Cross-lingual Sentence Compression for Subtitles

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Outline

1. Motivation
2. Related Work
3. Method
4. Experimental Setup
5. Results
6. Conclusion and Future Work

Scenario

Relevant commercial application

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    [1] SUMAT: `http://www.sumat-project.eu`
- Availability of resources
  - **54 languages**, 1K bitexts, 8.3G tokens, **1.2G segments**[2]

    [2] OpenSubtitles: `http://opus.lingfil.uu.se`

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  - manual (?)
  - amateur (OpenSubtitles data)

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Task: English (en) to Brazilian Portuguese (pt)

[1] **D**exter, **H**ow I met your mother and **T**erranova

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- 63% pt longer than en: 5.5 ± 4.3 chars over

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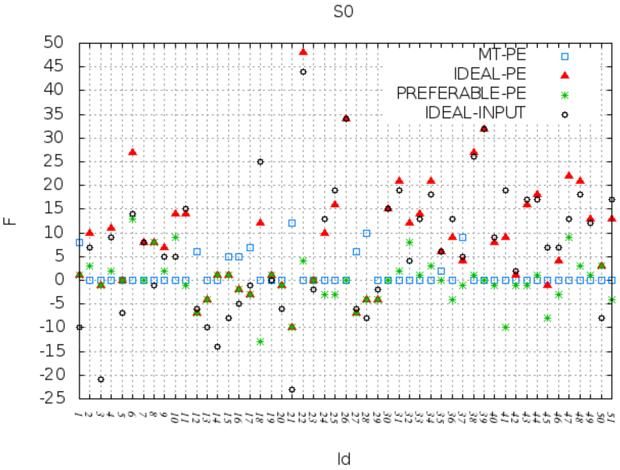
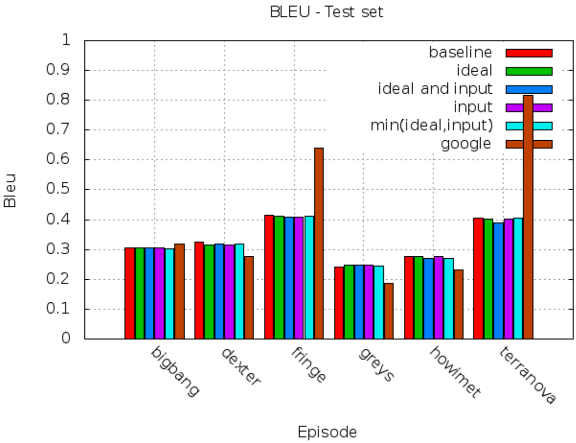
Evidence - Reference

Post-editing/Compression



Evidence - BLEU by show



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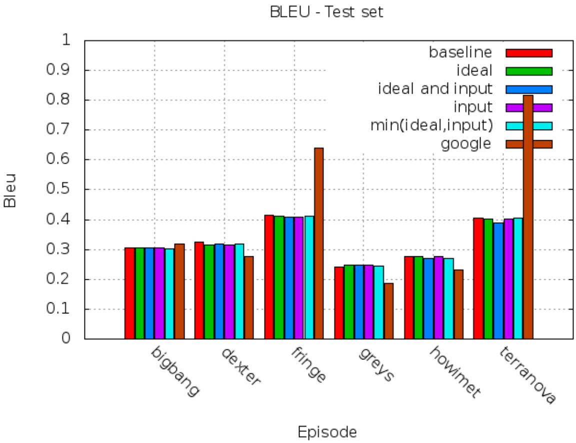

Google: surprising?!

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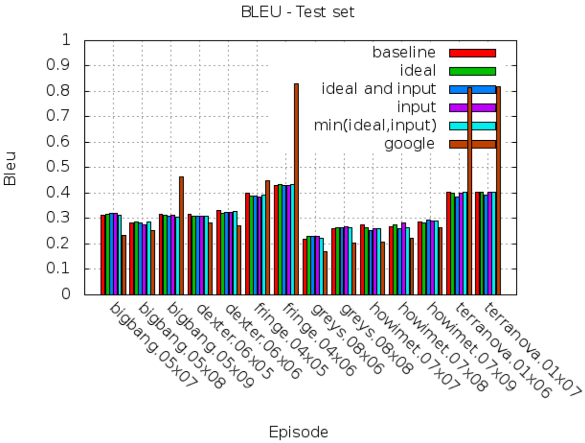

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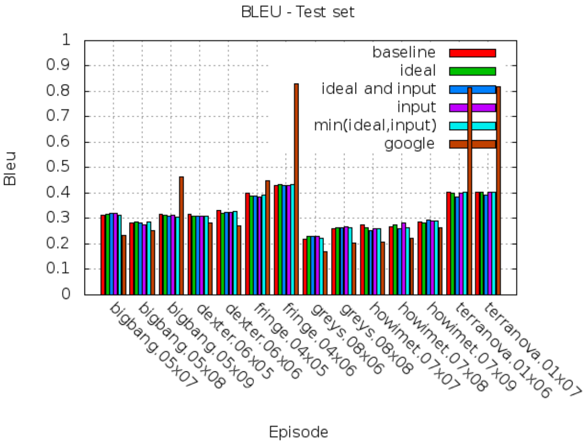

Amateur subtitlers do **post-edit**!

