Introduction

The Second Conference on Machine Translation (WMT 2017) took place on Thursday and Friday, September 7–8, 2017 in Copenhagen, Denmark, immediately preceding the Conference on Empirical Methods in Natural Language Processing (EMNLP 2017).

This is the second time WMT has been held as a conference. The first time WMT was held as a conference was at ACL 2016 in Berlin, Germany. Prior to being a conference, WMT was held 10 times as a workshop. WMT was held for the first time at HLT-NAACL 2006 in New York City, USA. In the following years the Workshop on Statistical Machine Translation was held at ACL 2007 in Prague, Czech Republic, ACL 2008, Columbus, Ohio, USA, EACL 2009 in Athens, Greece, ACL 2010 in Uppsala, Sweden, EMNLP 2011 in Edinburgh, Scotland, NAACL 2012 in Montreal, Canada, ACL 2013 in Sofia, Bulgaria, ACL 2014 in Baltimore, USA, and EMNLP 2015 in Lisbon, Portugal.

The focus of our conference was to use parallel corpora for machine translation. Recent experimentation has shown that the performance of MT systems varies greatly with the source language. In this conference we encouraged researchers to investigate ways to improve the performance of MT systems for diverse languages, including morphologically more complex languages, languages with partial free word order, and low-resource languages.

Prior to the conference, in addition to soliciting relevant papers for review and possible presentation, we conducted 8 shared tasks. This consisted of three translation tasks: Machine Translation of News, Biomedical Translation, and Multimodal Machine Translation, two evaluation tasks: Metrics and Quality Estimation, as well as the Automatic Post-Editing, Neural MT Training, and the Bandit Learning tasks. Two of these tasks were run at WMT for the first time. The Neural MT Training task provide comparable conditions and encouraging researchers to explore training methods that lead to improved and more robust translation quality and help speed up the training. The Bandit Learning Task encourages participants to train and improve MT systems by learning from weak or partial feedback instead of the commonly used gold-standard human-generated translations.

The results of all shared tasks were announced at the conference, and these proceedings also include overview papers for the shared tasks, summarizing the results, as well as providing information about the data used and any procedures that were followed in conducting or scoring the tasks. In addition, there are short papers from each participating team that describe their underlying system in greater detail.

Like in previous years, we have received a far larger number of submissions than we could accept for presentation. This year we have received 40 full research paper submissions. In total, WMT 2017 featured 16 full paper oral presentations and 59 shared task poster presentations.

Holger Schwenk gave the invited on “Multilingual Representations and Applications in NLP”.

We would like to thank the members of the Program Committee for their timely reviews. We also would like to thank the participants of the shared task and all volunteers who helped with the evaluations.

Ondřej Bojar, Christian Buck, Rajen Chatterjee, Christian Federmann, Yvette Graham Barry Haddow, Matthias Huck, Antonio Jimeno Yepes, Philipp Koehn, Julia Kreutzer, Varvara Logacheva Christof Monz, Matteo Negri, Aurélie Névéol, Mariana Neves, Matt Post, Stefan Riezler, Raphael Rubino, Artem Sokolov, Lucia Specia, Marco Turchi, and Karin Verspoor

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Christian Buck (University of Edinburgh)
Rajen Chatterjee (FBK)
Christian Federmann (MSR)
Yvette Graham (DCU)
Barry Haddow (University of Edinburgh)
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Julia Kreutzer (Heidelberg University)
Varvara Logacheva (University of Sheffield)
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Raphael Rubino (Saarland University)
Artem Sokolov (Heidelberg University, Amazon Development Center, Berlin)
Lucia Specia (University of Sheffield)
Marco Turchi (FBK)
Karin Verspoor (University of Melbourne)

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Holger Schwenk (Facebook AI Research)

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Conference Program

Thursday, September 7, 2016

8:45–9:00 Opening Remarks

9:00–10:30 Session 1: Shared Tasks Overview Presentations I

9:00–9:40 Shared Task: News Translation

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9:40–10:10 Shared Task: Multimodal Translation

