The LIG Arabic / English Speech Translation System at IWSLT07

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OUTLINE

1 Baseline MT system
-Task, data & tools
-Restoring punctuation and case
-Use of out-of-domain data
-Adding a bilingual dictionary

2 Lattice decomposition for CN decoding
-Lattice to CNs
-Word lattices to sub-word lattices
-What SRI-LM does
-Our algo.
-Examples in arabic

3 Speech translation experiments
-Results on IWSLT06
-Results on IWSLT07 (eval)

OUTLINE

1 Baseline MT system

-Task, data & tools

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Task, data & tools

- First participation to IWSLT
  - A/E task
  - Conventional phrase-based system using Moses+Giza+sri-lm
- Use of IWSLT-provided data (20k bitext) except
  - A 84k A/E bilingual dictionary taken from http://freedict.cvs.sourceforge.net/freedict/eng-ara/
  - The buckwalter morphological analyzer
  - LDC's Gigaword corpus (for english LM training)

Restoring punctuation and case

- 2 separated punct. and case restoration tools built using *hidden-ngram* and *disambig* commands from sri-lm
  - => restore MT outputs

	(1) train with case & punct	(2) train without case & punct	(3) train with restored case & punct
dev06	0.2341	0.2464	0.2298
tst06	0.1976	0.1948	0.1876

Option (2) kept

Use of out-of-domain data

- Baseline in-domain LM trained on the english part of A/E bitext
- Interpolated LM between *Baseline* and *Out-of-domain* (LDC gigaword) : 0.7/0.3

	In domain LM No MERT	Interpolated in-domain and out-of-domain LM No MERT	Interpolated in-domain and out-of-domain LM MERT on dev06
dev06	0.2464	0.2535	0.2674
tst06	0.1948	0.2048	0.2050

Adding a bilingual dictionary

- A 84k A/E bilingual dictionary taken from
  http://freedict.cvs.sourceforge.net/freedict/eng-ara/
- Directly concatenated to the training data + retraining + retuning (mert)

	No bilingual dict.	Use of a bilingual dict.
dev06	0.2674	0.2948
tst06	0.2050	0.2271

Submitted MT system (from verbatim trans.)

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2 Lattice decomposition for CN decoding

- Lattice to CNs
- Word lattices to sub-word lattices
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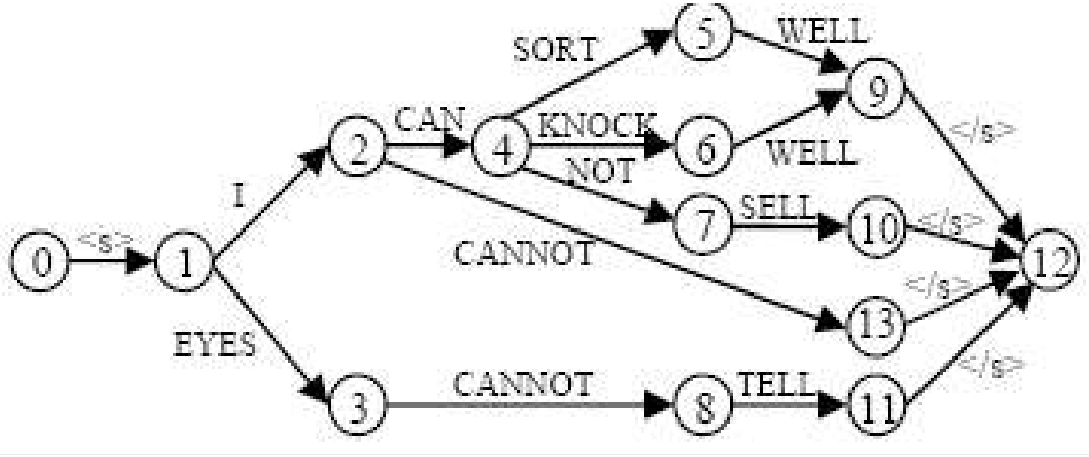
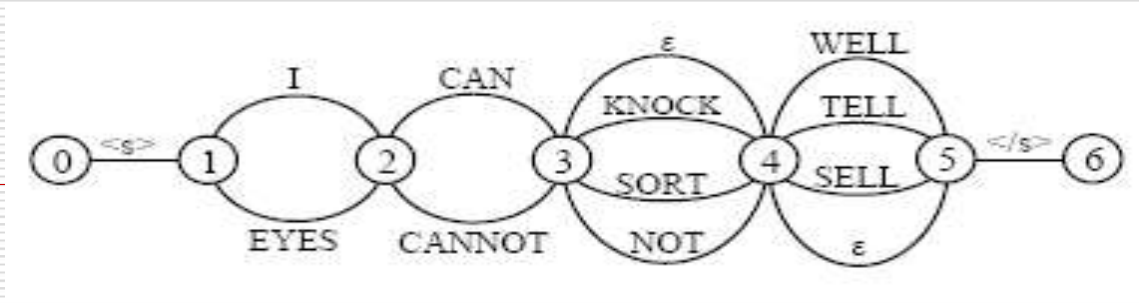
- Our algo.
- Examples in arabic

