



# Exploiting Alignment Techniques in MaTrEx: the DCU MT System for IWSLT 2008



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## Introduction

MaTrEx (Machine Translation using Examples) is a hybrid system which can exploit EBMT, SMT and syntax-based techniques to build a combined translation model. MaTrEx is built following established Design Patterns and consists of a number of extensible and re-implementable modules. Some significant modules include:

- **Word Alignment Module:** outputs a set of word alignments given a parallel corpus;
- **Chunking Module:** outputs a set of chunks given an input corpus;
- **Chunk Alignment Module:** outputs aligned chunk pairs given source and target chunks from comparable corpora;
- **Decoder:** returns optimal translation given a set of aligned sentences, chunk/phrase and word pairs.

## New Alignment Techniques

### Word Packing

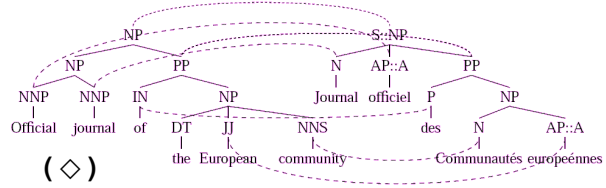
#### • Candidate Extraction

白葡萄酒 : white wine  
 抱歉 : excuse me  
 报警 : call the police  
 fifteen: 十五  
 here: 在这里

#### • Reliability Estimation

#### • Bootstrapping Word Alignment

### Treebank-based Phrase Alignment



### Punctuation Restoration

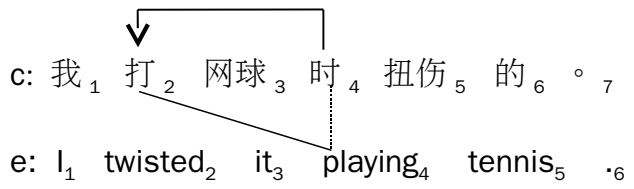
- Translation-based Punctuation Restoration
- Majority voting techniques to restore the final punctuation mark

### Syntax-enhanced Word Alignment

#### • Anchor Word Alignment

#### • Discriminative Syntax-Enhanced Word Alignment

#### • Search



(†)

	Journal	officiel	des	Communautés	européennes
Official					
journal					
of					
the					
European					
Communities					

† Official journal ↔ Journal officiel  
 † Official journal of ↔ Journal officiel des  
 \* Official journal of the/ ↔ Journal officiel des/  
 European Communities ↔ Communautés européennes  
 \* of ↔ des  
 \* of the European Communities ↔ des Communautés européennes  
 \* the European Communities ↔ Communautés européennes  
 \* European ↔ européennes  
 ◇ Communities ↔ Communautés  
 ◇ Official ↔ officiel  
 ◇ journal ↔ Journal  
 (\* = extracted from both † and ◇)

## Official Results

System	Challenge Task				BTEC						Pivot	
	ZH-EN		EN-ZH		AR-EN		ZH-EN		ZH-ES		ZH-EN-ES	
	CRR	ASR-1	CRR	ASR-1	CRR	ASR-1	CRR	ASR-1	CRR	ASR-1	CRR	ASR-1
Baseline	31.94	27.14	40.80	34.29	-	-	35.95	31.45	26.93	-	28.32	-
Word Packing	29.67	26.76	40.04	34.33	-	-	35.22	31.51	-	-	-	-
Syntax-Enhanced	34.52	29.31	42.43		-	-	38.23	34.23	-	-	-	-
Treebank	28.81	26.53	37.73	32.82	-	-	37.85	32.42	29.24	26.70	32.92	29.48
OOV Smoothing	32.59	-	-	-	-	-	-	-	-	-	-	-
All Smoothing	23.95	-	-	-	47.15	38.58	-	-	-	-	-	-
Data Combo	36.40	30.86	46.30	40.22	-	-	39.66	33.97	-	-	-	-

## Discussion

- Proper training on large data is always preferential.
- Syntax-enhanced word alignment leads to improvements.
- Treebank phrase extraction improves inconsistently
- Word packing leads to drops in performance.
- Smoothing and case/punctuation restoration techniques also effective.

