The Effects of Pretraining on Video Guided Machine Translation

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Research Questions:

How can pretraining strategies improve Video-Guided Machine Translation (VMT)?

What modalities make the biggest impact for pretraining strategies in VMT?

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What is Video-Guided Machine Translation?

- Video-Guided Machine Translation provides video context to aid in translation.
- This can help the model disambiguate between potential meanings of the sentence.

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VaTeX Dataset

- Approx. 30,000 YouTube video clips labeled in English and Chinese by Amazon Mechanical Turk.
- 10 labels per video in both languages, 5 of which are translations of each other.
- Used for a shared task (VMT Challenge held at the ALVR Workshop) in 2020.

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VaTeX Example

A group of dogs of varying breeds pull a man in a sled across the finish line.

https://www.youtube.com/watch?v=UZLSnJ2OBYA&ab_channel=grandylady

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VaTeX Example

Original Sentence:

A group of dogs of varying breeds pull a man in a sled across the finish line.

Masked input sentence:

A group _____ of varying _____ pull ___ man ___ a sled across the finish line.

Produced translation:

一群不同品种的狗拉着一个乘坐雪橇的人穿过了终点线。

Backtranslated by Google Translate:

A pack of dogs of various breeds pulls a man on a sled across the finish line.

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Movie Audio Description (MAD) Dataset

- 600 Movies ~ 180k sentences
- Transcribed English Audio Descriptions (not dialogue)
- We created synthetic Chinese translations using Google Translate.
- Higher quality and more variety than the VaTeX dataset

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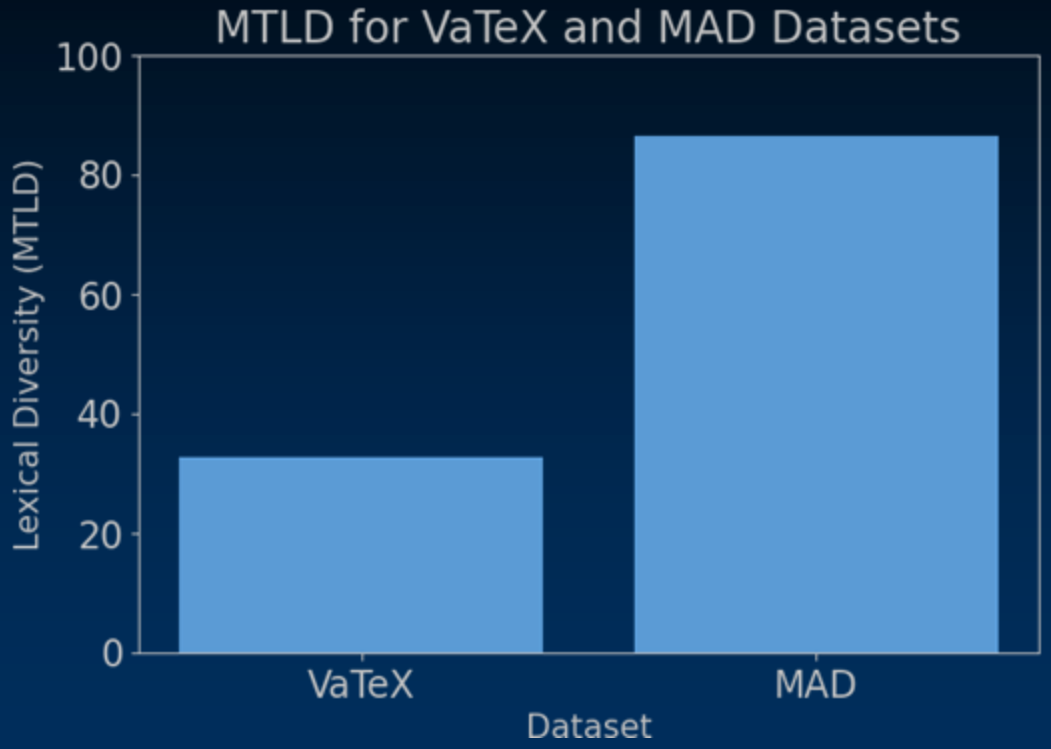
Lexical Richness

MTLD (Measure of Textual Lexical Diversity) reflects the amount of variety of words in text.



