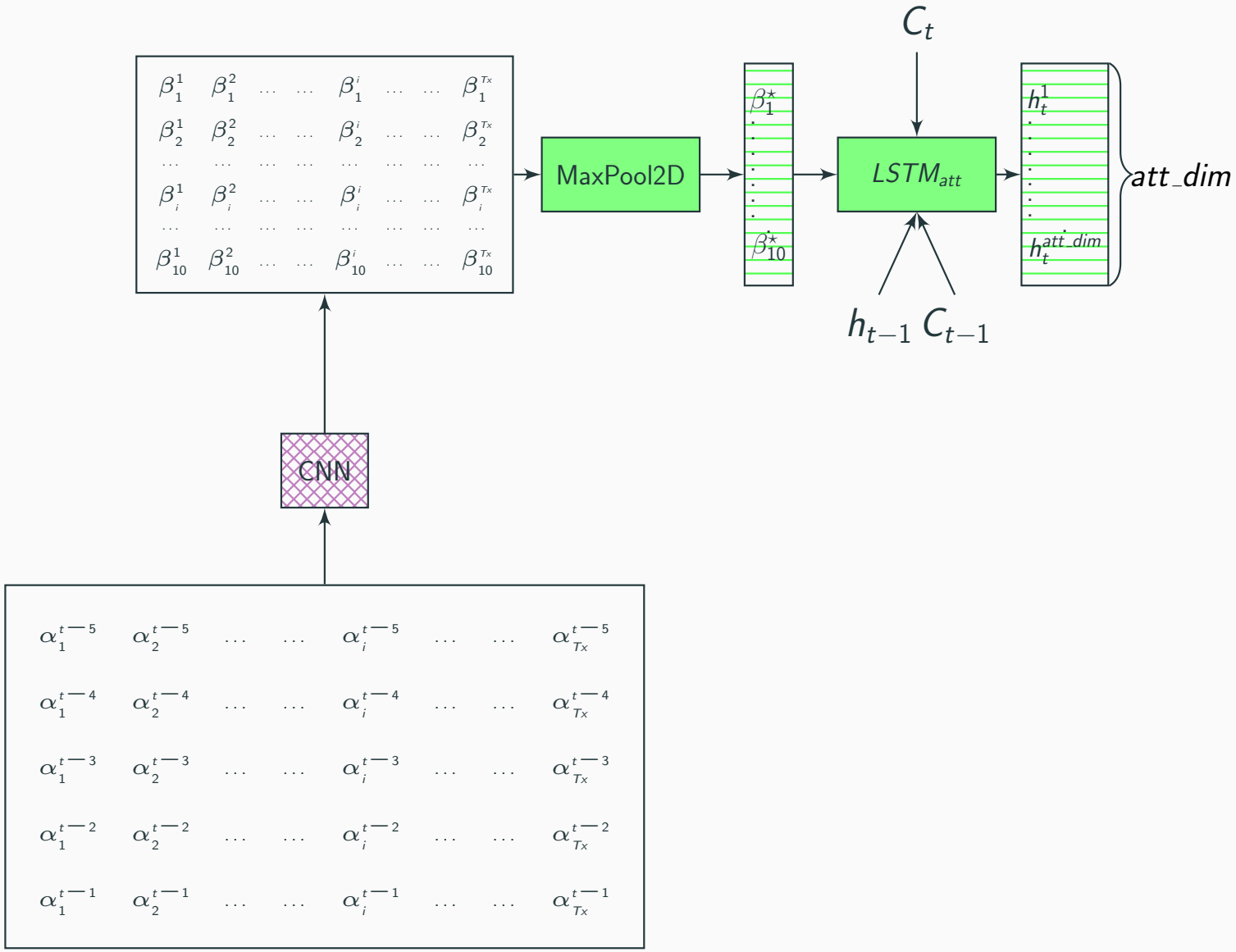


Location Aware Recurrent Attention

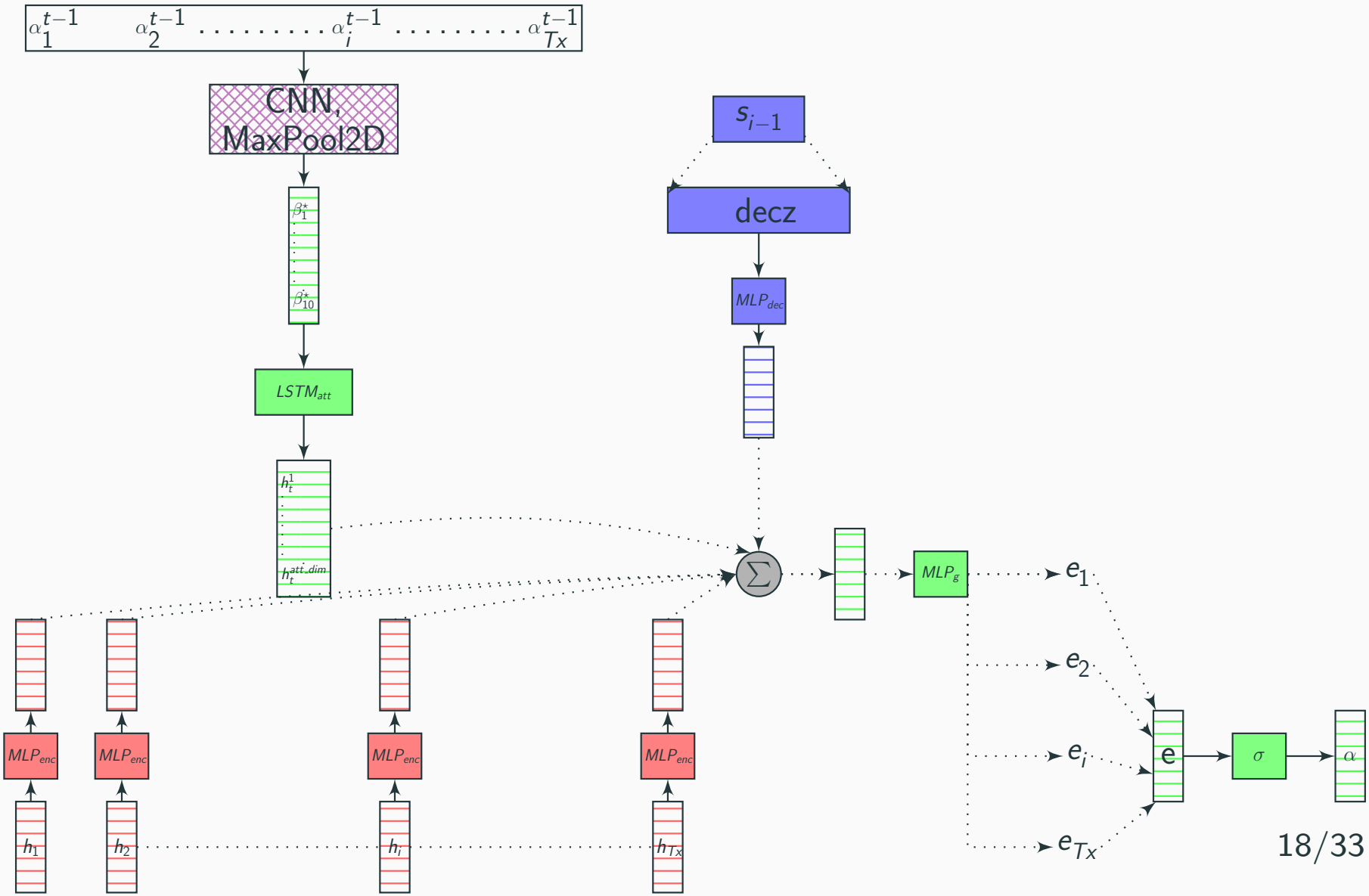
Location Aware Recurrent Attention



Location Aware Recurrent Attention - weights



Location Aware Recurrent Attention - Full picture

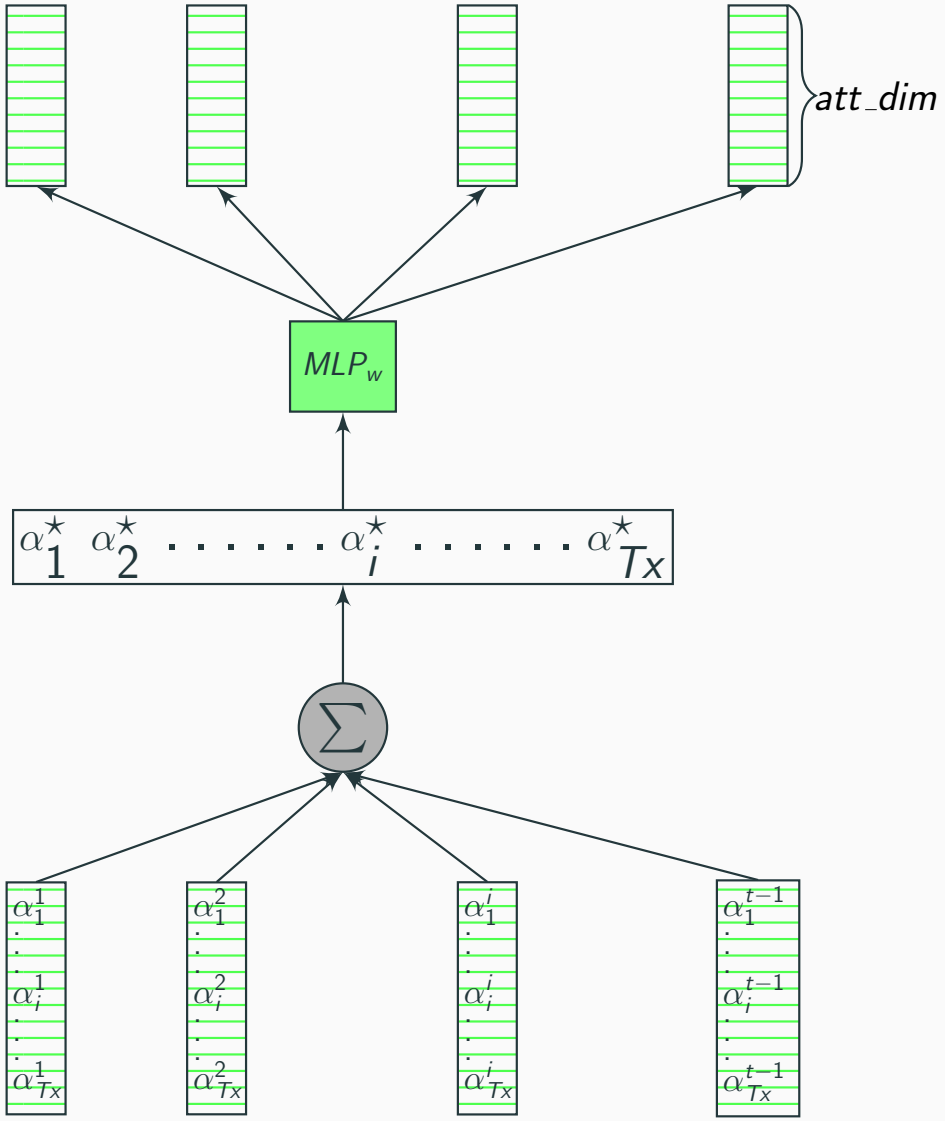


