

WMT 2017

**Second Conference on
Machine Translation**

Proceedings

September 7-8, 2017
Copenhagen, Denmark

©2017 The Association for Computational Linguistics

Order copies of this and other ACL proceedings from:

Association for Computational Linguistics (ACL)
209 N. Eighth Street
Stroudsburg, PA 18360
USA
Tel: +1-570-476-8006
Fax: +1-570-476-0860
acl@aclweb.org

ISBN 978-1-945626-96-8

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 Névél, Mariana Neves, Matt Post, Stefan Riezler, Raphael Rubino, Artem Sokolov, Lucia Specia, Marco Turchi, and Karin Verspoor

Co-Organizers

Organizers:

Ondřej Bojar (Charles University in Prague)
Christian Buck (University of Edinburgh)
Rajen Chatterjee (FBK)
Christian Federmann (MSR)
Yvette Graham (DCU)
Barry Haddow (University of Edinburgh)
Matthias Huck (University of Edinburgh)
Antonio Jimeno Yepes (IBM Research Australia)
Philipp Koehn (University of Edinburgh / Johns Hopkins University)
Julia Kreutzer (Heidelberg University)
Varvara Logacheva (University of Sheffield)
Christof Monz (University of Amsterdam)
Matteo Negri (FBK)
Aurélie Névél (LIMSI, CNRS)
Mariana Neves (Federal Institute for Risk Assessment / Hasso Plattner Institute)
Matt Post (Johns Hopkins University)
Stefan Riezler (Heidelberg University)
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)

Invited Speaker:

Holger Schwenk (Facebook AI Research)

Program Committee:

Tim Anderson (Air Force Research Laboratory)
Eleftherios Avramidis (German Research Center for Artificial Intelligence (DFKI))
Daniel Beck (University of Melbourne)
Arianna Bisazza (University of Amsterdam)
Graeme Blackwood (IBM Research)
Frédéric Blain (University of Sheffield)
Ozan Caglayan (LIUM, Le Mans University)
Marine Carpuat (University of Maryland)
Francisco Casacuberta (Universitat Politècnica de València)
Daniel Cer (Google)
Mauro Cettolo (FBK)
Rajen Chatterjee (Fondazione Bruno Kessler)
Boxing Chen (NRC)
Colin Cherry (NRC)
David Chiang (University of Notre Dame)

Eunah Cho (Karlsruhe Institute of Technology)
Kyunghyun Cho (New York University)
Vishal Chowdhary (MSR)
Jonathan Clark (Microsoft)
Marta R. Costa-jussà (Universitat Politècnica de Catalunya)
Praveen Dakwale (University of Amsterdam)
Steve DeNeefe (SDL Language Weaver)
Michael Denkowski (Amazon.com, Inc.)
Markus Dreyer (Amazon.com)
Nadir Durrani (QCRI)
Desmond Elliott (University of Edinburgh)
Marzieh Fadaee (University of Amsterdam)
Marcello Federico (FBK)
Minwei Feng (IBM Watson Group)
Yang Feng (Institute of Computing Technology, Chinese Academy of Sciences)
Andrew Finch (NICT)
Orhan Firat (Google Research)
Marina Fomicheva (Universitat Pompeu Fabra)
José A. R. Fonollosa (Universitat Politècnica de Catalunya)
Mikel L. Forcada (Universitat d'Alacant)
George Foster (National Research Council)
Alexander Fraser (Ludwig-Maximilians-Universität München)
Markus Freitag (IBM Research)
Ekaterina Garmash (University of Amsterdam)
Ulrich Germann (University of Edinburgh)
Hamidreza Ghader (Informatics Institute, University of Amsterdam)
Jesús González-Rubio (Universitat Politècnica de València)
Cyril Goutte (National Research Council Canada)
Thanh-Le Ha (Karlsruhe Institute of Technology)
Nizar Habash (New York University Abu Dhabi)
Jan Hajic (Charles University)
Greg Hanneman (Carnegie Mellon University)
Christian Hardmeier (Uppsala universitet)
Eva Hasler (SDL)
Yifan He (Bosch Research and Technology Center)
Kenneth Heafield (University of Edinburgh)
Carmen Heger (Iconic)
John Henderson (MITRE)
Felix Hieber (Amazon Research)
Stéphane Huet (Université d'Avignon)
Young-Sook Hwang (SKPlanet)
Gonzalo Iglesias (SDL)
Doug Jones (MIT Lincoln Laboratory)
Marcin Junczys-Dowmunt (Adam Mickiewicz University, Poznań)
Roland Kuhn (National Research Council of Canada)
Shankar Kumar (Google)
Ákos Kádár (Tilburg University)

