Dictionary-based Domain Adaptation of MT Systems without Retraining

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Motivation

We want to adapt an existing MT system to the target domain (IT in WMT16) using a domain-specific bilingual dictionary, but without retraining because

- **training costs (slow)**
- **running costs (if many target domains)**
- **dictionary not suitable as parallel data**
- **black-box MT (online, commercial)**
- **non-retrainable tools (tagger, URL tok...)**

Detection of entities (dictionary entries)

- **word-based trie text search**
- **heuristic scorer for matches overlap**
- **merging menu items separated by ">"**

MT systems used

- **Moses (tuned on in-domain)**
- **TectoMT (deepMT with TM interpol.)**
- **Chimera (Moses+TectoMT combination)**

Methods of forced translation

XXX placeholders

- **substitute entities with "xxxitemAxxx",...**
- **store their translation in a separate file**
- **applicable to any MT (not dropping OOV)**

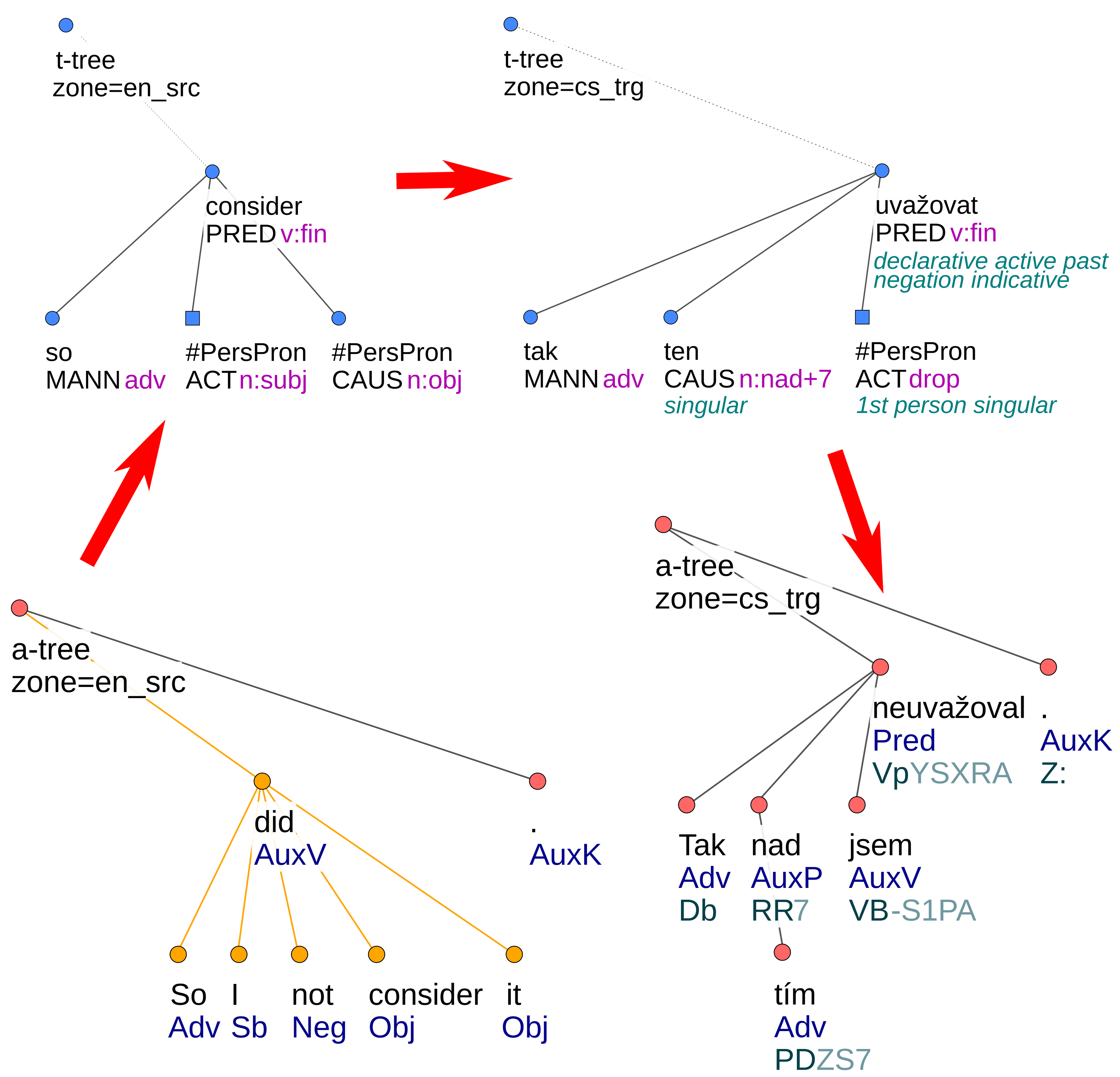
XML annotation

- **Moses with** `-xml-input=exclusive` **supports**
  select <item translation="Vypnout">Shut Down</item>.
- **better context for LM, but Moses specific**
- **incompatible with factored translation**

Wild attributes

- **TectoMT supports collapsing each entity into one node and storing its translation in a "wild" attribute.**

TectoMT pipeline



Results and conclusions

System	Annotations	→ES	→NL	→PT
Moses	(not adapted)	22.23	23.40	14.01
	XXX	23.61	24.89	15.47
	XML	**24.22**	**25.41**	**15.58**
Chimera	(not adapted)	26.01	21.82	13.11
	XXX	26.89	**23.52**	14.19
	XML	**27.40**	23.26	**14.21**

XML is better than XXX.
XXX is better than no adaptation.

System	Adapted	→CS	→ES	→NL	→PT
TectoMT	no	19.98	23.24	18.83	13.87
	wild	**21.89**	**24.31**	**19.89**	**15.51**
Moses	no	23.25	22.23	23.40	14.01
	xml	**23.71**	**24.22**	**25.41**	**15.58**
Chimera	no	**23.47**	26.01	21.82	13.11
	xml		**27.40**	**23.26**	**14.21**
	xxx	23.36			

Adaptation helps +1.3 BLEU on average.

Adaptation	→NL
(not adapted)	23.40
XML annotations	25.41
In-domain phrase table	**27.48**

The standard secondary in-domain phrase table in Moses gives the best results, but requires retraining.

System	Adapted	→CS	→ES	→NL	→PT
TectoMT	wild	3	**1–2**	3	**1**
Moses	only tune	4–5	3	4	3
Chimera	only tune	**1–2**			
	xxx	4–5	**1–2**	2	2
another		**1–2**		**1**	

WMT16 IT-task results: human ranking
Chimera combination helps (except PT).

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