Coverage mechanism Attention

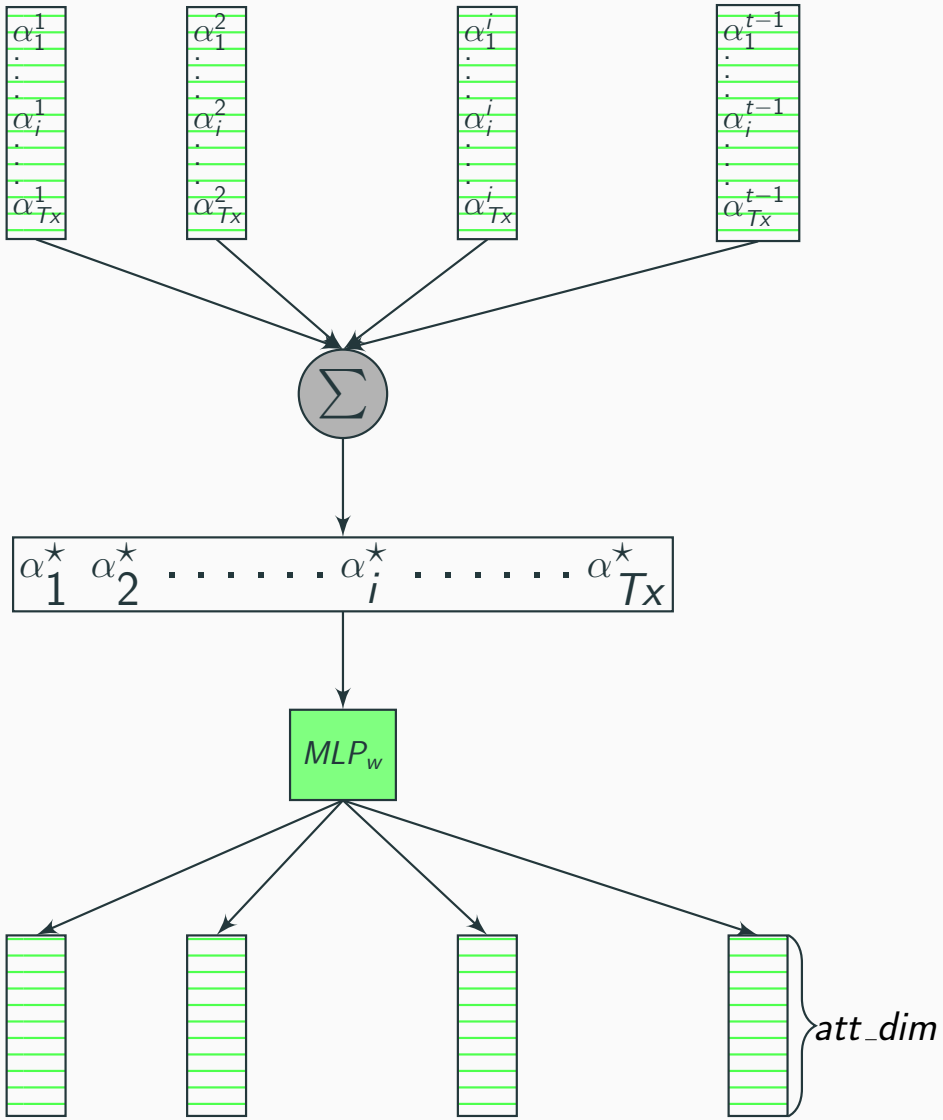
Coverage mechanism Attention

- Text summarization - Seq-to-Seq models
- Not reliable in producing factual details correctly
- Extend the standard seq-to-seq attention models
  - Hybrid pointer-generator network
  - Coverage