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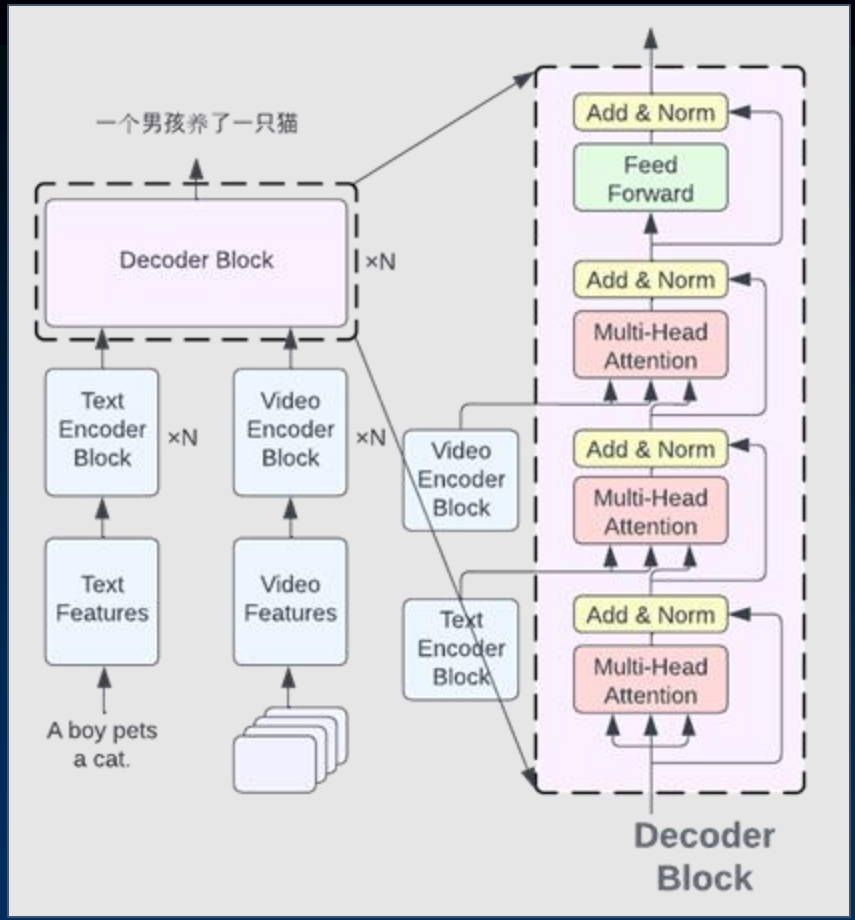
Architecture

Transformer architecture with separate video and text encoders, decoder has dual attention.



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Experiments

- Try pretraining on the MAD dataset.
- Finetune on the VaTeX dataset.
- Test performance on the VaTeX dataset.