David Langlois (LORIA, Université de Lorraine)
 William Lewis (Microsoft Research)
 Qun Liu (Dublin City University)
 Shujie Liu (Microsoft Research Asia, Beijing, China)
 Saab Mansour (Apple)
 Daniel Marcu (ISI/USC)
 Arne Mauser (Google, Inc)
 Mohammed Mediani (Karlsruhe Institute of Technology)
 Abhijit Mishra (IBM Research India)
 Maria Nadejde (University of Edinburgh)
 Preslav Nakov (Qatar Computing Research Institute, HBKU)
 Jan Niehues (Karlsruhe Institute of Technology)
 Kemal Oflazer (Carnegie Mellon University - Qatar)
 Tsuyoshi Okita (Kyushuu institute of technology university)
 Daniel Ortiz-Martínez (Technical University of Valencia)
 Martha Palmer (University of Colorado)
 Siddharth Patwardhan (IBM Watson)
 Pavel Pecina (Charles University)
 Stephan Peitz (Apple)
 Sergio Penkale (Lingo24)
 Jan-Thorsten Peter (RWTH Aachen University)
 Maja Popović (Humboldt University of Berlin)
 Preethi Raghavan (IBM Research TJ Watson)
 Stefan Riezler (Heidelberg University)
 Baskaran Sankaran (IBM T.J. Watson Research Center)
 Jean Senellart (SYSTRAN)
 Rico Sennrich (University of Edinburgh)
 Wade Shen (MIT)
 Michel Simard (NRC)
 Patrick Simianer (Heidelberg University)
 Linfeng Song (University of Rochester)
 Sara Stymne (Uppsala University)
 Katsuhito Sudoh (Nara Institute of Science and Technology (NAIST))
 Felipe Sánchez-Martínez (Universitat d'Alacant)
 Aleš Tamchyna (Charles University in Prague, UFAL MFF)
 Jörg Tiedemann (University of Helsinki)
 Christoph Tillmann (IBM Research)
 Ke M. Tran (University of Amsterdam)
 Dan Tufiş (Research Institute for Artificial Intelligence, Romanian Academy)
 Marco Turchi (Fondazione Bruno Kessler)
 Ferhan Ture (Comcast Labs)
 Masao Utiyama (NICT)
 David Vilar (Amazon)
 Stephan Vogel (Qatar Computing Research Institute)
 Martin Volk (University of Zurich)
 Taro Watanabe (Google)
 Bonnie Webber (University of Edinburgh)

Marlies van der Wees (University of Amsterdam)
Marion Weller-Di Marco (LMU München, Universität Stuttgart)
Philip Williams (University of Edinburgh)
Hua Wu (Baidu)
Joern Wuebker (Lilt, Inc.)
François Yvon (LIMSI/CNRS)