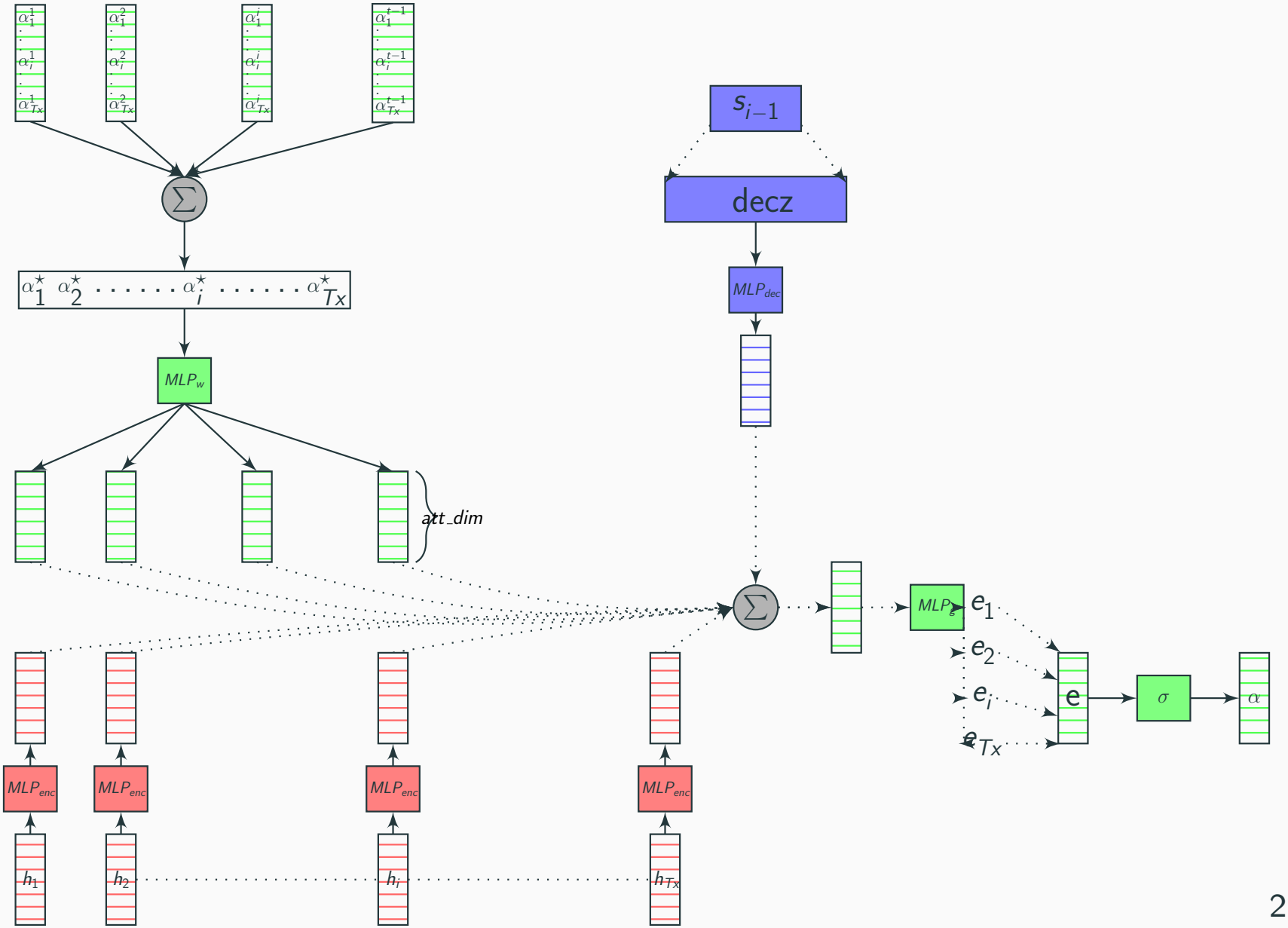
Coverage mechanism Attention



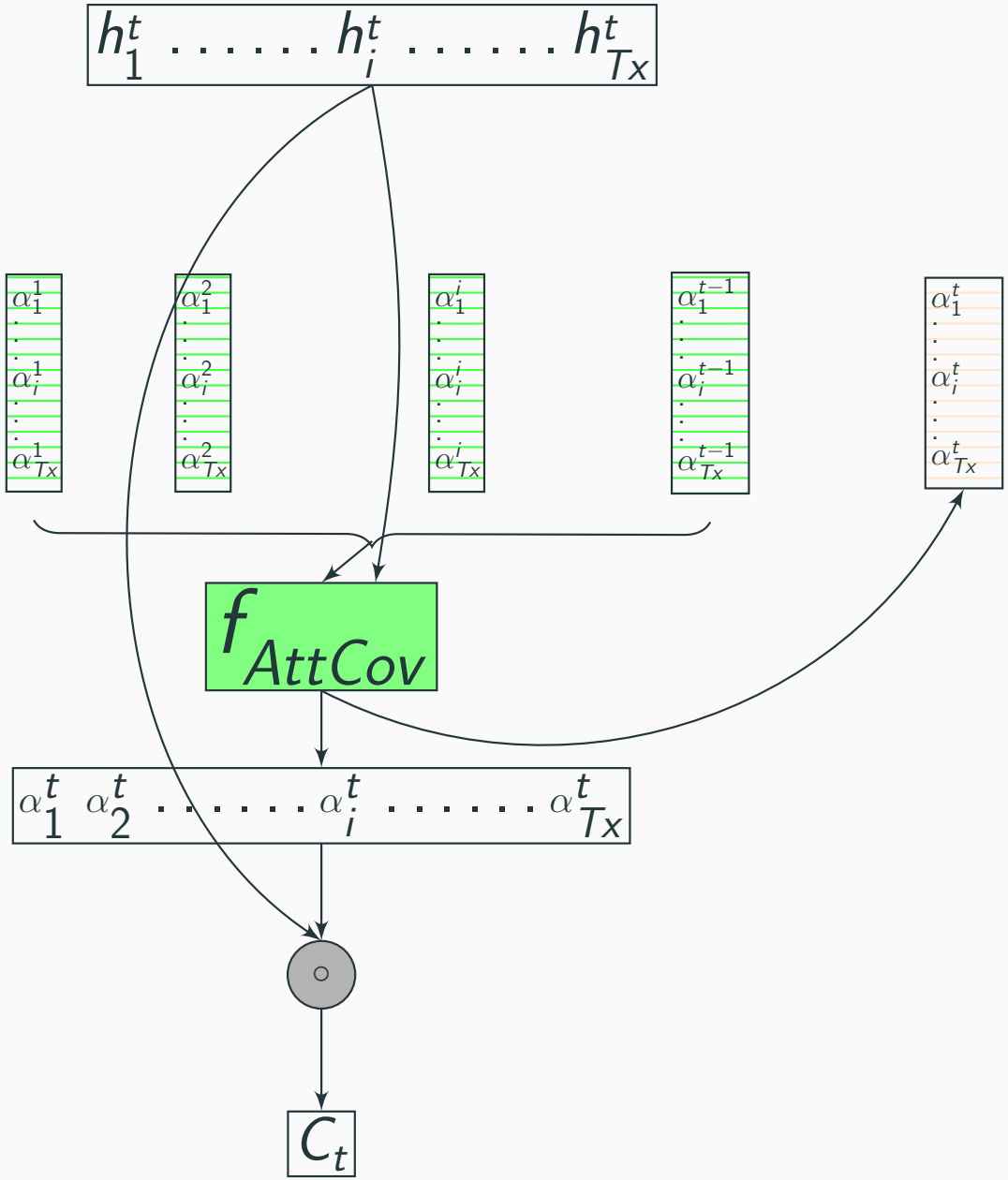
