A New Methodology to Maximize the Strength of SMT and NMT

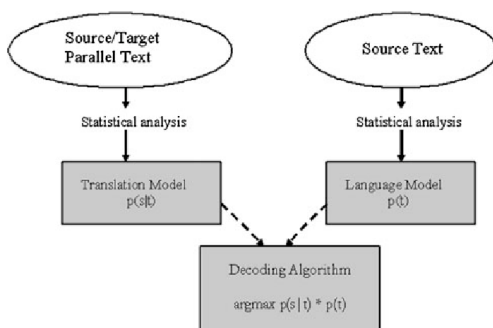## MT Summit XVI

Yu Gong
August 14th, 2017

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SMT vs. NMT

Figure-1
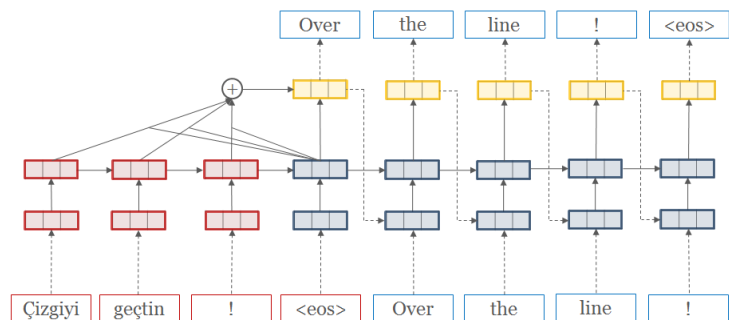

Figure-2

1. Karunesh Arora, Sunita Arora, Mukund Kumar Roy, Speech to speech translation: a communication boon, 2013

2. http://opennmt.net/

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Which one is better?

- More and more attention to Neural MT
- Improved translation quality over SMT
- A milestone in machine translation

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Is it true?

The Data

- Selection of "real world" customer data collected over a three month period
- Catalogue of technical tools
- German → English
- ~ 5,000 Segments

Automatic Evaluation Results

	NMT	Moses
BLEU	23.68	47.98
METEOR	28.46	38.26

Table 1: BLEU and METEOR scores.

Manual Evaluation Results

	#	NMT	Moses
formal address	138	90%	86%
genitive	114	**92%**	68%
modal construction	290	**94%**	75%
negation	101	93%	86%
passive voice	109	**83%**	40%
predicate adjective	122	81%	75%
prepositional phrase	104	81%	75%
terminology	330	35%	**68%**
tagging	145	83%	**100%**
sum	1453		
average		**89%**	73%

Anne Beyer, Vivien Macketanz, Aljoscha Burchardt and Philip Williams, Can out-of-the-box NMT Beat a Domain-trained Moses on Technical Data? EAMT 2017

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Another Example

Preference rates of translations produced by the Tilde SMT and Tilde NMT systems

Automatic evaluation (BLEU scores) of Tilde SMT and Tilde NMT systems with a 95% confidence interval

Error Analysis of English-Latvian SMT and NMT translations for 196 sentences from a balanced evaluation set