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- Modest training data
- Modest evaluation setups
  - Small test sets
  - Subjective evaluation
  - Few human annotators for evaluation

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- General purpose sentence compression
  "achieve an overall (document-level) compression rate"

Cross-lingual Sentence Compression

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Compressing on demand

Length Constraints

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Once the device is fixed the constraint is a function of the duration (of the source)

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Scaling to a phrase pair

$$\hat{h}_{lp}(\bar{f}, \bar{e}, c) = c \times \frac{\text{length}(\bar{f})}{\text{length}(f)} - \text{length}(\bar{e})$$

Informing the Decoder

XML markup

```
<s id="15" lp::ideal="23" lp::input="19" lp::min="19">
  I never felt this .
</s>
```

Data

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OpenSubtitles

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- Training (unconstrained): 14M segments

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- Tuning (unconstrained): 2K segments
- Tuning (constrained): 1,9K (**D**), 1,13K (**H**) and 1,32K (**T**)
- Test (unconstrained): 400 sentences per show

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2. **lp::input** is the length of the input text
   - intuitively one would like to have target subtitles that are close to their source equivalents
3. **lp::min** the minimum of the two above
   - one would like to keep the target length close to the source length while complying with lp:ideal

Systems

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B$_2$: Moses (unconstrained tuning)

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LP$_2$: **B**$_3$ + lp::ideal + lp::input

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LP$_2$: **B**$_3$ + lp::ideal + lp::input

LP$_1$: **B**$_3$ + lp::min

Evaluation

Post-editing

8 Brazilian annotators

- PET[3]
- Highlight compliance to length constraints
- Compress only if necessary
- Fix quality only if necessary

HTER Snover et al. [2006]

[3] http://pers-www.wlv.ac.uk/~in1676/pet

Results

Statistical significance in relation to B_3[4]

System	D		H		T	
	TER ↓	LENGTH	TER ↓	LENGTH	TER ↓	LENGTH
B_3	30.3	116.0	20.0	108.5	33.8	120.2
B_1	**63.6**	**156.5**	**52.8**	**144.3**	**63.1**	**152.1**
B_2	**35.7**	**127.3**	**31.3**	**126.9**	**44.1**	**135.8**
LP_2	29.5	115.5	**21.0**	109.1	33.4	**119.3**
LP_1	**28.3**	115.8	20.7	**110.0**	34.8	119.8

[4] x, y and z denote results that are significantly better than a baseline ($p < 0.01$, 0.05 and 0.10, respectively). x, y and z denote results that are significantly worse than a baseline ($p < 0.01$, 0.05 and 0.10, respectively).

Average Length Constraints

Some datasets require more compression

Set	lp::input	lp::ideal	lp::min
D	28.82 ± 15.43	36.99 ± 14.40	26.03 ± 12.86
H	28.40 ± 13.81	33.25 ± 13.77	25.97 ± 12.20
T	28.34 ± 15.22	30.14 ± 11.47	**24.61** ± **11.93**

Malformed Subtitles

Some outputs are easier to compress

Malformed	**B$_1$**	**B$_2$**	**B$_3$**	**LP$_2$**	**LP$_1$**
MT	44.15	34.41	27.40	24.57	25.65
PE	8.50	9.08	7.0	**5.65**	**5.65**

Tuning with Multiple References

Tuning^m: 5 length-compliant reference translations produced for the $1,2K$ test sentences

Test: 600 unseen sentences (200 from each show)

Statistical significance in relation to B$_3^m$[5]

System	TER ↓	LENGTH
B$_3^m$	26.8	103.8
B$_3$	27.0	**106.1**
LP$_2^m$	**26.0**	**103.3**
LP$_1^m$	**25.9**	103.6

[5] x, y and z denote results that are significantly better than a baseline ($p < 0.01$, 0.05 and 0.10, respectively). x, y and z denote results that are significantly worse than a baseline ($p < 0.01$, 0.05 and 0.10, respectively).

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2. Controlling the string length can further improve the model's compression capabilities
3. Even more in the presence of shorter paraphrases
4. LP models select some nice paraphrases, but they also drop words that are usually added back by human translators: articles, prepositions and conjunctions amongst the most frequent cases

Future Work

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Thank you!

References I

Jorge Díaz Cintas and Aline Remael. *Audiovisual Translation: Subtitling. Translation Practice Explained.* St Jerome Publishing, 2007.

Matthew Snover, Bonnie Dorr, Richard Schwartz, Linnea Micciulla, and John Makhoul. A Study of Translation Edit Rate with Targeted Human Annotation. In *7th Conference of the Association for Machine Translation in the Americas*, pages 223–231, Cambridge, Massachusetts, 2006.

Length Constraints

Duration (s)	Length	Ratio (char/s)	Duration (s)	Length	Ratio (char/s)
1.0000	17	17.0000	3.6667	65	17.7273
1.1667	20	17.1429	3.8333	68	17.7391
1.3333	23	17.2500	4.0000	70	17.5000
1.5000	26	17.3333	4.1667	73	17.5200
1.6667	28	16.8000	4.3333	76	17.5385
1.8333	30	16.3636	4.5000	76	16.8889
2.0000	35	17.5000	4.6667	77	16.5000
2.1667	37	17.0769	4.8333	77	15.9310
2.3333	39	16.7143	5.0000	78	15.6000
2.5000	43	17.2000	5.1667	78	15.0968
2.6667	45	16.8750	5.3333	78	14.6250
2.8333	49	17.2941	5.5000	78	14.1818
3.0000	53	17.6667	5.6667	78	13.7647
3.1667	55	17.3684	5.8333	78	13.3714
3.3333	57	17.1000	6.0000	78	13.0000
3.5000	62	17.7143	-	-	-