Coverage mechanism Attention



Coverage mechanism Attention

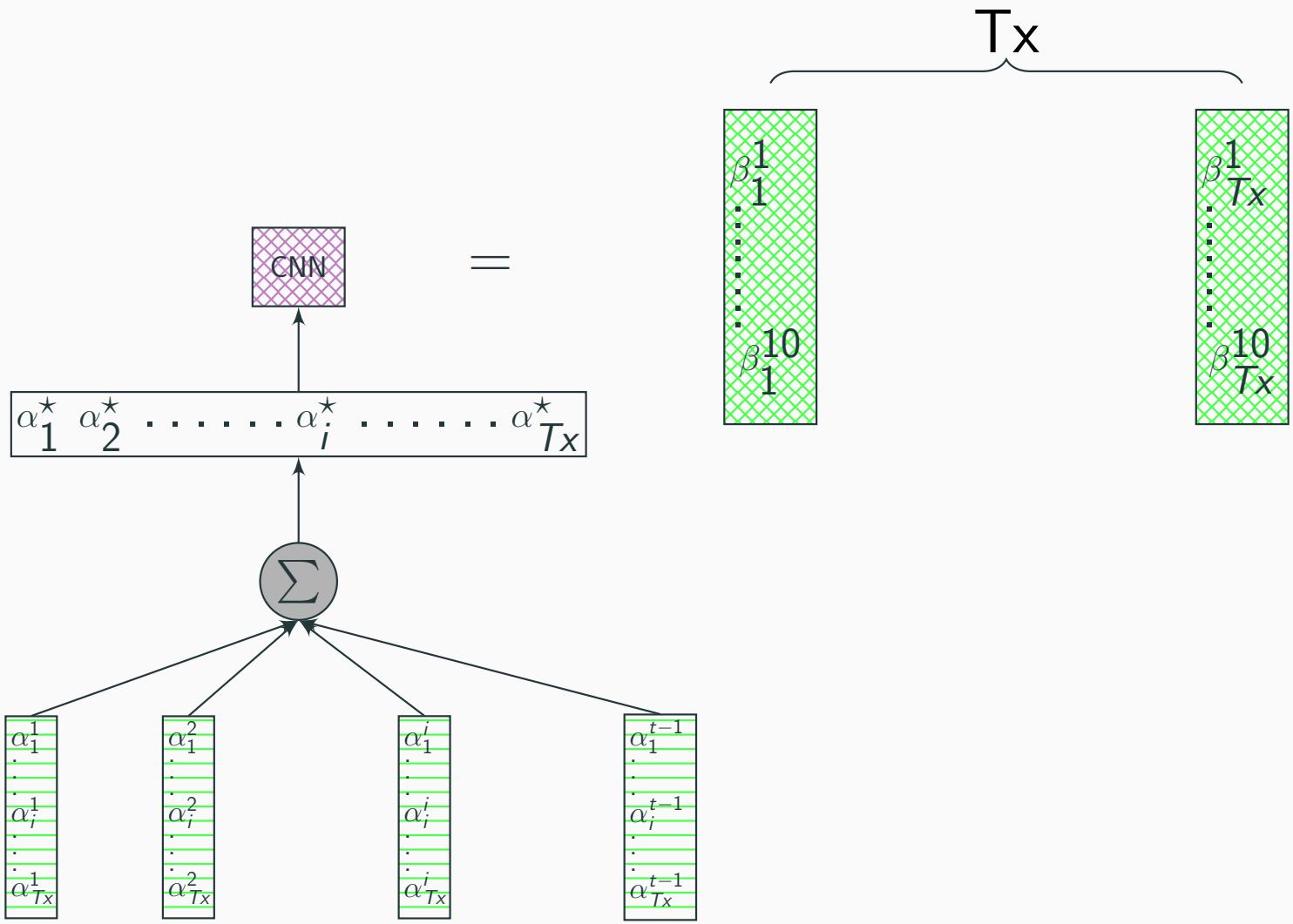


Coverage mechanism Attention

