

KyotoEBMT System Description for the 2nd Workshop on Asian Translation

John Richardson
john@nlp.ist.i.kyoto-u.ac.jp

Raj Dabre
dabre@nlp.ist.i.kyoto-u.ac.jp

Chenhui Chu
chu@pa.jst.jp

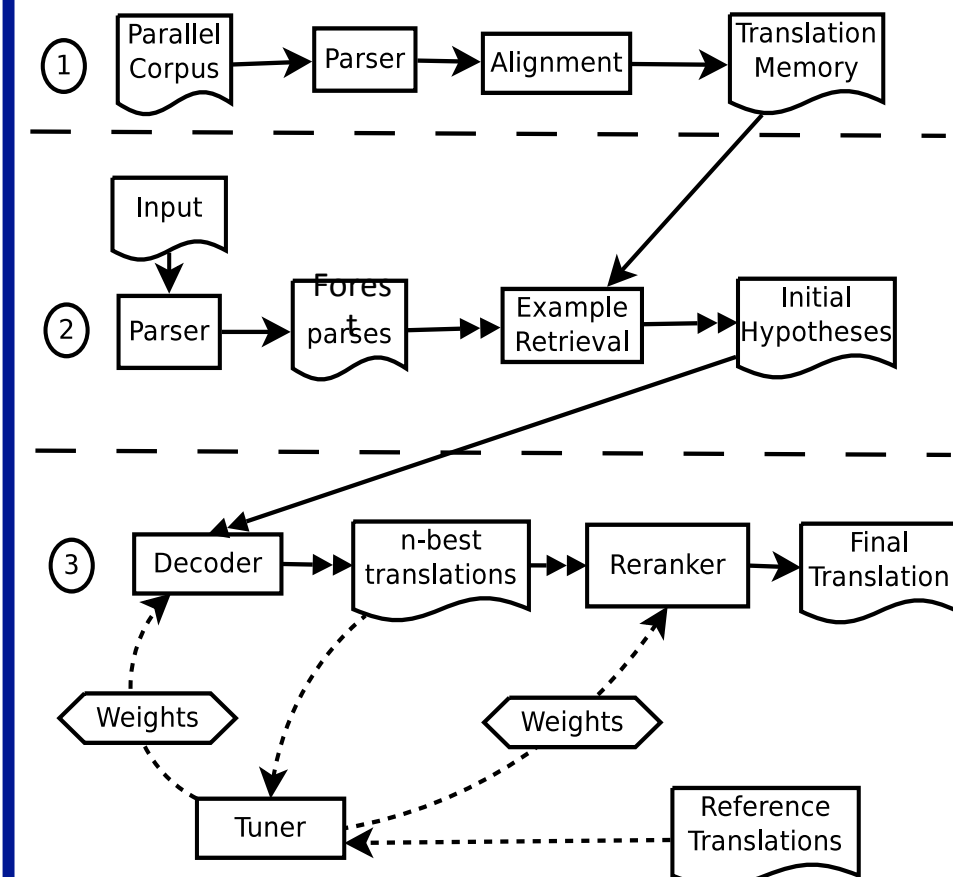
Fabien Cromières
fabien@pa.jst.jp

Toshiaki Nakazawa
nakazawa@pa.jst.jp

Sadao Kurohashi
kuro@i.kyoto-u.ac.jp

Graduate School of Informatics, Kyoto University

KyotoEBMT System Pipeline



Web Interface of Translation

Example based machine translation system based on dependency structure are introduced in this paper.

```

*** Input and Output Dependency Trees ***
0 | r[0] 本稿
1 | r[0] で
2 | r[0] は
3 | | r[6] 依存
4 | | r[6] 構造
5 | | r[5] に
6 | | r[5] 基づく
7 | | r[4] 用例
8 | | r[3] ベース
9 | | r[2] 機械
10 | | r[2] 翻訳
11 | | r[1] システム
12 | | r[1] を
13 | | r[0] 紹介
14 | | r[0] する
15 | | r[7] 。

r[4] an*
r[4] example
r[3] based
r[2] machine
r[2] translation
r[1] system
r[1] based
r[1] on
r[6] dependency
r[6] structure
r[5] .*
r[0] are*
r[0] introduced
r[0] in
r[0] this
r[0] paper
r[7] .*

*** List of Used Translation Examples ***
[0] NICT JE SP-train-G-0654753
0 | r[0] 本稿
1 | r[0] で
2 | r[0] は
3 | r[7] を
4 | r[8] ,
5 | r[26] 紹介
6 | r[0] した
7 | r[27] 。

r[7] in
r[8] ,
here
r[26] introduced
r[8] in
r[0] this
r[0] paper
r[27] .

[1] NICT JE SP-train-R-0064303
0 | r[5] おける
1 | | r[6] CAD
2 | | r[6] /

#which
r[8] explains
r[6] CAD/CAM
    
```

