Forest-to-String SMT for Asian Language Translation: NAIST at WAT 2014

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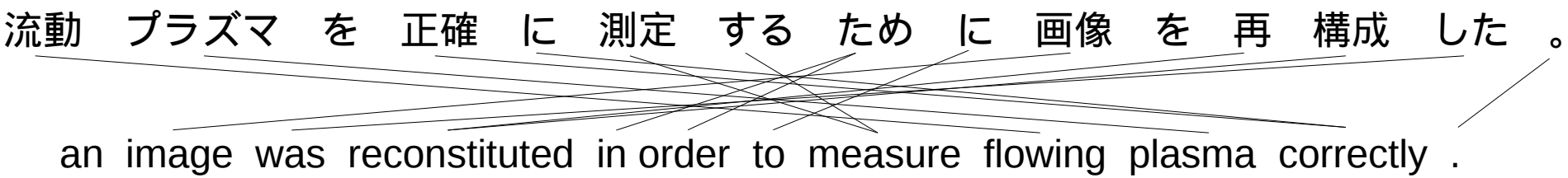
Features of ASPEC

- Translation between languages with different grammatical structures



- We all know: Phrase-based MT is not enough

for the accurate measurement of plasma flow image was reconstructed .

Solution?: 2-step Translation Process

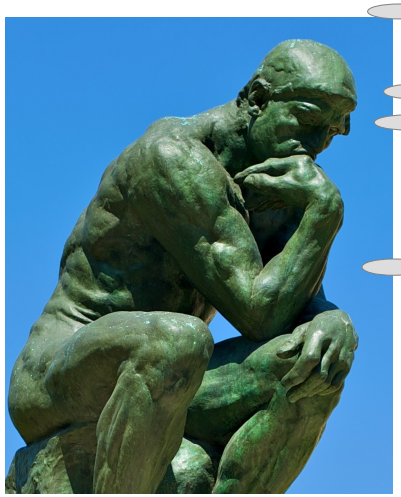
- Pre-ordering [Weblio, SAS_MT, NII, TMU, NICT]

我々 は 科学 論文 を 翻訳 する → 我々 翻訳 する 科学 論文 → we translate scientific papers

- RBMT+Statistical Post Editing [TOSHIBA, EIWA]

我々 は 科学 論文 を 翻訳 する → we translate science thesis → we translate scientific papers

This is a lot of work... :(



How do I make good Japanese-English preordering rules?!

How do I make good Japanese-Chinese preorderering rules?!

What about error propagation?