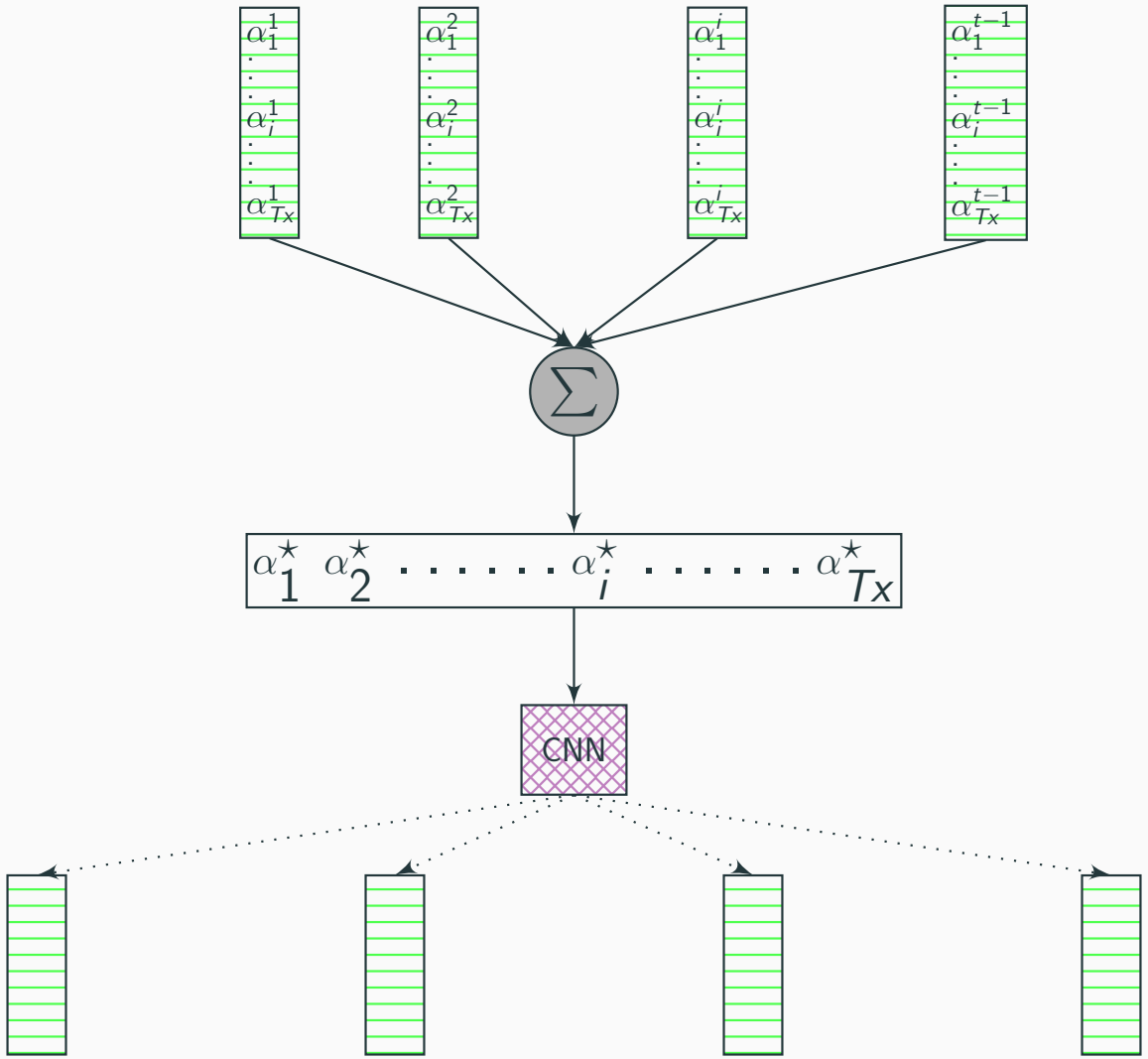


Coverage mechanism location aware Attention

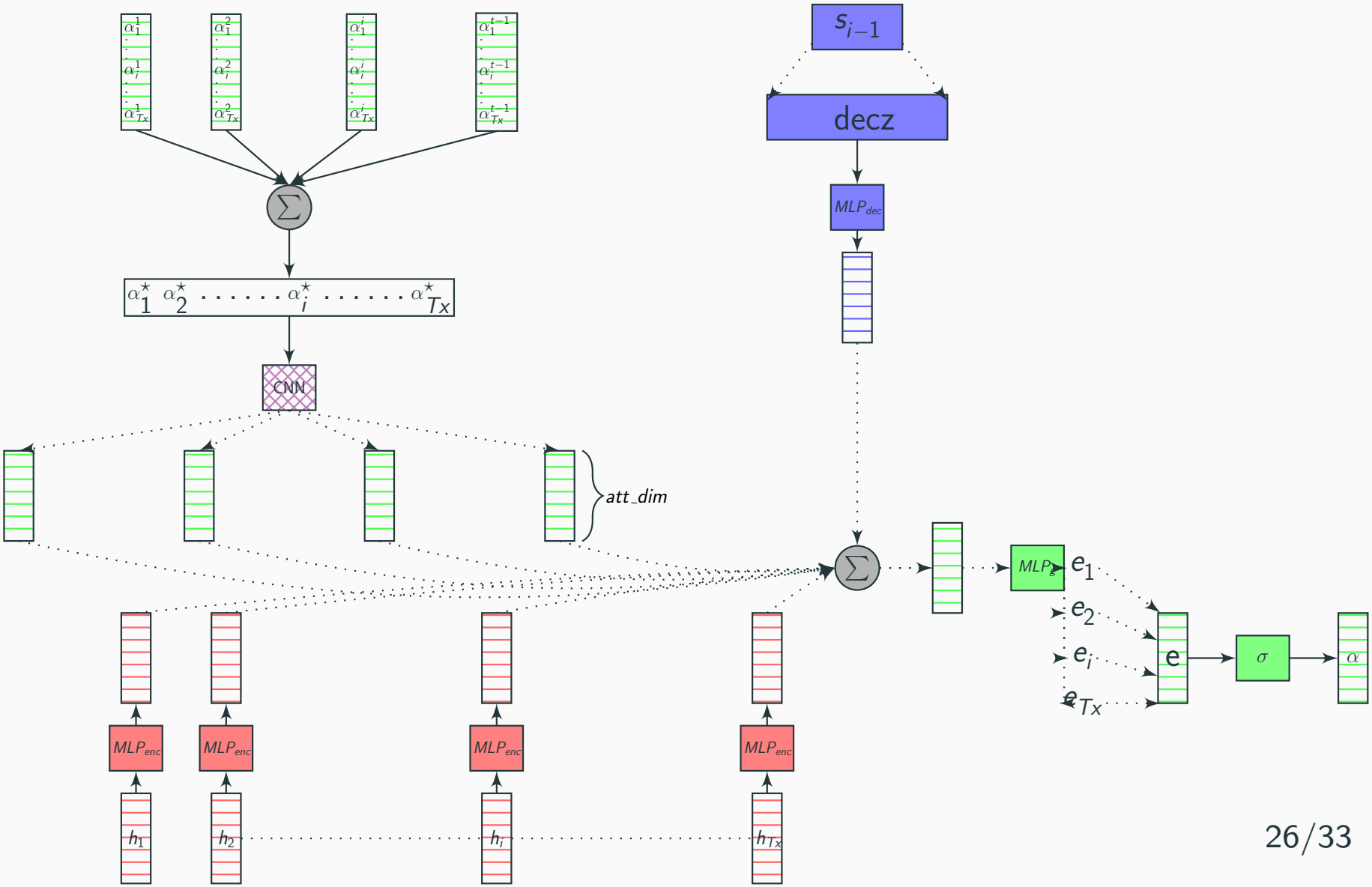