https://www.tilde.com/about/news/316
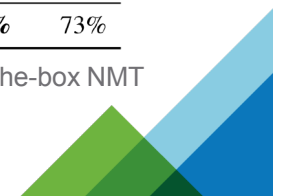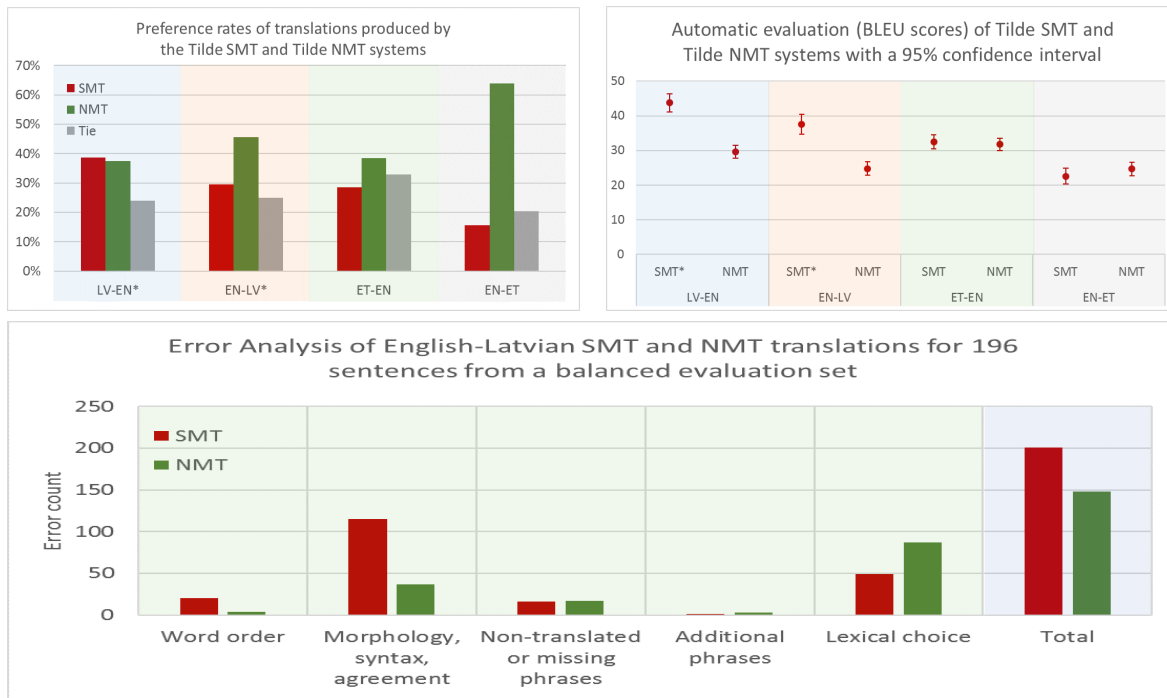
Some Findings

- Professional translators prefer translations of NMT systems over translations of the SMT systems*

- NMT systems are better at handling word ordering and morphology, syntax and agreements (including long distance agreements) than the SMT systems*

- SMT systems are better at handling terminologies than the SMT systems

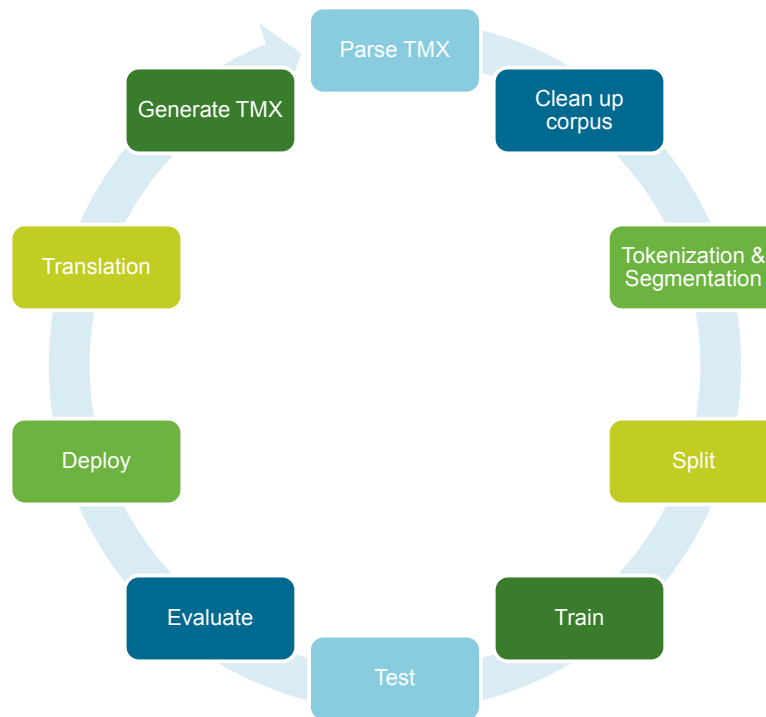- Human comparative evaluation is crucial when comparing MT systems from fundamentally different approaches*