Lattice to CNs

- Moses allows to exploit CN as interface between ASR and MT
- Example of word lattice and word CN



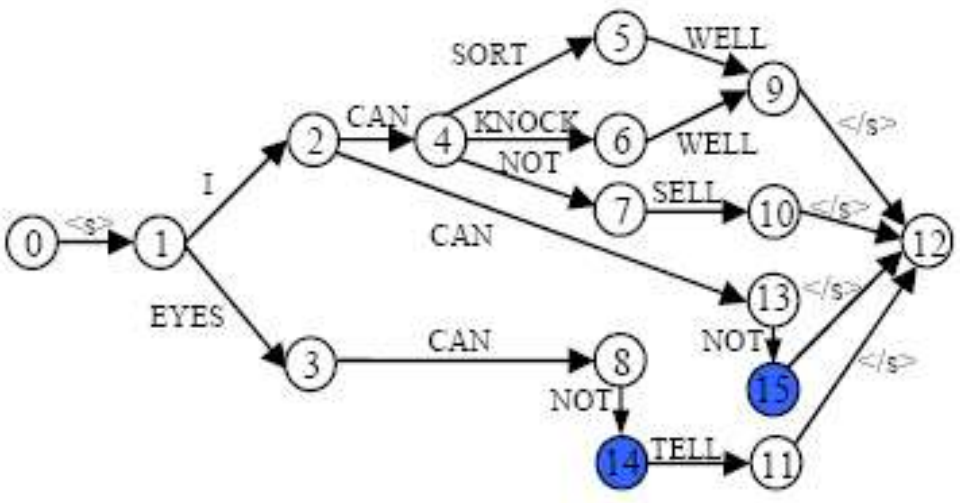


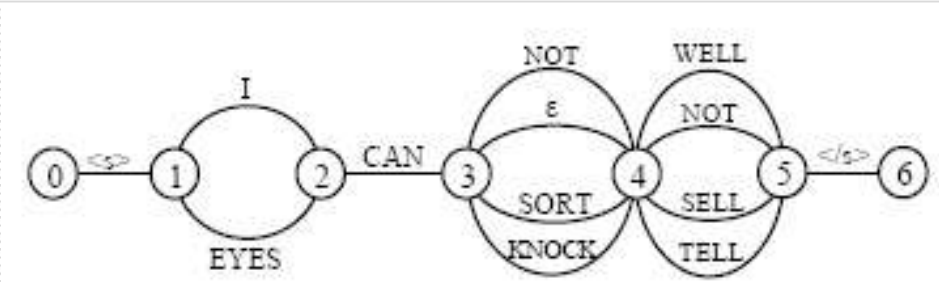
Word lattices to sub-word lattices

- Problem : word graphs provided for IWSLT07 do not have necessarily word decomposition compatible with the word decomposition used to train our MT models
  - Word units *vs* sub-word units
  - Different sub-word units used
- Need for a lattice decomposition algorithm