Coverage mechanism location aware Attention



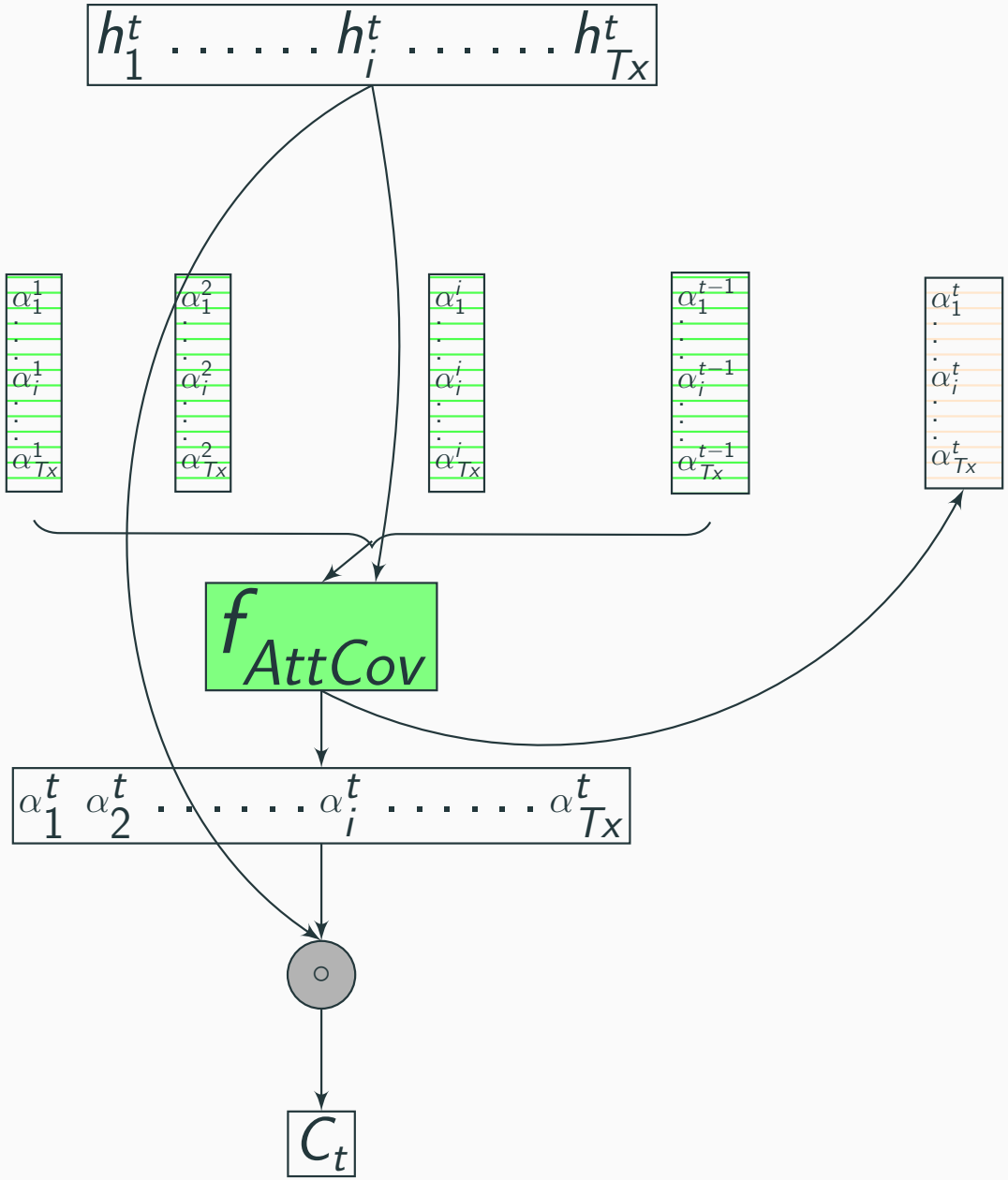
Coverage mechanism location aware Attention