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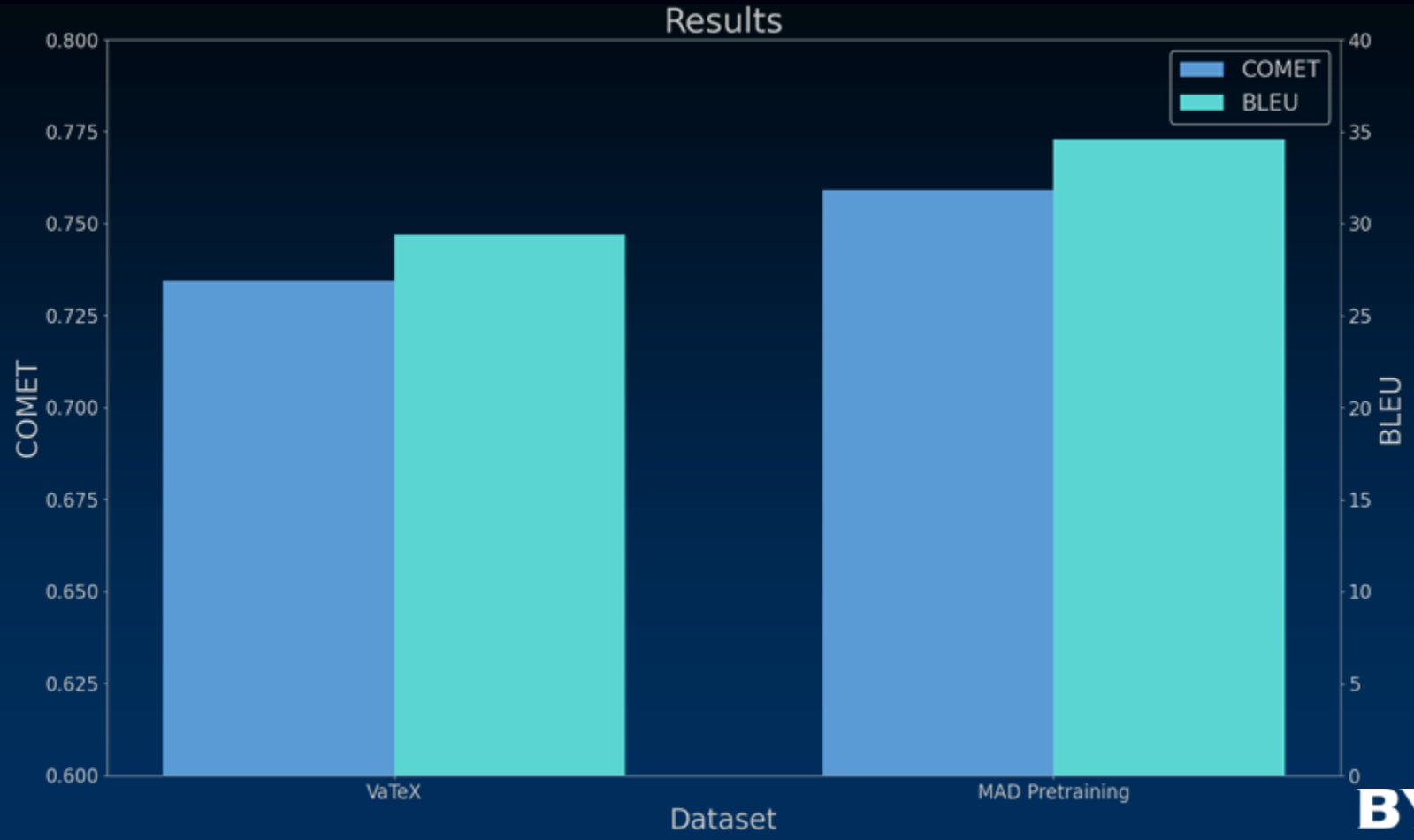
Results
COMET
BLEU
0.800
0.775
0.750
0.725
0.700
0.675
0.650
0.625
0.600
40
35
30
25
20
15
10
5
0
VaTeX
MAD Pretraining
Dataset

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Video Ablation Study

How much do the videos really matter compared to pretraining with more text?

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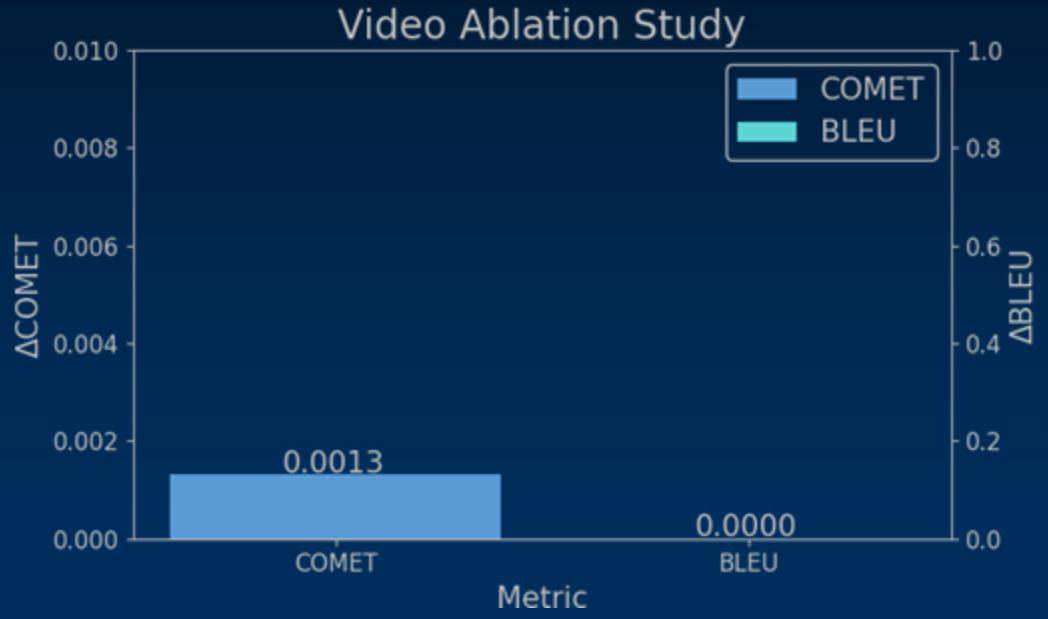
Video Ablation Study

How much do the videos really matter compared to pretraining with more text?



