QCRI at IWSLT 2013: Experiments in Arabic-English and English-Arabic Spoken Language Translation

Hassan Sajjad, Francisco Guzmán, Preslav Nakov, Ahmed Abdelali, Kenton Murray, Fahad Al Obaidli, Stephan Vogel
Qatar Computing Research Institute

1. Baseline System

- **Train:** TED 2013 training data;
- **Dev:** dev2010;
- **Dev test:** tst2010;
- **Maximum sentence length:** 100 tokens;
- **English truecasing:** For AR→EN only;
- **Word alignments:** IBM4 + grow-diag-final-and;
- **Maximum phrase length:** 7 tokens;
- **Language model:** 5-gram;
- **Reordering:** msd-bidirectional-fe, mono-punct;
- **Tuning:** PRO.

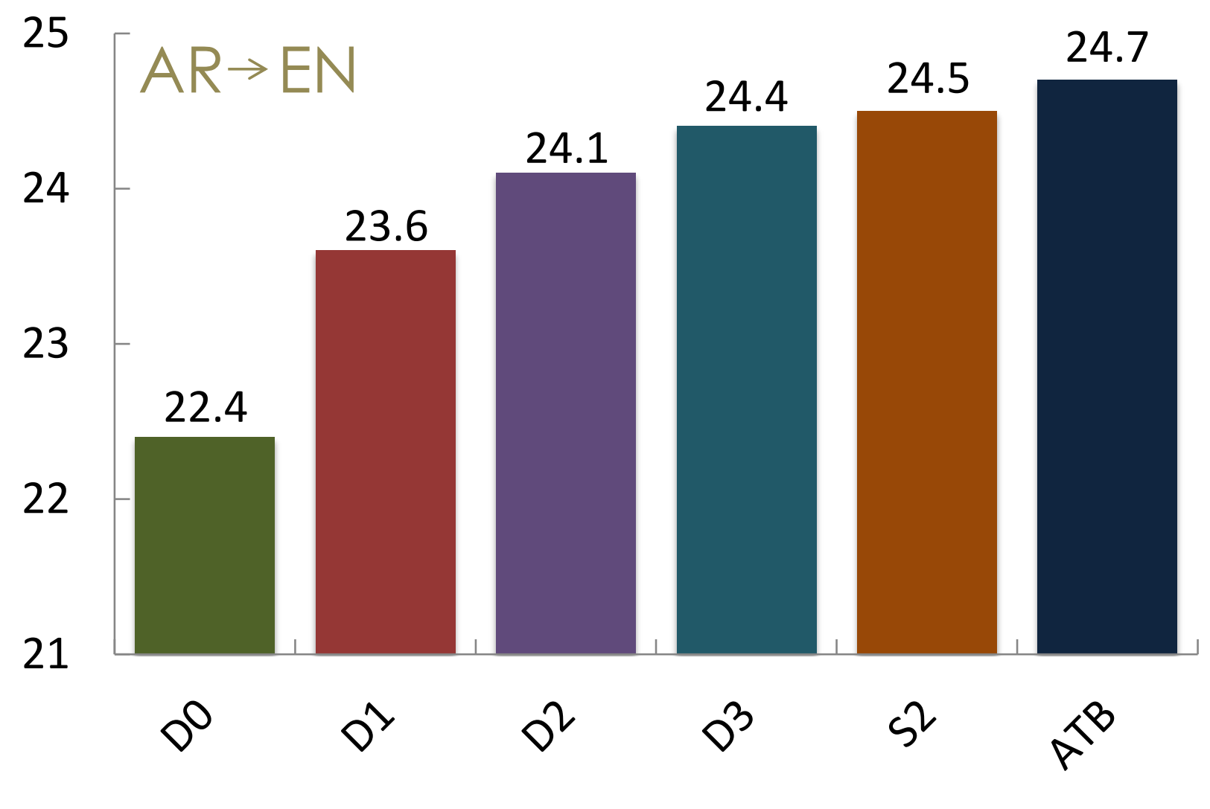
2. Adaptation

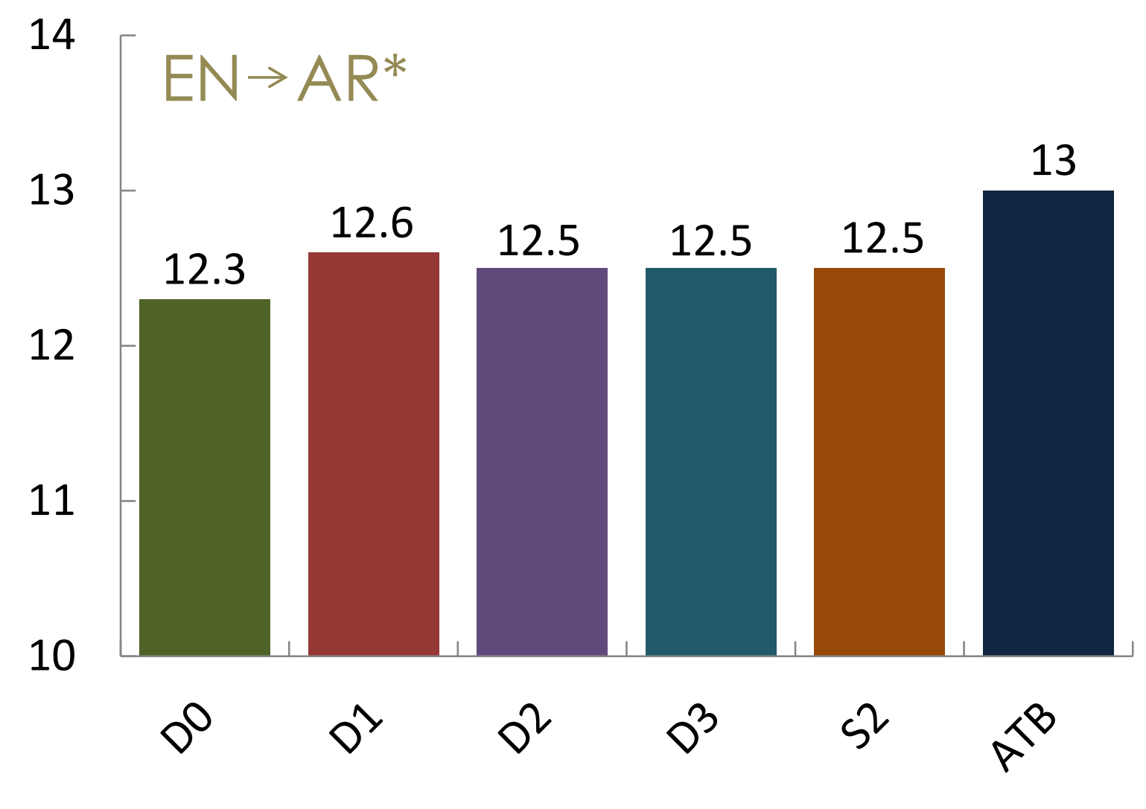
- **Phrase table combination (TED+UN)**
  - Three additional features
    - F1 if a phrase pair came from TED
    - F2 if a phrase pair came from UN
    - F3 if a phrase pair came from both TED and UN
  - Preferring TED data performs best
  - **+0.6** BLEU points
- **Backoff phrase tables (TED,UN)**
  - n-gram order 6 or less
  - **+0.6** BLEU points
- **Modified Moore-Lewis filtering on UN**
  - **-0.3** BLEU points (UN filtered combined with TED)

3. Arabic Segmentation

Arabic segmentation schemes

- D0, D1, D2, D3, S2, ATB (using MADA)





4. System Combination

1. **Decoder settings**
   - OSM, MBR, 100 translations per input phrase
2. **Arabic segmentations**
   - D0, D1, D2, D3, S2, ATB
3. **Adaptation**
   - Phrase table combination
4. **Decoders**
   - Moses, cdec, Jane