Coverage mechanism location aware Attention

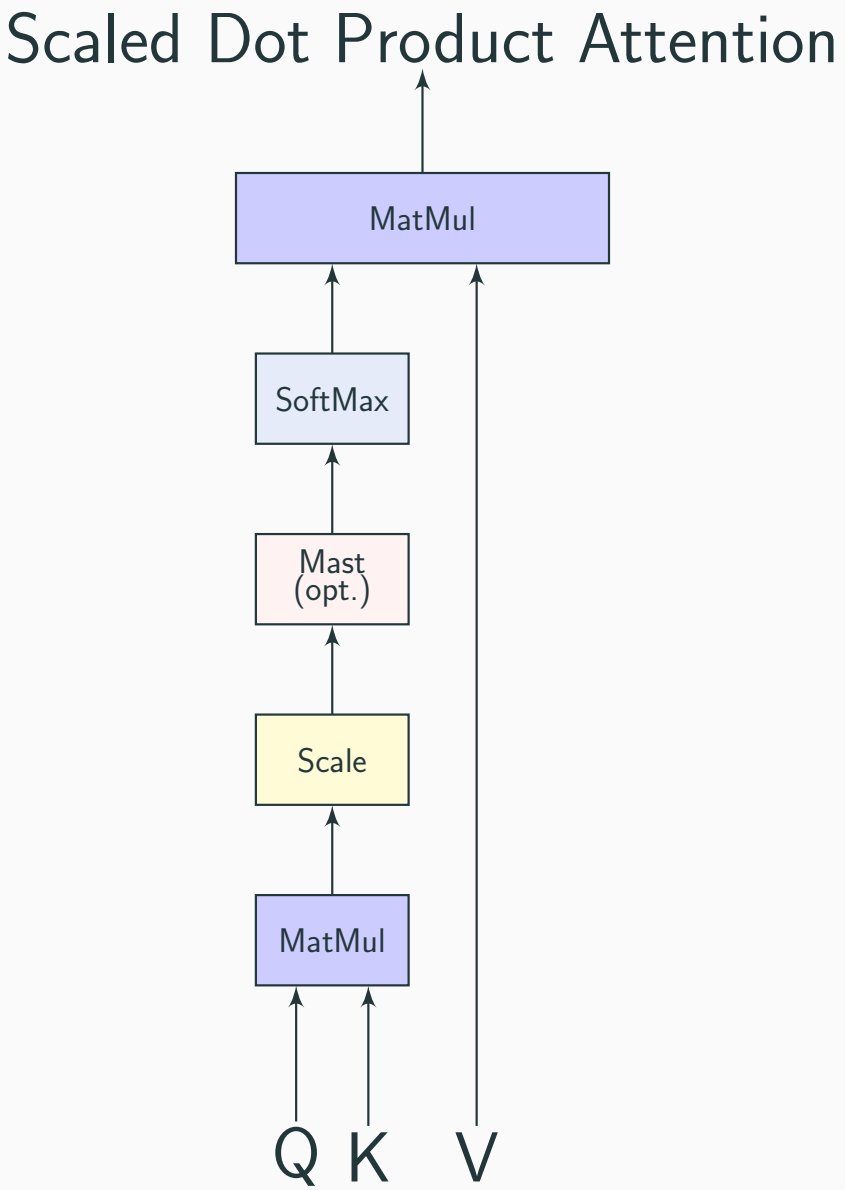


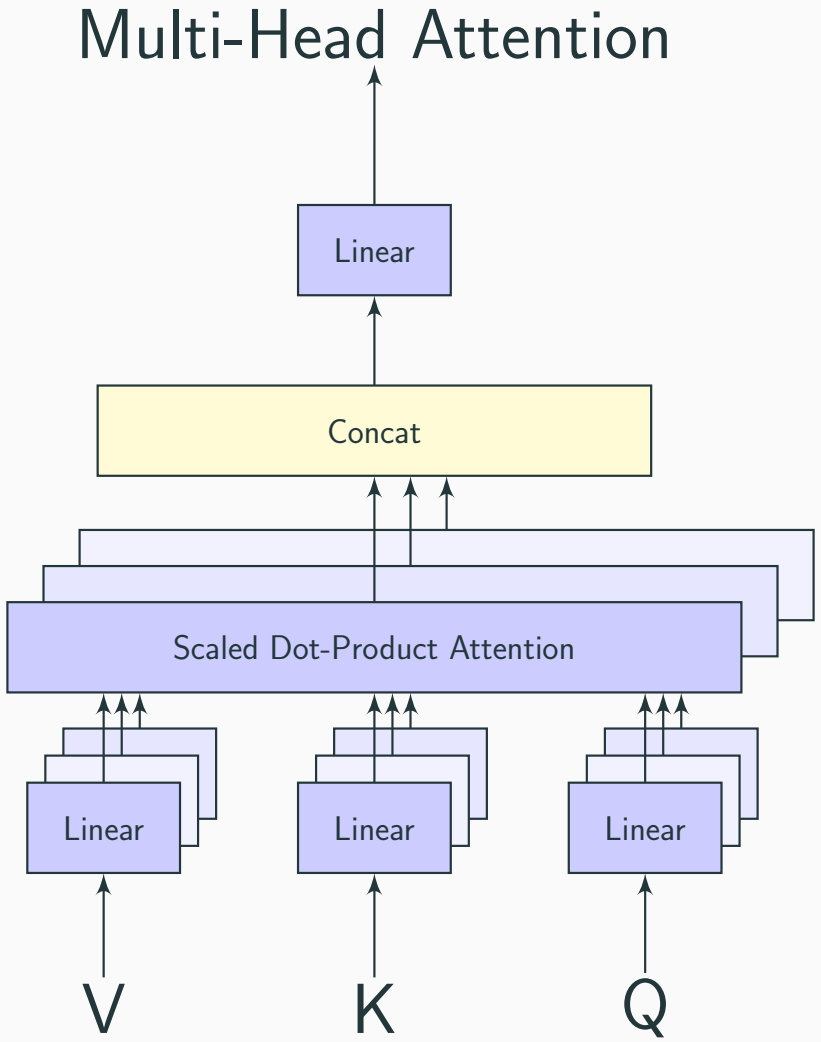
Coverage mechanism location aware Attention



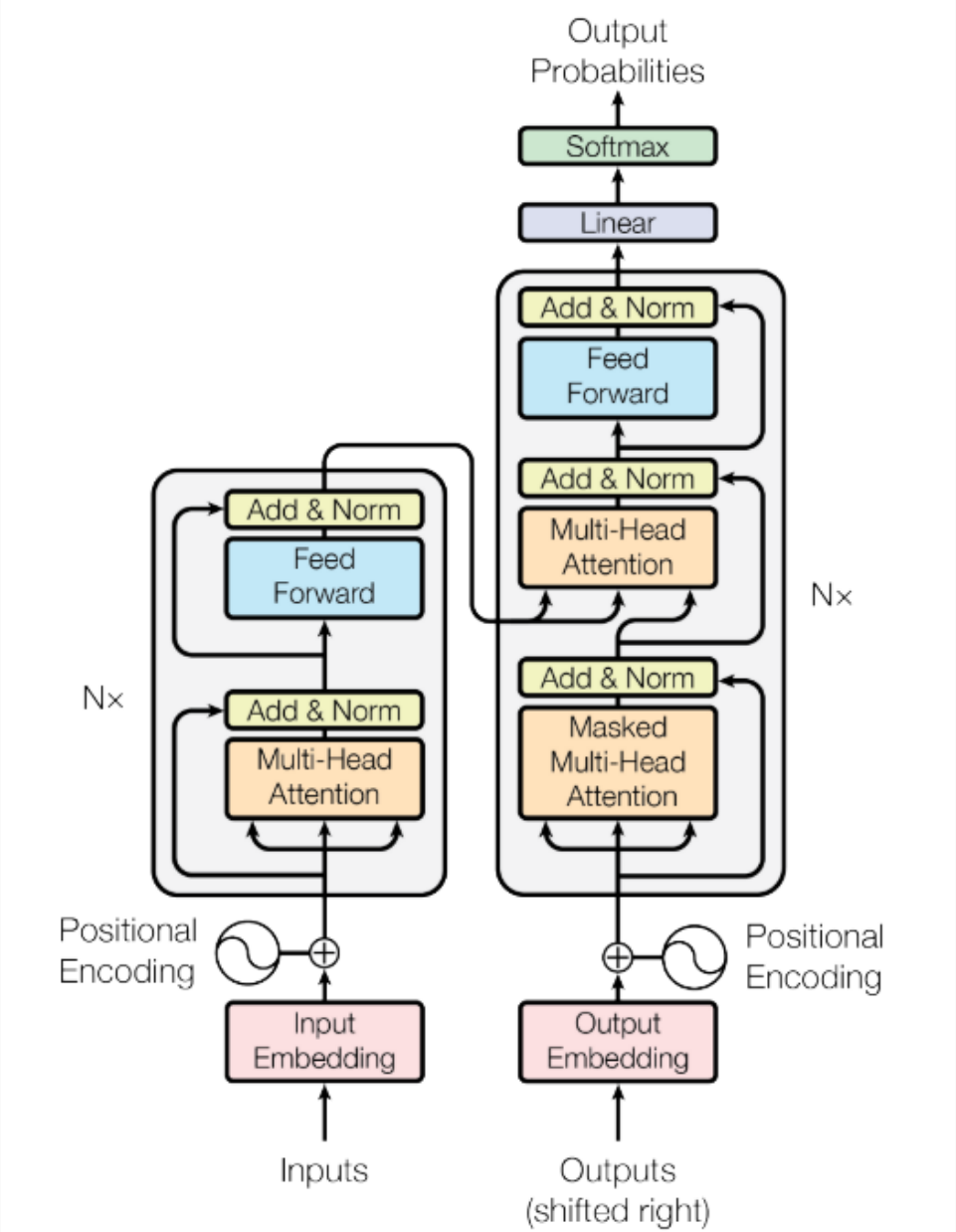
Multi-Head Attention

Scaled Dot product




Multi-Head Attention
Linear
Concat
Scaled Dot-Product Attention
Linear
Linear
Linear
V
K
Q

The Transformer - model architecture



Positional Encoding - Example

$$PE_{(pos,2_i)} = sin(pos/1000^{2i/d_{model}})$$

$$PE_{(pos,2_{i+1})} = cos(pos/1000^{2i/d_{model}})$$

Pending Discussion

- Pointer Generator Attention network
- Multi Head location based Attention
- Multi Head multi resolution location based Attention

Questions?

Multi Head Dot Product Attention

Multi Head location based Attention

Multi Head multi resolution location based Attention