Table of Contents

<i>Sense-Aware Statistical Machine Translation using Adaptive Context-Dependent Clustering</i>	
Xiao Pu, Nikolaos Pappas and Andrei Popescu-Belis	1
<i>Improving Word Sense Disambiguation in Neural Machine Translation with Sense Embeddings</i>	
Annette Rios Gonzales, Laura Mascarell and Rico Sennrich	11
<i>Word Representations in Factored Neural Machine Translation</i>	
Franck Burlot, Mercedes García-Martínez, Loïc Barrault, Fethi Bougares and François Yvon . . .	20
<i>Modeling Target-Side Inflection in Neural Machine Translation</i>	
Aleš Tamchyna, Marion Weller-Di Marco and Alexander Fraser	32
<i>Evaluating the morphological competence of Machine Translation Systems</i>	
Franck Burlot and François Yvon	43
<i>Target-side Word Segmentation Strategies for Neural Machine Translation</i>	
Matthias Huck, Simon Riess and Alexander Fraser	56
<i>Predicting Target Language CCG Supertags Improves Neural Machine Translation</i>	
Maria Nadejde, Siva Reddy, Rico Sennrich, Tomasz Dwojak, Marcin Junczys-Dowmunt, Philipp Koehn and Alexandra Birch	68
<i>Exploiting Linguistic Resources for Neural Machine Translation Using Multi-task Learning</i>	
Jan Niehues and Eunah Cho	80
<i>Tree as a Pivot: Syntactic Matching Methods in Pivot Translation</i>	
Akiva Miura, Graham Neubig, Katsuhito Sudoh and Satoshi Nakamura	90
<i>Deep architectures for Neural Machine Translation</i>	
Antonio Valerio Miceli Barone, Jindřich Helcl, Rico Sennrich, Barry Haddow and Alexandra Birch	99
<i>Biasing Attention-Based Recurrent Neural Networks Using External Alignment Information</i>	
Tamer Alkhouli and Hermann Ney	108
<i>Effective Domain Mixing for Neural Machine Translation</i>	
Denny Britz, Quoc Le and Reid Pryzant	118
<i>Multi-Domain Neural Machine Translation through Unsupervised Adaptation</i>	
M. Amin Farajian, Marco Turchi, Matteo Negri and Marcello Federico	127
<i>Adapting Neural Machine Translation with Parallel Synthetic Data</i>	
Mara Chinae-Rios, Álvaro Peris and Francisco Casacuberta	138
<i>Copied Monolingual Data Improves Low-Resource Neural Machine Translation</i>	
Anna Currey, Antonio Valerio Miceli Barone and Kenneth Heafield	148
<i>Guiding Neural Machine Translation Decoding with External Knowledge</i>	
Rajen Chatterjee, Matteo Negri, Marco Turchi, Marcello Federico, Lucia Specia and Frédéric Blain	157

<i>Findings of the 2017 Conference on Machine Translation (WMT17)</i>	
Ondřej Bojar, Rajen Chatterjee, Christian Federmann, Yvette Graham, Barry Haddow, Shujian Huang, Matthias Huck, Philipp Koehn, Qun Liu, Varvara Logacheva, Christof Monz, Matteo Negri, Matt Post, Raphael Rubino, Lucia Specia and Marco Turchi	169
<i>Findings of the Second Shared Task on Multimodal Machine Translation and Multilingual Image Description</i>	
Desmond Elliott, Stella Frank, Loïc Barrault, Fethi Bougares and Lucia Specia	215
<i>Findings of the WMT 2017 Biomedical Translation Shared Task</i>	
Antonio Jimeno Yepes, Aurelie Neveol, Mariana Neves, Karin Verspoor, Ondrej Bojar, Arthur Boyer, Cristian Grozea, Barry Haddow, Madeleine Kittner, Yvonne Lichtblau, Pavel Pecina, Roland Roller, Rudolf Rosa, Amy Siu, Philippe Thomas and Saskia Trescher	234
<i>CUNI submission in WMT17: Chimera goes neural</i>	
Roman Sudarikov, David Mareček, Tom Kocmi, Dusan Varis and Ondřej Bojar	248
<i>LIMSI@WMT'17</i>	
Franck Burlot, Pooyan Safari, Matthieu Labeau, Alexandre Allauzen and François Yvon	257
<i>SYSTRAN Purely Neural MT Engines for WMT2017</i>	
Yongchao Deng, Jungi Kim, Guillaume Klein, Catherine KOBUS, Natalia Segal, Christophe Servan, Bo Wang, Dakun Zhang, Josep Crego and Jean Senellart	265
<i>FBK's Participation to the English-to-German News Translation Task of WMT 2017</i>	
Mattia Antonino Di Gangi, Nicola Bertoldi and Marcello Federico	271
<i>The JHU Machine Translation Systems for WMT 2017</i>	
Shuoyang Ding, Huda Khayrallah, Philipp Koehn, Matt Post, Gaurav Kumar and Kevin Duh	276
<i>The TALP-UPC Neural Machine Translation System for German/Finnish-English Using the Inverse Direction Model in Rescoring</i>	
Carlos Escolano, Marta R. Costa-jussà and José A. R. Fonollosa	283
<i>LIUM Machine Translation Systems for WMT17 News Translation Task</i>	
Mercedes García-Martínez, Ozan Caglayan, Walid Aransa, Adrien Bardet, Fethi Bougares and Loïc Barrault	288
<i>Extending hybrid word-character neural machine translation with multi-task learning of morphological analysis</i>	
Stig-Arne Grönroos, Sami Virpioja and Mikko Kurimo	296
<i>The AFRL-MITLL WMT17 Systems: Old, New, Borrowed, BLEU</i>	
Jeremy Gwinnup, Timothy Anderson, Grant Erdmann, Katherine Young, Michael Kazi, Elizabeth Salesky, Brian Thompson and Jonathan Taylor	303
<i>University of Rochester WMT 2017 NMT System Submission</i>	
Chester Holtz, Chuyang Ke and Daniel Gildea	310
<i>LMU Munich's Neural Machine Translation Systems for News Articles and Health Information Texts</i>	
Matthias Huck, Fabienne Braune and Alexander Fraser	315
<i>Rule-based Machine translation from English to Finnish</i>	
Arvi Hurskainen and Jörg Tiedemann	323