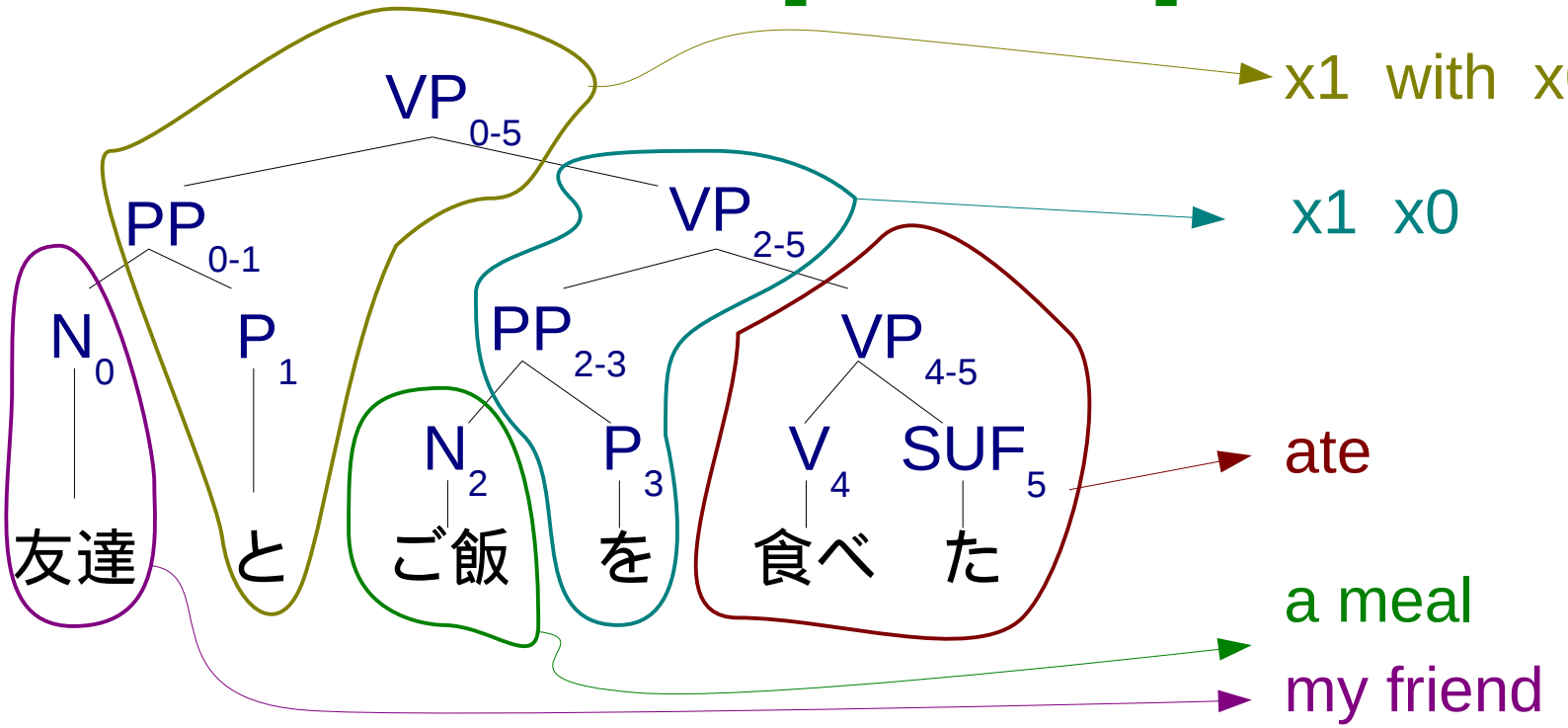
What if better preordering accuracy doesn't equal better translation accuracy?

Evidence

Team ID	Organization	JE	EJ	JC	CJ
NAIST (Neubig, 2014)	Nara Institute of Science and Technology	✓	✓	✓	✓
EIWA (Ehara, 2014)	Yamanashi Eiwa College	✓			✓
Kyoto-U (Richardson et al., 2014)	Kyoto University	✓	✓	✓	✓
WEBLIO-EJ1 (Zhu, 2014)	Weblio, Inc.		✓		
TMU (Ohwada et al., 2014)	Tokyo Metropolitan University	✓			
BJTUNLP (Cai et al., 2014)	Beijing Jiaotong University			✓	
NII (Hoshino et al., 2014)	National Institute of Informatics	✓			
SAS_MT (Wang et al., 2014)	SAS Research and Development Co., Ltd		✓		✓
Sense (Tan and Bond, 2014)	Saarland University & Nanyang Technological University	✓	✓	✓	✓
NICT (Ding et al., 2014)	National Institute of Information and Communication Technology			✓	
TOSHIBA (Sonoh et al., 2014)	Toshiba Corporation	✓		✓	
WASUIPS (Yang and Lepage, 2014)	Waseda University			✓*	✓*

Table 4: The list of participants which submitted translation results to WAT2014 and their participations to each subtasks. (*Only submitted to automatic evaluations.)

Our Solution: Tree-to-String Translation [Liu+ 06]