Findings of the Second Shared Task on Multimodal Machine Translation and Multilingual Image Description
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10:10–10:30 Shared Task: Biomedical Translation

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10:30-11:00 Coffee Break
Thursday, September 7, 2016 (continued)

11:00–12:30  Session 2: Shared Tasks Poster Session I

11:00–12:30  Shared Task: News Translation

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The University of Edinburgh’s Neural MT Systems for WMT17
Rico Sennrich, Alexandra Birch, Anna Currey, Ulrich Germann, Barry Haddow, Kenneth Heafield, Antonio Valerio Miceli Barone and Philip Williams

XMU Neural Machine Translation Systems for WMT 17
Zhixing Tan, Boli Wang, Jinming Hu, Yidong Chen and xiaodong shi

The JAIST Machine Translation Systems for WMT 17
Long Trieu, Trung-Tin Pham and Le-Minh Nguyen
Thursday, September 7, 2016 (continued)

**Sogou Neural Machine Translation Systems for WMT17**
Yuguang Wang, Shanbo Cheng, Liyang Jiang, Jiajun Yang, Wei Chen, Muze Li, Lin Shi, Yanfeng Wang and Hongtao Yang

**PJIIT’s systems for WMT 2017 Conference**
Krzysztof Wolk and Krzysztof Marasek

**Hunter MT: A Course for Young Researchers in WMT17**
Jia Xu, Yi Zong Kuang, Shondell Baijoo, Jacob Hyun Lee, Uman Shahzad, Mir Ahmed, Meredith Lancaster and Chris Carlan

**CASICT-DCU Neural Machine Translation Systems for WMT17**
Jinchao Zhang, Peerachet Porkaew, Jiawei Hu, Qiuye Zhao and Qun Liu

11:00–12:30  **Shared Task: Multi-Modal Translation**

**LIUM-CVC Submissions for WMT17 Multimodal Translation Task**
Ozan Caglayan, Walid Aransa, Adrien Bardet, Mercedes García-Martínez, Fethi Bougares, Loïc Barrault, Marc Masana, Luis Herranz and Joost van de Weijer

**DCU System Report on the WMT 2017 Multi-modal Machine Translation Task**
Iacer Calixto, Koel Dutta Chowdhury and Qun Liu

**The AFRL-OSU WMT17 Multimodal Translation System: An Image Processing Approach**
Jeremy Gwinnup, John Duselis, Michael Hutt, James Davis and Joshua Sandvick

**CUNI System for the WMT17 Multimodal Translation Task**
Jindřich Helcl and Jindřich Libovický

**Generating Image Descriptions using Multilingual Data**
Alan Jaffe

**OSU Multimodal Machine Translation System Report**
Mingbo Ma, Dapeng Li, Kai Zhao and Liang Huang

**Sheffield MultiMT: Using Object Posterior Predictions for Multimodal Machine Translation**
Pranava Swaroop Madhyastha, Josiah Wang and Lucia Specia
Thursday, September 7, 2016 (continued)

**NICT-NAIST System for WMT17 Multimodal Translation Task**
Jingyi Zhang, Masao Utiyama, Eiichro Sumita, Graham Neubig and Satoshi Nakamura

11:00–12:30  
Shared Task: Biomedical Translation

**Automatic Threshold Detection for Data Selection in Machine Translation**
Mirela-Stefania Duma and Wolfgang Menzel

12:30–14:00  
Lunch

14:00–15:30  
Session 3: Invited Talk

14:00–15:30  
Holger Schwenk (Facebook): Multilingual Representations and Applications in NLP

15:30–16:00  
Coffee Break

16:00–17:30  
Session 4: Research Papers on Lexicon and Morphology

16:00–16:15  
Sense-Aware Statistical Machine Translation using Adaptive Context-Dependent Clustering
Xiao Pu, Nikolaos Pappas and Andrei Popescu-Belis

