SEGMENTATION-FREE STREAMING MACHINE TRANSLATION

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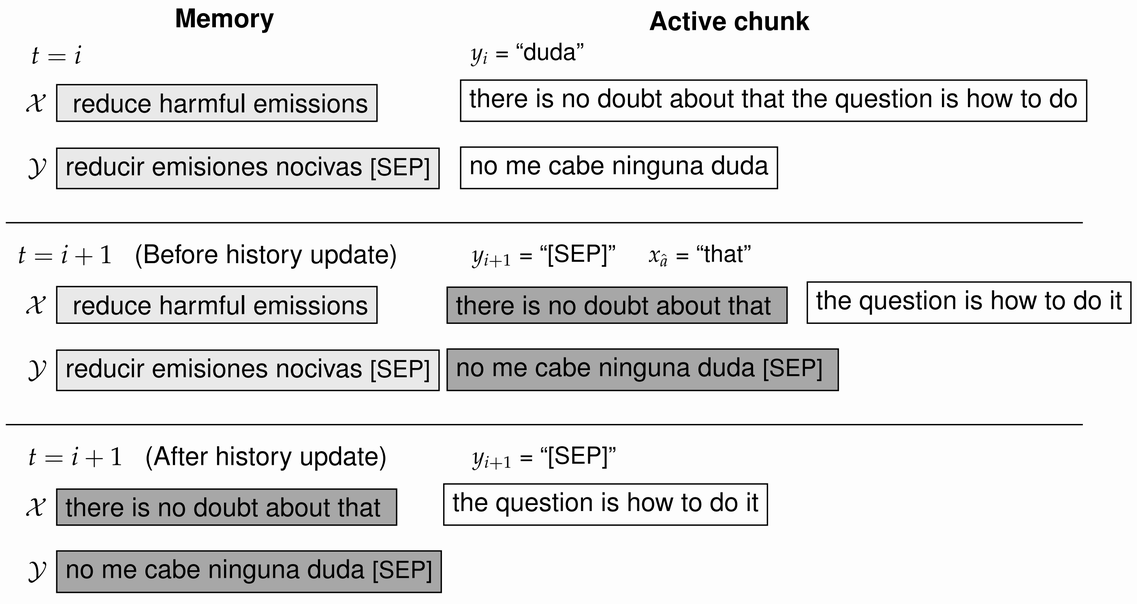
INTRODUCTION

- Streaming Machine Translation: Translate unbounded input text stream in real-time
- Mismatch between MT model training (sentence-level) and streaming input
- Previous systems use external segmentation models
- Our approach: **Let the translation model learn to segment**

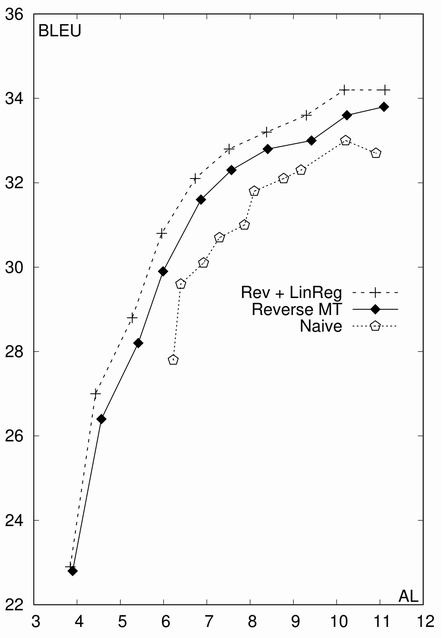
MEMORY MECHANISM

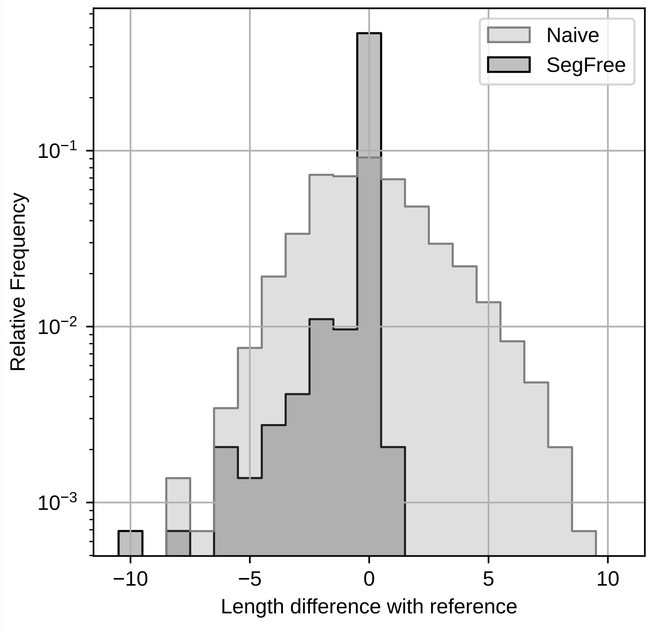


- Model learns to emit special [SEP] token during training
- Memory mechanism tracks positions of src-tgt segments in streams
- Log-linear model detects a positions when generating [SEP]