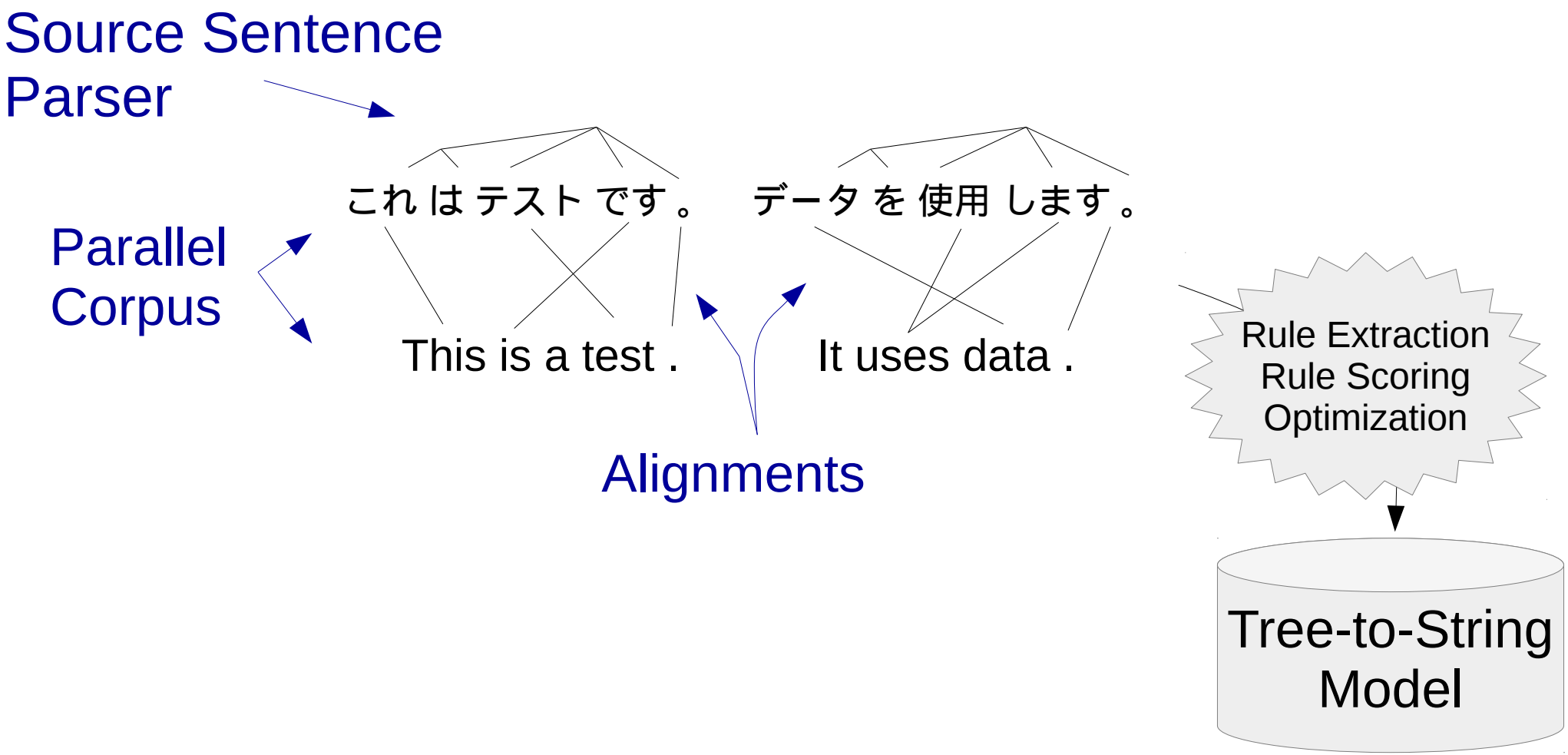


x1 x0

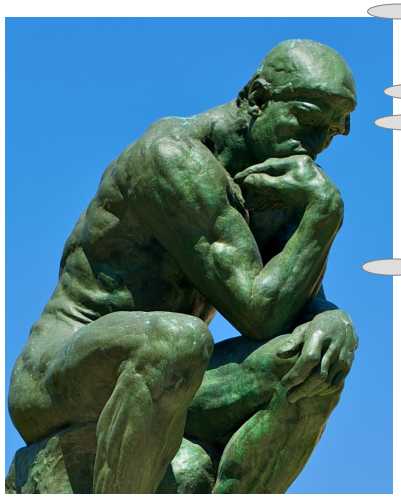
x1 x0

ate a meal with my friend

Requirements for a Tree-to-String Model



Reducing our work load.