16:15–16:30  
Improving Word Sense Disambiguation in Neural Machine Translation with Sense Embeddings
Annette Rios Gonzales, Laura Mascaréll and Rico Sennrich

16:30–16:45  
Word Representations in Factored Neural Machine Translation
Franck Burlot, Mercedes García-Martínez, Loïc Barrault, Fethi Bougares and François Yvon

16:45–17:00  
Modeling Target-Side Inflection in Neural Machine Translation
Aleš Tamchyna, Marion Weller-Di Marco and Alexander Fraser

17:00–17:15  
Evaluating the morphological competence of Machine Translation Systems
Franck Burlot and François Yvon
Thursday, September 7, 2016 (continued)

17:15–17:30 Target-side Word Segmentation Strategies for Neural Machine Translation
Matthias Huck, Simon Riess and Alexander Fraser

Friday, September 8, 2017

9:00–10:30 Session 5: Shared Tasks Overview Presentations II

9:00–9:20 Shared Task: Quality Estimation

9:20–9:40 Shared Task: Metrics

Results of the WMT17 Metrics Shared Task
Ondřej Bojar, Yvette Graham and Amir Kamran

9:40–10:00 Shared Task: Automatic Post-Editing

10:00–10:15 Shared Task: Bandit Learning

A Shared Task on Bandit Learning for Machine Translation
Artem Sokolov, Julia Kreutzer, Kellen Sunderland, Pavel Danchenko, Witold Szymaniak, Hagen Fürstenau and Stefan Riezler

10:15–10:30 Shared Task: Neural Training

Results of the WMT17 Neural MT Training Task
Ondřej Bojar, Jindřich Helcl, Tom Kocmi, Jindřich Libovický and Tomáš Musil

10:30–11:00 Coffee Break
11:00–12:30  **Session 6: Shared Tasks Poster Session II**

**11:00–12:30  Shared Task: Quality Estimation**

*Sentence-level quality estimation by predicting HTER as a multi-component metric*
Eleftherios Avramidis

*Predicting Translation Performance with Referential Translation Machines*
Ergun Biçici

*Bilexical Embeddings for Quality Estimation*
Frédéric Blain, Carolina Scarton and Lucia Specia

*Improving Machine Translation Quality Estimation with Neural Network Features*
Zhiming Chen, Yiming Tan, Chenlin Zhang, Qingyu Xiang, Lilin Zhang, Maoxi Li and Mingwen WANG

*UHH Submission to the WMT17 Quality Estimation Shared Task*
Melania Duma and Wolfgang Menzel

*Predictor-Estimator using Multilevel Task Learning with Stack Propagation for Neural Quality Estimation*
Hyun Kim, Jong-Hyeok Lee and Seung-Hoon Na

*Unbabel’s Participation in the WMT17 Translation Quality Estimation Shared Task*
André F. T. Martins, Fabio Kepler and Jose Monteiro

*Feature-Enriched Character-Level Convolutions for Text Regression*
Gustavo Paetzold and Lucia Specia

**11:00–12:30  Shared Task: Metrics**

*UHH Submission to the WMT17 Metrics Shared Task*
Melania Duma and Wolfgang Menzel
MEANT 2.0: Accurate semantic MT evaluation for any output language
Chi-kiu Lo

Blend: a Novel Combined MT Metric Based on Direct Assessment — CASICT-DCU submission to WMT17 Metrics Task
Qingsong Ma, Yvette Graham, Shugen Wang and Qun Liu

CUNI Experiments for WMT17 Metrics Task
David Mareček, Ondřej Bojar, Ondřej Hübsch, Rudolf Rosa and Dusan Varis

chrF++: words helping character n-grams
Maja Popović

bleu2vec: the Painfully Familiar Metric on Continuous Vector Space Steroids
Andre Tättar and Mark Fishel