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Added Dataset: OPUS Subtitles

- Collection of 10M parallel subtitles in English and Chinese
- Similar domain to VaTeX and MAD, but only dialogue

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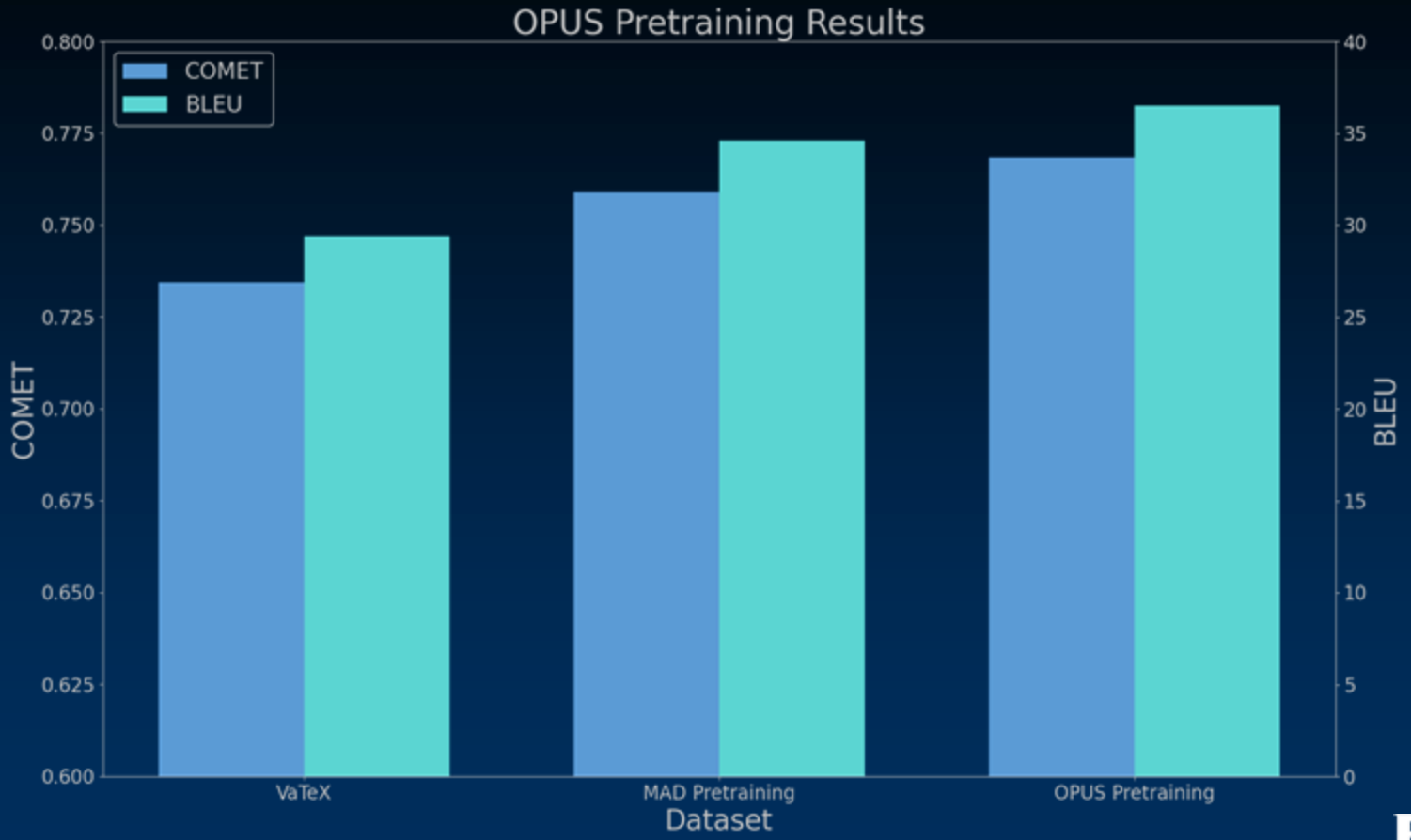
OPUS Pretraining Results
COMET
BLEU
0.800
0.775
0.750
0.725
0.700
0.675
0.650
0.625
0.600
40
35
30
25
20
15
10
5
0
VaTeX
MAD Pretraining
OPUS Pretraining
Dataset