$$\hat{a} = \arg\max_{a} \sum_{f} \lambda_f \log h_f(a, \boldsymbol{x}, \hat{\boldsymbol{y}}).$$

- Lot of flexibility when defining features $h(\cdot)$





EXPERIMENTAL SETUP

Original	Prefix-augmented
I'm going to talk today about energy and climate.	I'm going to talk today
Heute spreche ich zu Ihnen über Energie und Klima.	Heute spreche ich zu Ihnen
Think about it. [SEP] The PC is a miracle.	Think about it. [SEP] The PC is
Denk darüber nach. [SEP] Der PC ist ein Wunder.	Denk darüber nach. [SEP] Der PC ist

Data:

- Training: Corpus from OPUS MT + IWSLT ST corpora (∼95-320M)
- Augmented document-level corpora and regular bitext corpora
- Lowercase source → Punctuated and truecased target

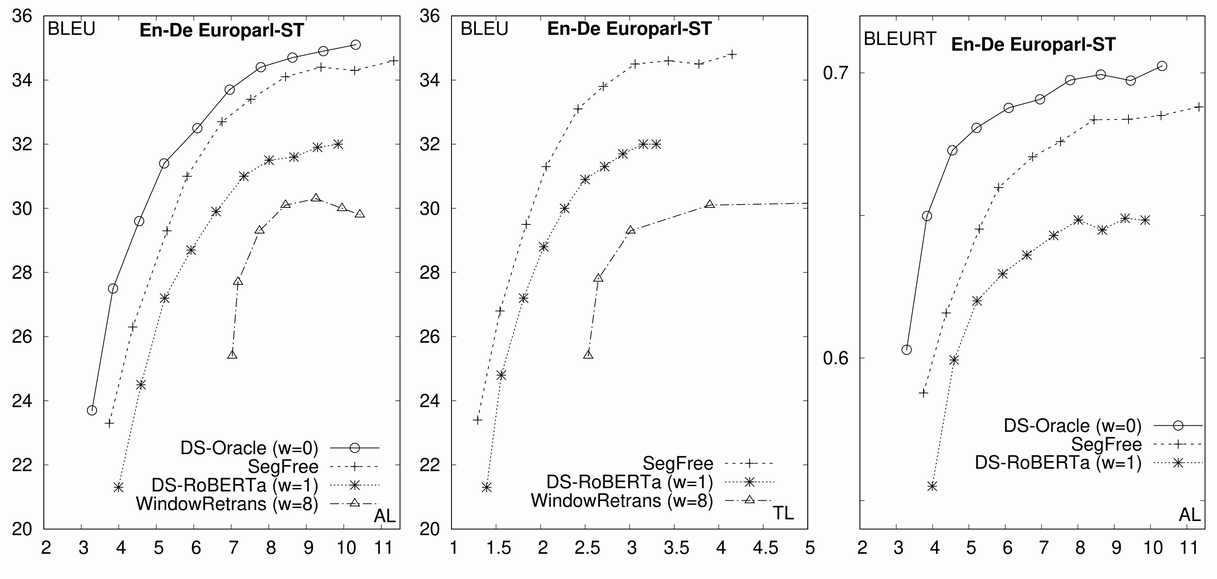
Models:

- Enc-Dec Transformers with bidirectional encoder and wait-k
- Can be extended to adaptive policies and other architectures

Evaluation:

- Stream-level latency metrics and traditional/neural quality metrics
- Eval: **MuST-C** and **Europarl-ST** datasets
- Langs: En ↔ De and En → Fr, Es

SYSTEM EVALUATION



- Results are consistent with compute aware and neural metrics
- En → Fr, Es and MusT-C show similar results

CONCLUSIONS

- Flexible framework to create true streaming MT models.
- Improved performance and reduced latency compared to baselines
- Eliminates need for external segmentation models, simplifying the translation pipeline.

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