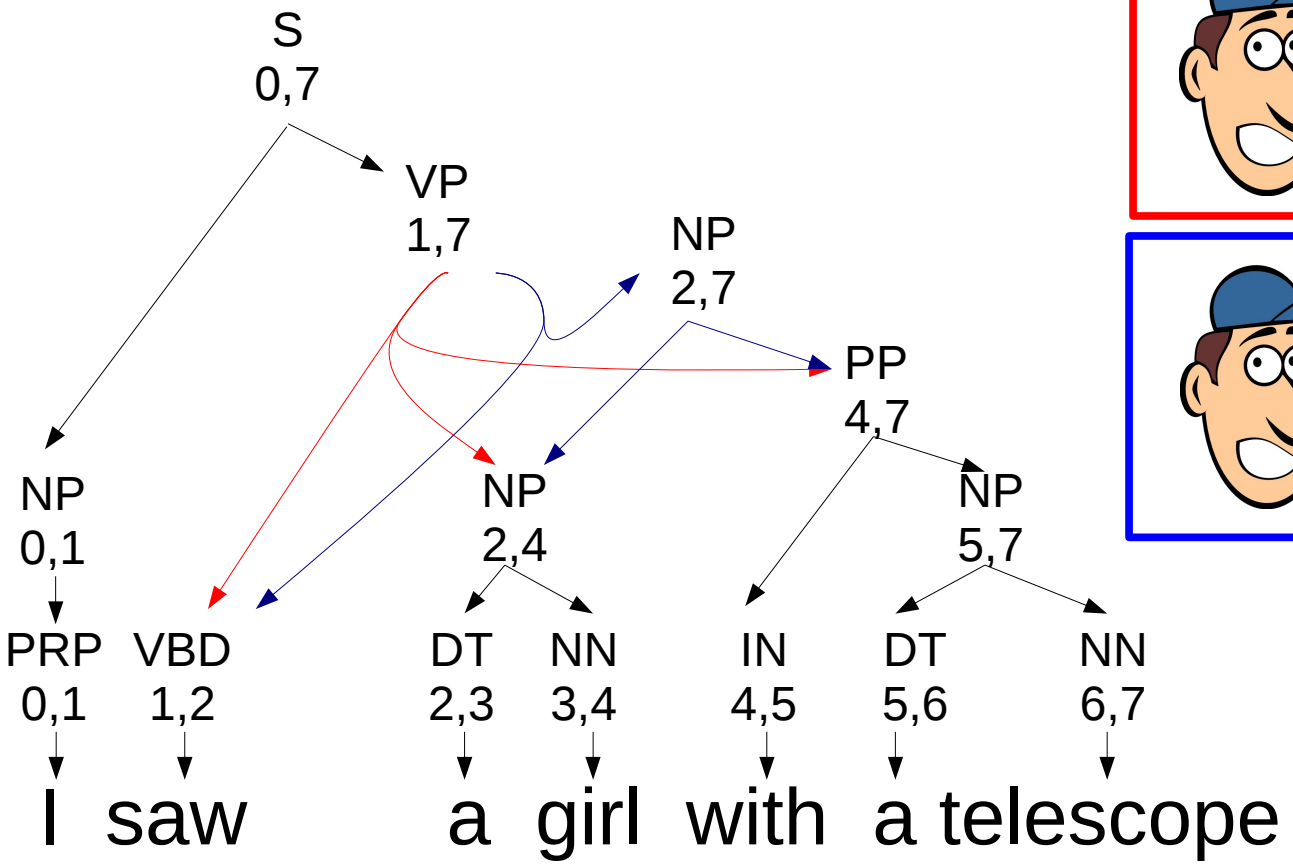
How do I make good Japanese-English preordering rules?! X

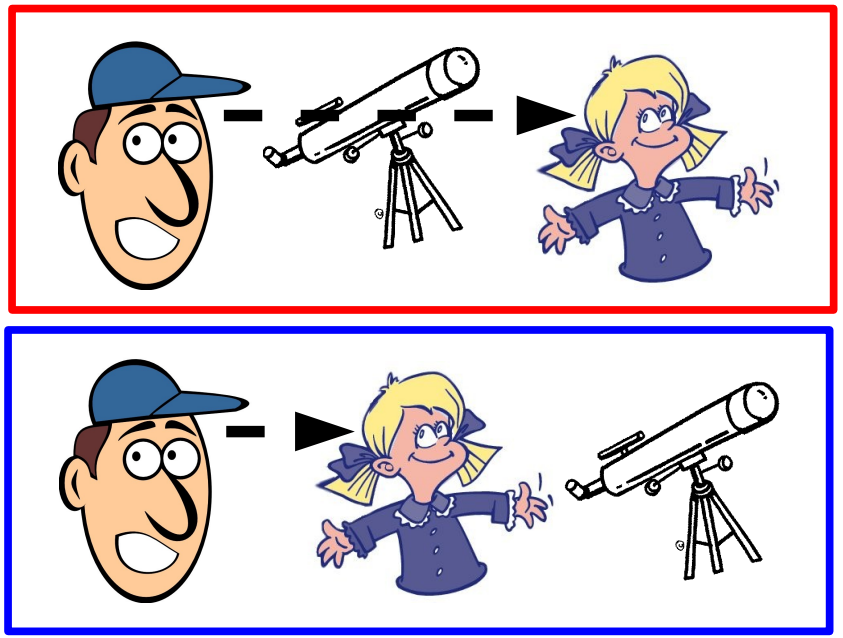
How do I make good Japanese-Chinese preordering rules?! X