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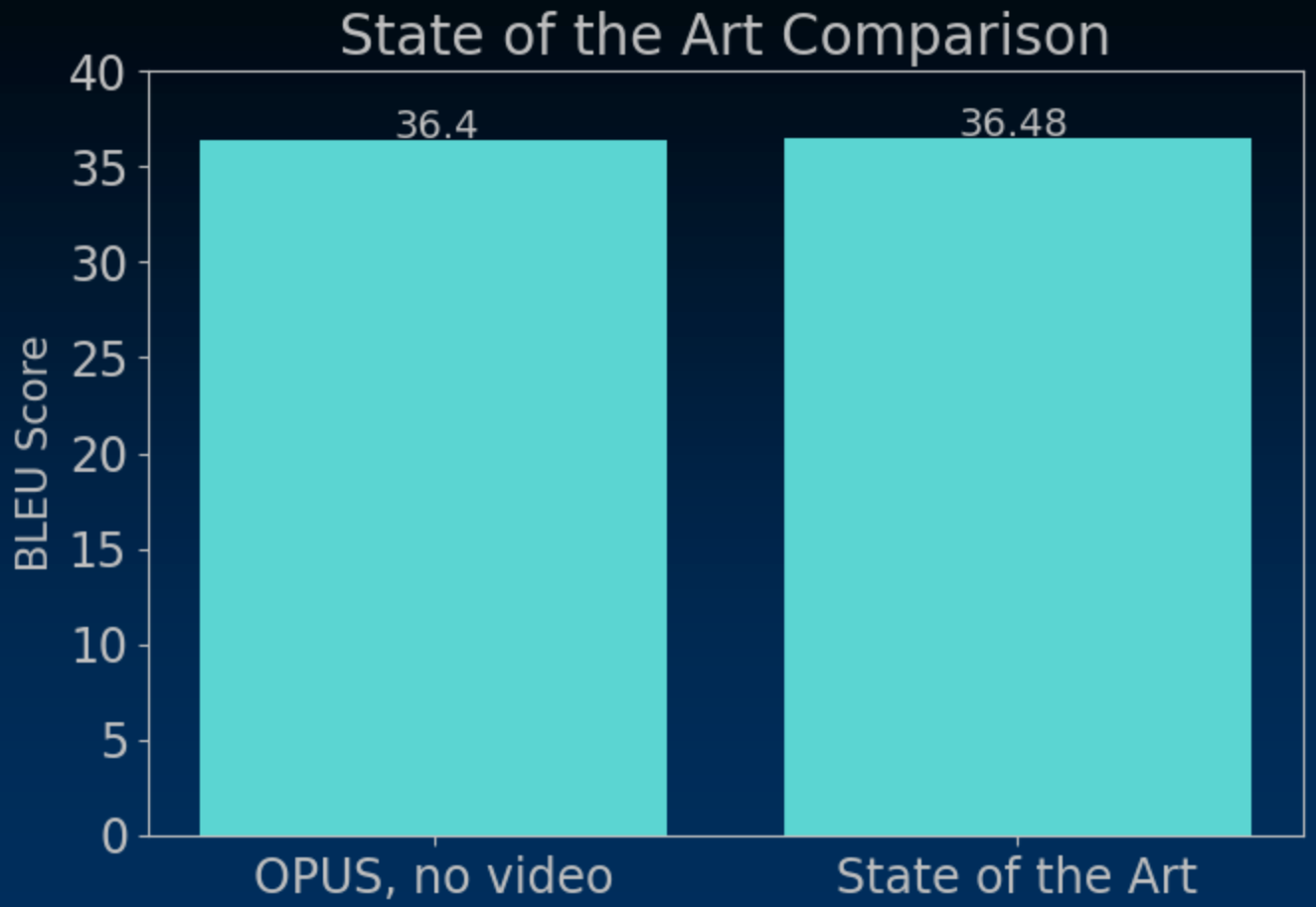
State of the Art Comparison
BLEU Score
40
35
30
25
20
15
10
5
0
36.4
36.48
OPUS, no video
State of the Art

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Conclusions

- Pretraining on diverse text significantly boosts performance.
- The VaTeX dataset sentences do not need video to be translated.

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Future Work

- BigVideo dataset
- MAD 2.0 dataset
- Translate from morphologically simple to more complex languages
- Unsupervised alignment between languages

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