What SRI-LM does

- Example : CANNNOT splitted into CAN and NOT
- *-split-multiwords* option of *lattice-tool*
  - *First node keeps all the information*
  - *new nodes have null scores and zero-duration*





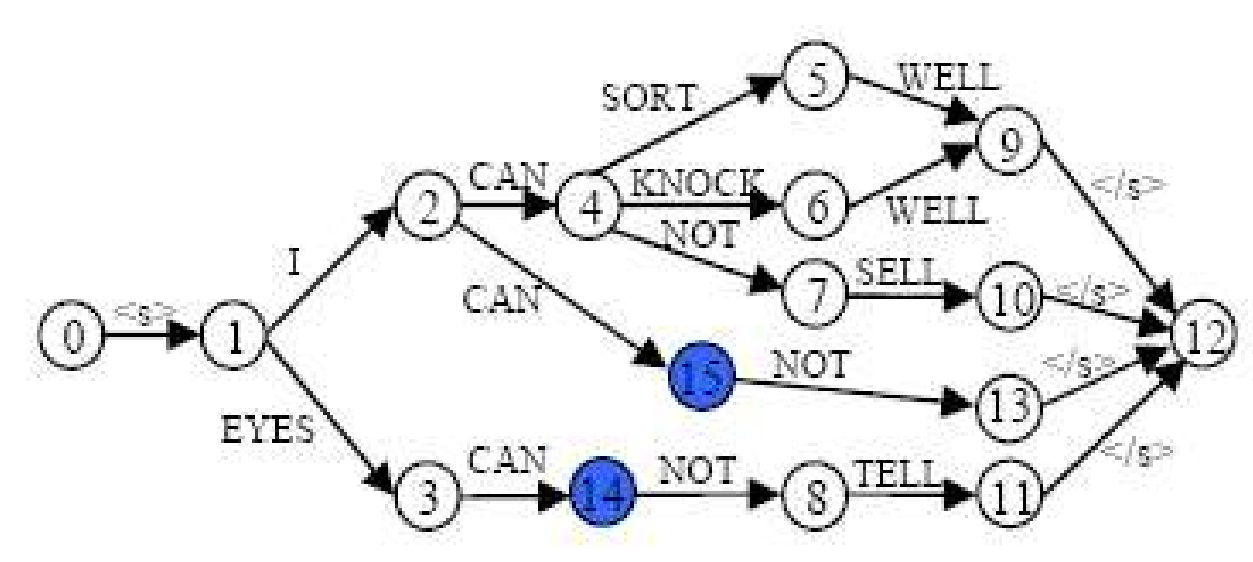
Proposed lattice decomposition algorithm (1)

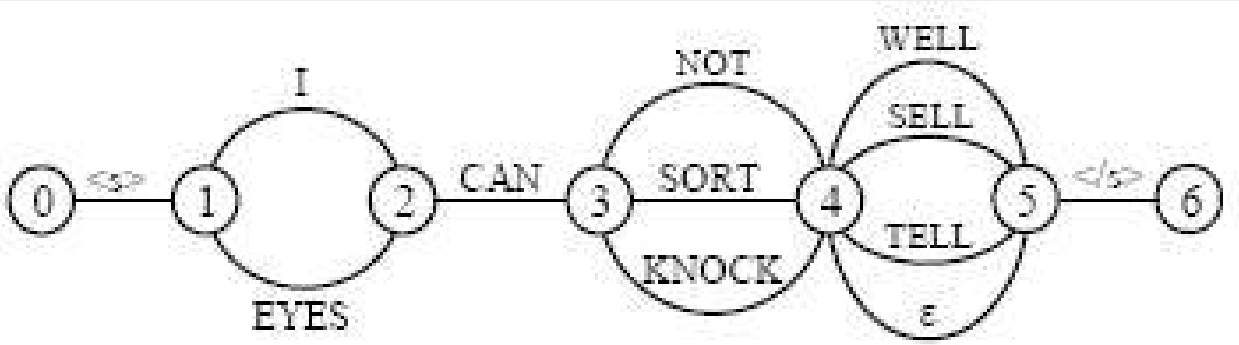
- *identify the arcs of the graph that will be split (decompoundable words)*
- *each arc to be split is decomposed into a number of arcs that depends on the number of subword units*
- *the start / end times of the arcs are modified according to the number of graphemes into each subword unit*
- *so are the acoustic scores*
- *the first subword of the decomposed word is equal to the initial LM score of the word, while the following subwords LM scores are made equal to 0*