11:00–12:30  Shared Task: Automatic Post-Editing

LIG-CRISiAL Submission for the WMT 2017 Automatic Post-Editing Task
Alexandre Berard, Laurent Besacier and Olivier Pietquin

Multi-source Neural Automatic Post-Editing: FBK’s participation in the WMT 2017 APE shared task
Rajen Chatterjee, M. Amin Farajian, Matteo Negri, Marco Turchi, Ankit Srivastava and Santanu Pal

The AMU-UEdin Submission to the WMT 2017 Shared Task on Automatic Post-Editing
Marcin Junczys-Dowmunt and Marcin Junczys-Dowmunt

Ensembling Factored Neural Machine Translation Models for Automatic Post-Editing and Quality Estimation
Chris Hokamp

Neural Post-Editing Based on Quality Estimation
Yiming Tan, Zhiming Chen, Liu Huang, Lilin Zhang, Maoxi Li and Mingwen Wang

CUNI System for WMT17 Automatic Post-Editing Task
Dusan Varis and Ondřej Bojar
Friday, September 8, 2017 (continued)

11:00–12:30  Shared Task: Bandit Learning

*The UMD Neural Machine Translation Systems at WMT17 Bandit Learning Task*
Amr Sharaf, Shi Feng, Khanh Nguyen, Kiante Brantley and Hal Daumé III

*LIMSI Submission for WMT’17 Shared Task on Bandit Learning*
Guillaume Wisniewski

11:00–12:30  Shared Task: Neural Training

*Variable Mini-Batch Sizing and Pre-Trained Embeddings*
Mostafa Abdou, Vladan Gloncak and Ondrej Bojar

*The AFRL WMT17 Neural Machine Translation Training Task Submission*
Jeremy Gwinnup, Grant Erdmann and Katherine Young

12:30–14:00  Lunch

14:00–15:15  Session 7: Research Papers on Syntax and Deep Models

14:00–14:15  *Predicting Target Language CCG Supertags Improves Neural Machine Translation*
Maria Nadejde, Siva Reddy, Rico Sennrich, Tomasz Dwojak, Marcin Junczys-Dowmunt, Philipp Koehn and Alexandra Birch

14:15–14:30  *Exploiting Linguistic Resources for Neural Machine Translation Using Multi-task Learning*
Jan Niehues and Eunah Cho

14:30–14:45  *Tree as a Pivot: Syntactic Matching Methods in Pivot Translation*
Akiva Miura, Graham Neubig, Katsuhito Sudoh and Satoshi Nakamura

14:45–15:00  *Deep architectures for Neural Machine Translation*
Antonio Valerio Miceli Barone, Jindřich Helcl, Rico Sennrich, Barry Haddow and Alexandra Birch

15:00–15:15  *Biasing Attention-Based Recurrent Neural Networks Using External Alignment Information*
Tamer Alkhouli and Hermann Ney
Friday, September 8, 2017 (continued)

15:15–16:00 Coffee Break

16:00–17:15 Session 8: Research Papers on Domain Adaptation and External Data

16:00–16:15 Effective Domain Mixing for Neural Machine Translation
Denny Britz, Quoc Le and Reid Pryzant

16:15–16:30 Multi-Domain Neural Machine Translation through Unsupervised Adaptation
M. Amin Farajian, Marco Turchi, Matteo Negri and Marcello Federico

16:30–16:45 Adapting Neural Machine Translation with Parallel Synthetic Data
Mara Chinea-Rios, Álvaro Peris and Francisco Casacuberta

16:45–17:00 Copied Monolingual Data Improves Low-Resource Neural Machine Translation
Anna Currey, Antonio Valerio Miceli Barone and Kenneth Heafield

17:00–17:15 Guiding Neural Machine Translation Decoding with External Knowledge
Rajen Chatterjee, Matteo Negri, Marco Turchi, Marcello Federico, Lucía Specia and Frédéric Blain