WAT2015 Official Results

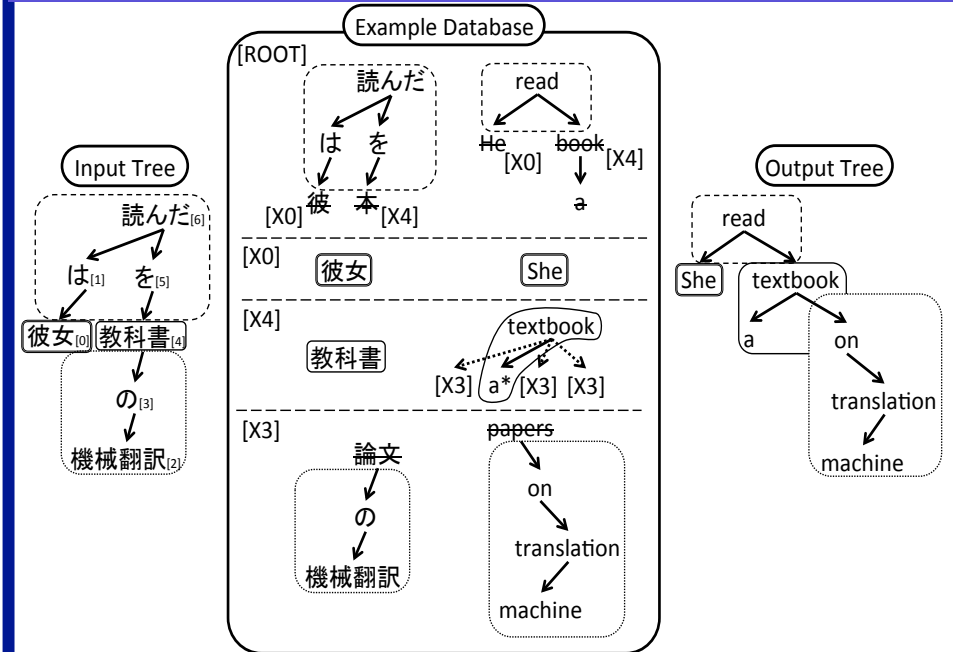
Dependency Parsers
 Ja: KNP [Kawahara and Kurohashi, 2006]
 En: NLPParser [Charniak and Johnson, 2005] with rules
 Zh: SKP [Shen et al., 2012]

Reranking Features
 7-gram language model with Modified Kneser-Ney smoothing
 Recurrent Neural Network Language Model (hidden layer: 200) (Mikolov, 2011)
 Bilingual RNN Language Model (Bahdanau et al., 2015)

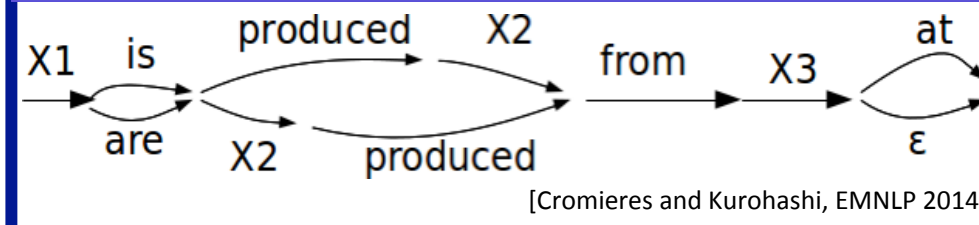
	Rerank	BLEU	RIBES	HUMAN
JE	NO	21.31 (+0.71)	70.65 (+0.53)	16.50
	YES	22.89 (+1.82)	72.46 (+2.56)	32.50
EJ	NO	30.69 (+0.92)	76.78 (+1.57)	40.50
	YES	33.06 (+1.97)	78.95 (+2.99)	51.00
JC	NO	29.99 (+2.78)	80.71 (+1.58)	16.00
	YES	31.40 (+3.83)	82.70 (+3.87)	12.50
CJ	NO	36.30 (+2.73)	81.97 (+1.87)	16.75
	YES	38.53 (+3.78)	84.07 (+3.81)	18.50

(Improvement over WAT2014 in parentheses)
 Remark: For WAT2014, J->C was the only direction for which reranking was worsening BLEU and Human Evaluation. For WAT2015, J->C is still the only direction for which reranking worsens Human Evaluation (although it now does improve BLEU)

Illustration of Translation Process



Translation with Lattice Rules



Each path in this lattice corresponds to different choices of insertion position for X2, morphological forms of “be”, and the optional insertion of “at”.

- designed to handle an arbitrary number of non-terminals
- able to handle ambiguities of translation hypotheses
- which target word is going to be used

Conclusion and Future Work

- KyotoEBMT system**
- source code available under a GPL license at <http://nlp.ist.i.kyoto-u.ac.jp/kyotoebmt/> (version 1.0 just released!)
 - uses both source and target dependency analysis
 - online example retrieving
 - availability of full translation examples at run time
 - can use forest parses of input
- Future work**
- use a target-side tree language model
 - online tuning of weights
 - target-side structural features
 - use of neural network language models in decoding