System combination: +0.6 BLEU points over best individual system

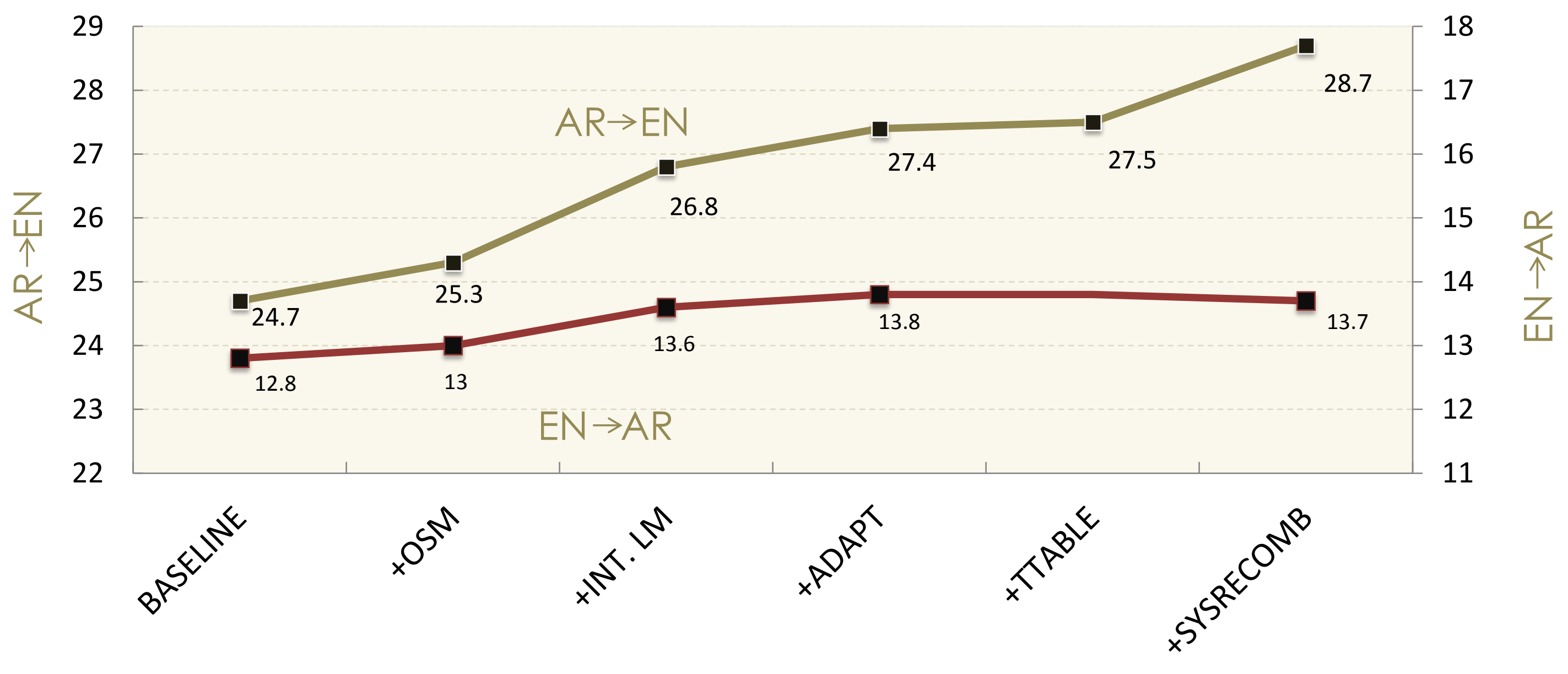
5. QCRI Normalizer for Arabic Output and References

- **Translating into Arabic:**
  - Spelling inconsistencies (Ta Marbuta, Alef)
  - Punctuation symbols (Arabic & English mixed)
  - Digits (Arabic & Indian mixed)
  - Diacritics (with, without or wrong)
- **Evaluation unfairly penalizes the translation output**

- **Solution:** Use MADA+Aramorph to normalize the translation and the reference before evaluation
  - Punctuation symbols (to English)
  - Digits (to Arabic, i.e. 0-9)
  - Diacritics (dropped)
  - Fixed potential spelling errors of Alef, Ta Marbuta, Alef Maqsura, etc.
- **Also:** Reattach waw, normalize ".."

6. Arabic – English

Incremental improvement (ATB segmentation)



Major Improvement (tst2010)	AR-EN	EN-AR
Operation Sequence Model (OSM)	+0.6	+0.2
Interpolated LM (Int. LM)	+1.5	+0.6
Adaptation	+0.6	+0.2
Translations per input phrase	+0.1	-
System combination	+0.6	-0.1
Total	**+3.4**	**+0.9**

7. Official Scores

		tst2011	*tst2012*	*tst2013*
AR-EN	Primary	27.8	30.3	30.5
	Secondary	26.9	28.7	30.0
EN-AR	Primary	15.5	15.5	15.8
	Secondary	15.2	15.7	15.7
EN-AR (SLT)	Primary	-	-	10.3
	Secondary	-	-	10.3

Primary: system combination. Secondary: best individual system

8. Conclusion & Future Work

+3.4 BLEU points over the baseline AR→EN system

What helped most

- System combination
- Interpolated language model
- Adaptation using full UN data
- Operation sequence model
- PRO with fixed BLEU+1

Future work

- Why less improvement for EN→AR than for AR→EN?

* The system uses OSM and MBR with baseline settings