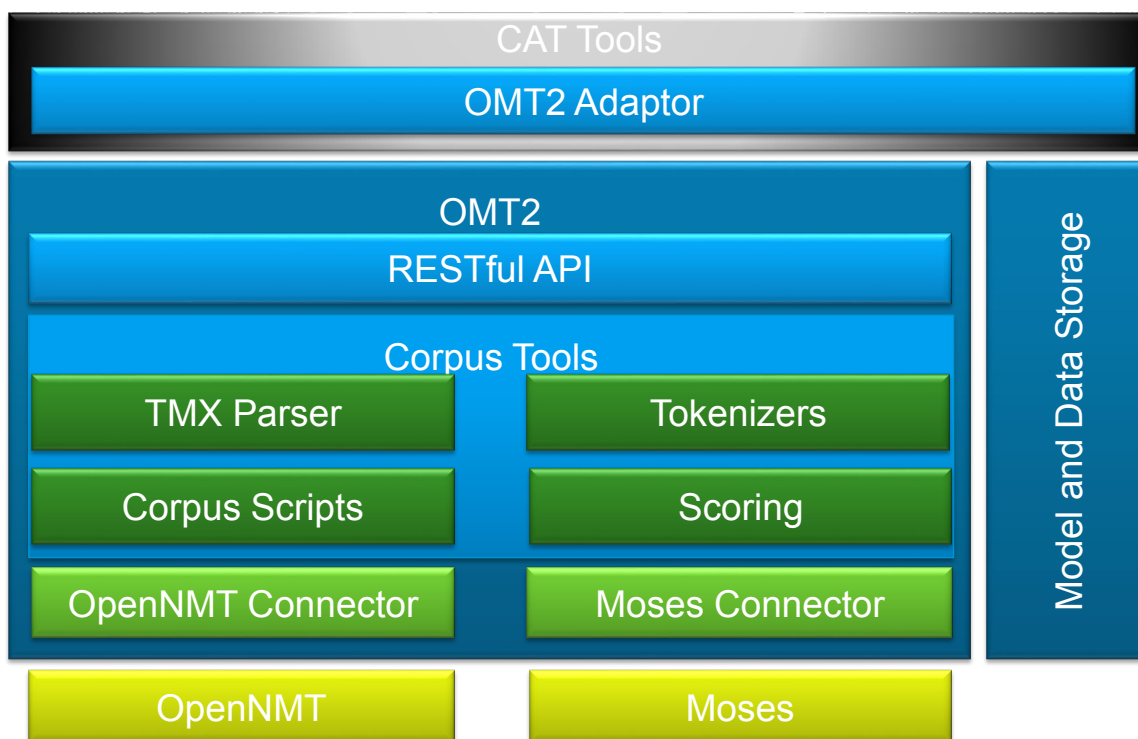https://www.tilde.com/about/news/316

What Can We Do?

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Open Machine Translation Toolset (OMT²)

- Streamline the process of creating workable MT models

- Help users choose the best model by evaluating MT output

- Integrate machine translation into enterprise localization process

- Enable users to try the latest machine translation technology with least effort

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Architecture

OMT² Features

- Parse TMX: Extract corpus from Translation Memory eXchange (TMX).

- Clean up corpus: Remove garbage tags, those sentences length of which are not suitable for training a MT model.

- Tokenization & Segmentation: Call third party tools to tokenize or segment corpus.

- Split corpus: Split the original corpus by randomly selecting sentences for different purposes: training, validating and testing.

- Train: Train an MT model by calling OpenNMT or Moses scripts.

- Score: Use BLEU to give users a sense of how good the model is.

- Select the best model: automatically choose the model with highest BLEU score.

- Translation: Enable users to translate content by RESTful API.

OMT² RESTful API

Request
https://translate.eng.vmware.com:5000/omt2/api/v1.0/getTranslation?src=en_US&tgt=zh_CN&str=hello

Response
{ "translation": {   "SMT": "你好",   "NMT": "你好" }}

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Sample Output in CAT Tools

| 1 | Po the Panda is the laziest animals in all of the Valley of Peace, but unwittingly becomes the chosen one when enemies threaten their way of life. | SMT: | 宝熊是和平谷中最懒惰的动物，但是当敌人威胁生活方式时，不知不觉地成为选择的动物。 |
| | | NMT: | 熊猫是所有和平谷中最懒的动物，但是当敌人威胁他们的生活方式时, 它不知不觉地变成了一个被选中的人。 |

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Demo

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Q&A

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Thank You

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