- **Freely available on**

http://www-clips.imag.fr/geod/User/viet-bac.le/outils/

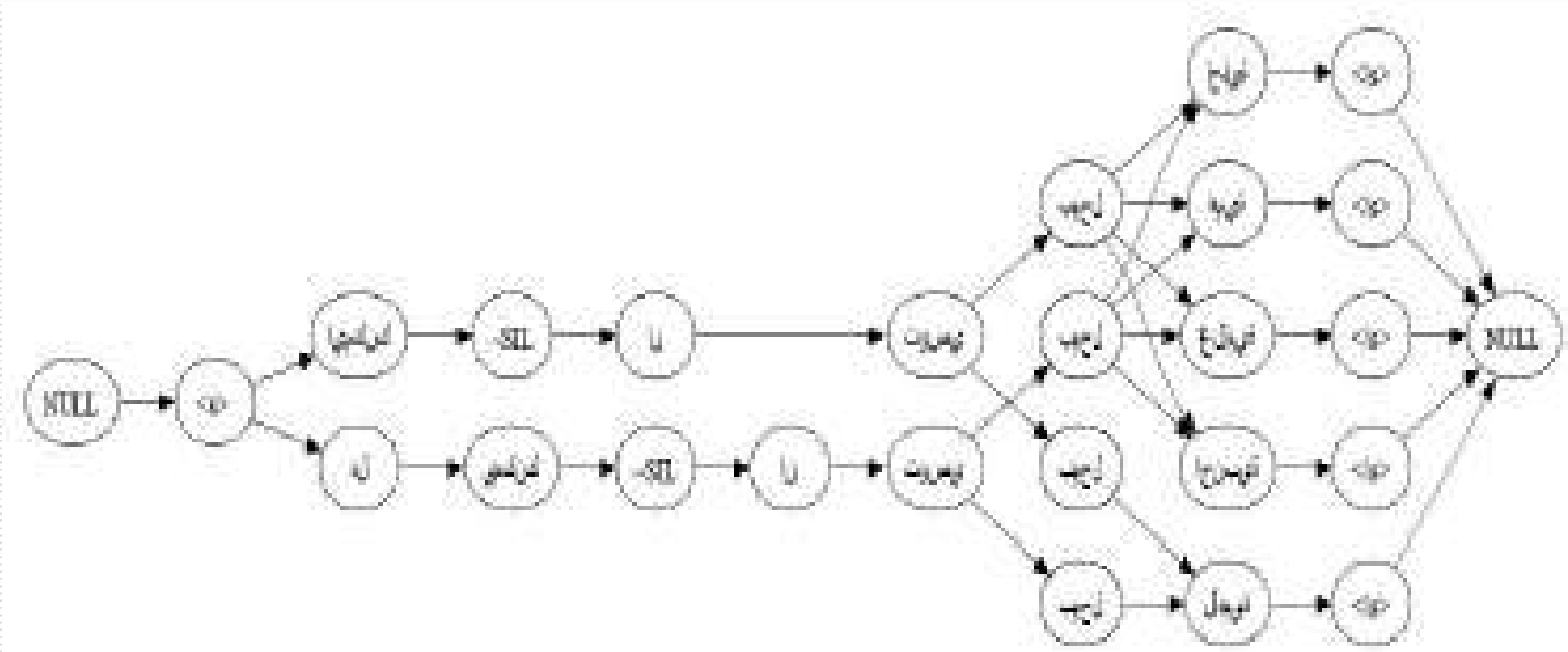
Proposed lattice decomposition algorithm (2)