What about error propagation?

What if better preordering accuracy doesn't equal better translation accuracy? X

Forest-to-string Translation [Mi+ 08]





Travatar Toolkit

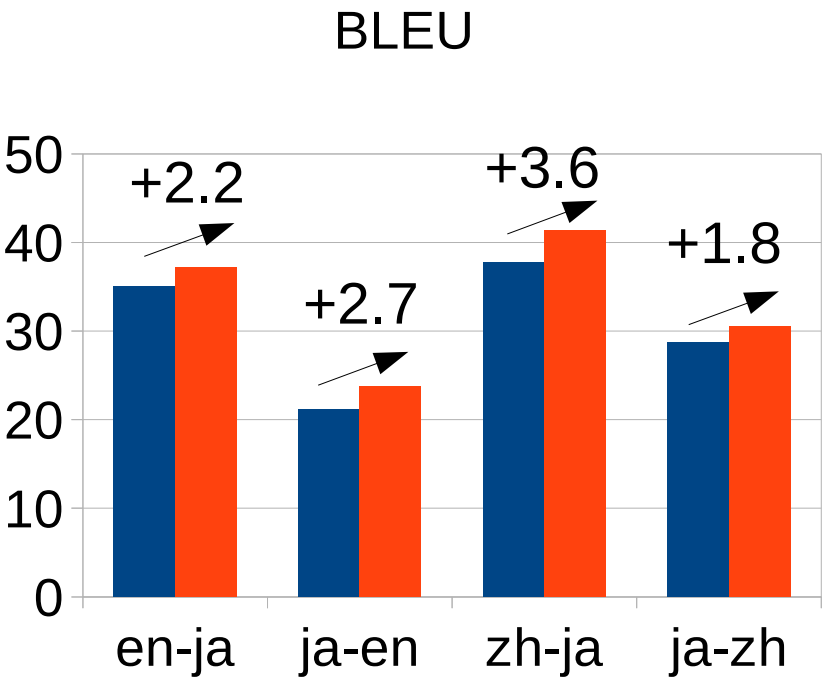
- Forest-to-string translation toolkit
- Supports training, decoding
- Includes preprocessing scripts for parsing, etc.
- Many other features (optimization, Hiero, etc...)

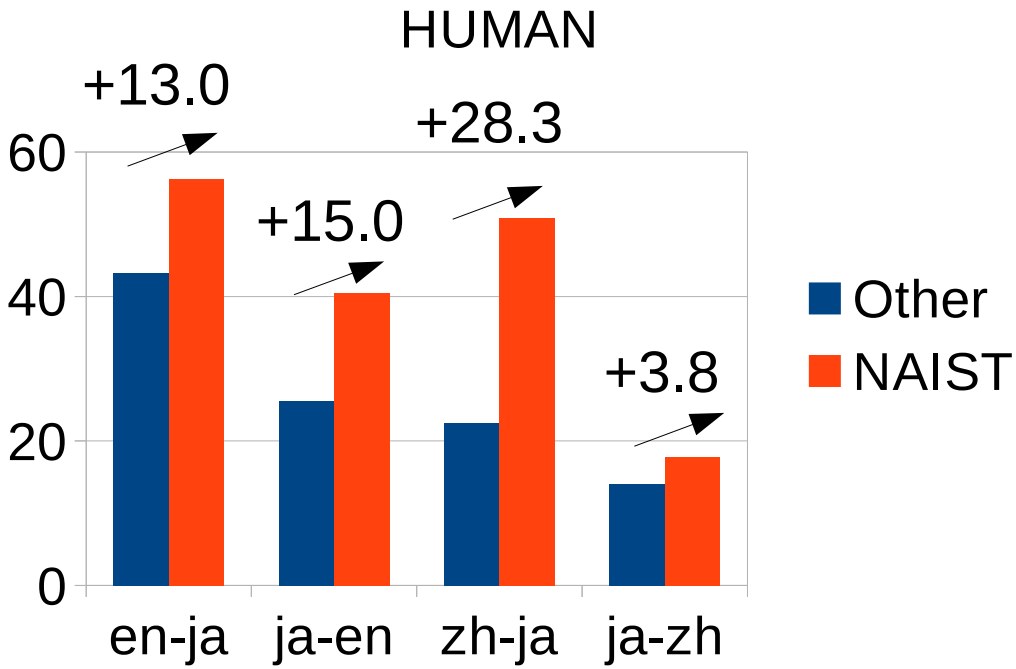
Available open source!
http://phontron.com/travatar