<i>NRC Machine Translation System for WMT 2017</i>	
Chi-kiu Lo, Boxing Chen, Colin Cherry, George Foster, Samuel Larkin, Darlene Stewart and Roland Kuhn	330
<i>The Helsinki Neural Machine Translation System</i>	
Robert Östling, Yves Scherrer, Jörg Tiedemann, Gongbo Tang and Tommi Nieminen	338
<i>The QT21 Combined Machine Translation System for English to Latvian</i>	
Jan-Thorsten Peter, Hermann Ney, Ondřej Bojar, Ngoc-Quan Pham, Jan Niehues, Alex Waibel, Franck Burlot, François Yvon, Mārcis Pinnis, Valters Sics, Joost Bastings, Miguel Rios, Wilker Aziz, Philip Williams, Frédéric Blain and Lucia Specia	348
<i>The RWTH Aachen University English-German and German-English Machine Translation System for WMT 2017</i>	
Jan-Thorsten Peter, Andreas Guta, Tamer Alkhouli, Parnia Bahar, Jan Rosendahl, Nick Rossenbach, Miguel Graça and Hermann Ney	358
<i>The Karlsruhe Institute of Technology Systems for the News Translation Task in WMT 2017</i>	
Ngoc-Quan Pham, Jan Niehues, Thanh-Le Ha, Eunah Cho, Matthias Sperber and Alexander Waibel	366
<i>Tilde's Machine Translation Systems for WMT 2017</i>	
Mārcis Pinnis, Rihards Krišlauks, Toms Miks, Daiga Deksnē and Valters Šics	374
<i>C-3MA: Tartu-Riga-Zurich Translation Systems for WMT17</i>	
Matīss Rikters, Chantal Amrhein, Maksym Del and Mark Fishel	382
<i>The University of Edinburgh's Neural MT Systems for WMT17</i>	
Rico Sennrich, Alexandra Birch, Anna Currey, Ulrich Germann, Barry Haddow, Kenneth Heafield, Antonio Valerio Miceli Barone and Philip Williams	389
<i>XMU Neural Machine Translation Systems for WMT 17</i>	
Zhixing Tan, Boli Wang, Jinming Hu, Yidong Chen and xiaodong shi	400
<i>The JAIST Machine Translation Systems for WMT 17</i>	
Long Trieu, Trung-Tin Pham and Le-Minh Nguyen	405
<i>Sogou Neural Machine Translation Systems for WMT17</i>	
Yuguang Wang, Shanbo Cheng, Liyang Jiang, Jiajun Yang, Wei Chen, Muze Li, Lin Shi, Yanfeng Wang and Hongtao Yang	410
<i>PJIT's systems for WMT 2017 Conference</i>	
Krzysztof Wolk and Krzysztof Marasek	416
<i>Hunter MT: A Course for Young Researchers in WMT17</i>	
Jia Xu, Yi Zong Kuang, Shondell Baijoo, Jacob Hyun Lee, Uman Shahzad, Mir Ahmed, Meredith Lancaster and Chris Carlan	422
<i>CASICT-DCU Neural Machine Translation Systems for WMT17</i>	
Jinchao Zhang, Peerachet Porkaew, Jiawei Hu, Qiuye Zhao and Qun Liu	428
<i>LIUM-CVC Submissions for WMT17 Multimodal Translation Task</i>	
Ozan Caglayan, Walid Aransa, Adrien Bardet, Mercedes García-Martínez, Fethi Bougares, Loïc Barrault, Marc Masana, Luis Herranz and Joost van de Weijer	432