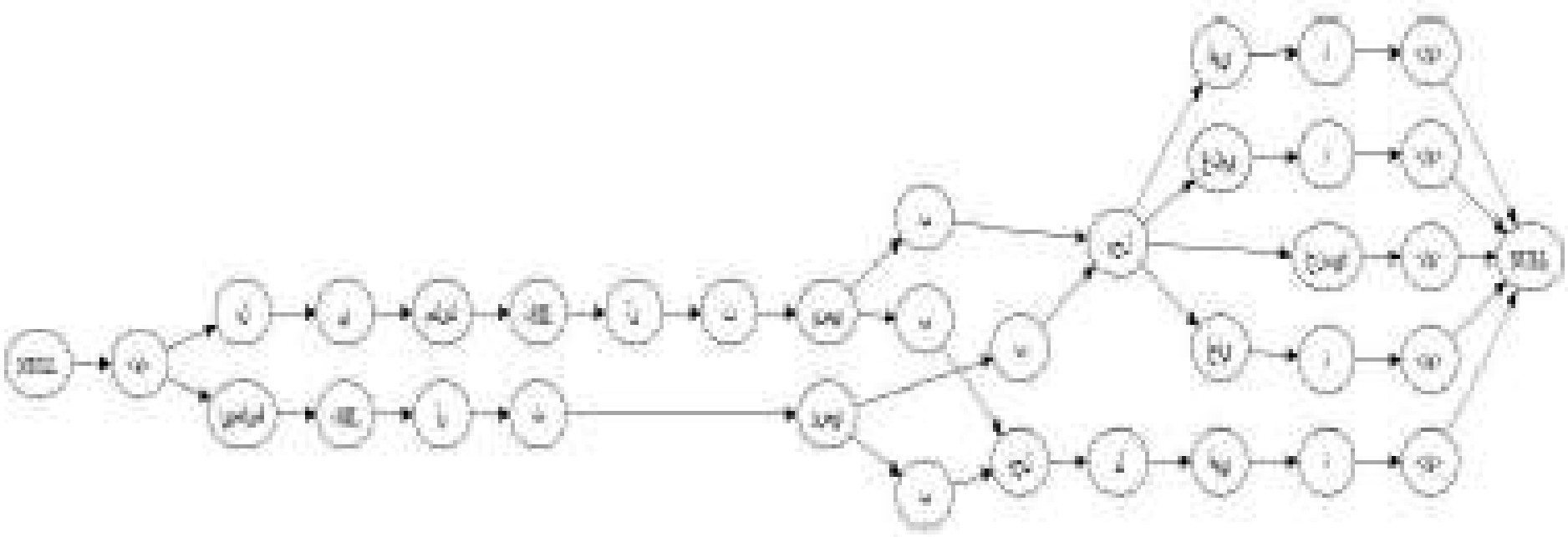
Examples in arabic

Word lattice



Examples in arabic

Sub-Word lattice



OUTLINE

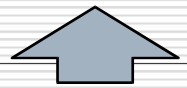
3 Speech translation experiments

- Results on IWSLT06
- Results on IWSLT07 (eval)

Results on IWSLT06

- Full CN decoding (subword CN as input)
  - obtained after applying our word lattice decomposition algorithm
  - all the parameters of the log-linear model used for the CN decoder were retuned on *dev06* set
    - "CN posterior probability parameter" to be tuned

	(1) verbatim	(2) 1-best	(3) cons-dec	(4) full-cn-dec
dev06	0.2948	0.2469	0.2486	0.2779
tst06	0.2271	0.1991	0.2009	0.2253



ASR secondary

ASR primary

Results on IWSLT07 (eval)

	clean verbatim	ASR 1-best	ASR full-cn-dec
Eva07	0.4135	0.3644	0.3804

AE ASR

1XXXX	BLEU score = 0.4445
2XXXX	BLEU score = 0.4429
3XXXX	BLEU score = 0.4092
4XXXX	BLEU score = 0.3942
5XXXX	BLEU score = 0.3908
6LIG_AE_ASR_primary_01	**BLEU score = 0.3804**
7XXXX	BLEU score = 0.3756
8XXXX	BLEU score = 0.3679
9XXXX	BLEU score = 0.3644
10XXXX	BLEU score = 0.3626
11XXXX	BLEU score = 0.1420