NAIST WAT System

WAT Results

First place in all tasks!





System Elements

Travatar!

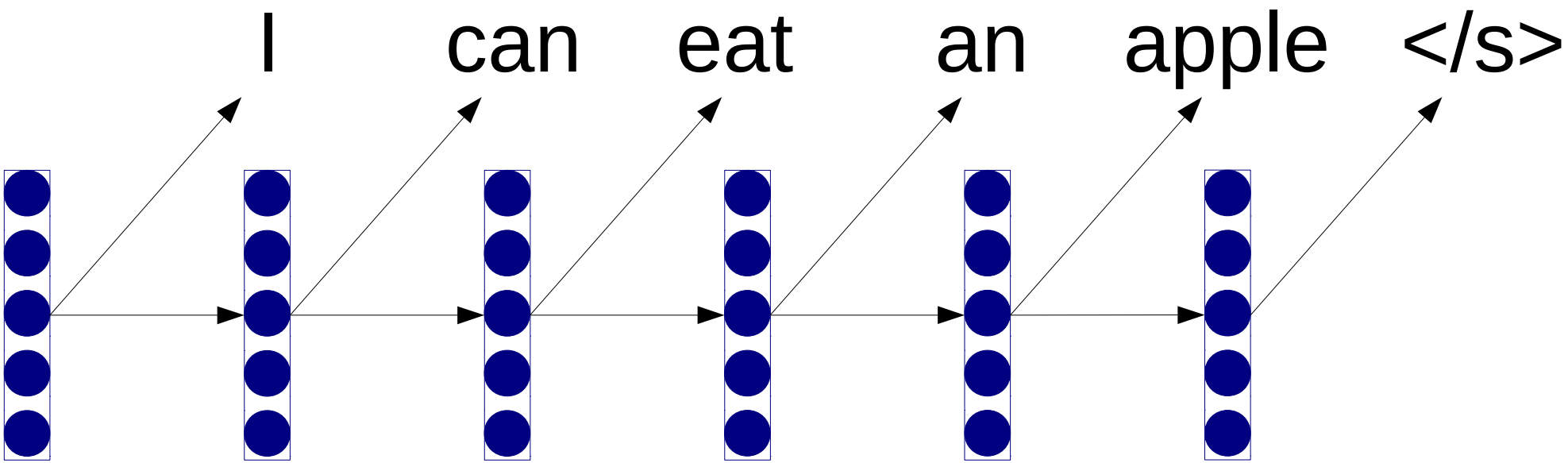
Same as [Neubig & Duh, ACL2014]

Recurrent Neural Net Language Model

Pre/post Processing (UNK splitting, transliteration)

Dictionaries

Recurrent Neural Network LM



- Vector representation → robustness
- Recurrent architecture → longer context

Pre/post processing

UNK segmentation (ja-en)

球内部　試験　管立て
↓　↓
球　内部　試験　管　立て

Kanji Normalization (ja-zh, zh-ja)

イチョウ黄叶　臭気鉴定师
↓　↓
イチョウ黄葉　臭気鑑定師

Transliteration (ja-en)

Japan　インテック
↓
Japan Intekku

Dictionary addition (ja-en)

膿瘍　典型
↓　↓
apostema　archetype

Conclusion

Future Work

LOSE at next year's WAT.

↓

(Make Travatar so easy to use that others can use it to make really good MT systems for Asian languages.)

Starting soon! Training scripts to be available:
http://phontron.com/project/wat2014