<i>DCU System Report on the WMT 2017 Multi-modal Machine Translation Task</i>	
Iacer Calixto, Koel Dutta Chowdhury and Qun Liu	440
<i>The AFRL-OSU WMT17 Multimodal Translation System: An Image Processing Approach</i>	
Jeremy Gwinnup, John Duseles, Michael Hutt, James Davis and Joshua Sandvick	445
<i>CUNI System for the WMT17 Multimodal Translation Task</i>	
Jindřich Helcl and Jindřich Libovický	450
<i>Generating Image Descriptions using Multilingual Data</i>	
Alan Jaffe	458
<i>OSU Multimodal Machine Translation System Report</i>	
Mingbo Ma, Dapeng Li, Kai Zhao and Liang Huang	465
<i>Sheffield MultiMT: Using Object Posterior Predictions for Multimodal Machine Translation</i>	
Pranava Swaroop Madhyastha, Josiah Wang and Lucia Specia	470
<i>NICT-NAIST System for WMT17 Multimodal Translation Task</i>	
Jingyi Zhang, Masao Utiyama, Eiichiro Sumita, Graham Neubig and Satoshi Nakamura	477
<i>Automatic Threshold Detection for Data Selection in Machine Translation</i>	
Mirela-Stefania Duma and Wolfgang Menzel	483
<i>Results of the WMT17 Metrics Shared Task</i>	
Ondřej Bojar, Yvette Graham and Amir Kamran	489
<i>A Shared Task on Bandit Learning for Machine Translation</i>	
Artem Sokolov, Julia Kreutzer, Kellen Sunderland, Pavel Danchenko, Witold Szymaniak, Hagen Fürstenau and Stefan Riezler	514
<i>Results of the WMT17 Neural MT Training Task</i>	
Ondřej Bojar, Jindřich Helcl, Tom Kocmi, Jindřich Libovický and Tomáš Musil	525
<i>Sentence-level quality estimation by predicting HTER as a multi-component metric</i>	
Eleftherios Avramidis	534
<i>Predicting Translation Performance with Referential Translation Machines</i>	
Ergun Biçici	540
<i>Bilexical Embeddings for Quality Estimation</i>	
Frédéric Blain, Carolina Scarton and Lucia Specia	545
<i>Improving Machine Translation Quality Estimation with Neural Network Features</i>	
Zhiming Chen, Yiming Tan, Chenlin Zhang, Qingyu Xiang, Lilin Zhang, Maoxi Li and Mingwen WANG	551
<i>UHH Submission to the WMT17 Quality Estimation Shared Task</i>	
Melania Duma and Wolfgang Menzel	556
<i>Predictor-Estimator using Multilevel Task Learning with Stack Propagation for Neural Quality Estimation</i>	
Hyun Kim, Jong-Hyeok Lee and Seung-Hoon Na	562
<i>Unbabel's Participation in the WMT17 Translation Quality Estimation Shared Task</i>	
André F. T. Martins, Fabio Kepler and Jose Monteiro	569

<i>Feature-Enriched Character-Level Convolutions for Text Regression</i> Gustavo Paetzold and Lucia Specia	575
<i>UHH Submission to the WMT17 Metrics Shared Task</i> Melania Duma and Wolfgang Menzel	582
<i>MEANT 2.0: Accurate semantic MT evaluation for any output language</i> Chi-kiu Lo	589
<i>Blend: a Novel Combined MT Metric Based on Direct Assessment — CASICT-DCU submission to WMT17 Metrics Task</i> Qingsong Ma, Yvette Graham, Shugen Wang and Qun Liu	598
<i>CUNI Experiments for WMT17 Metrics Task</i> David Mareček, Ondřej Bojar, Ondřej Hübsch, Rudolf Rosa and Dusan Varis	604
<i>chrF++: words helping character n-grams</i> Maja Popović	612
<i>bleu2vec: the Painfully Familiar Metric on Continuous Vector Space Steroids</i> Andre Tättar and Mark Fishel	619
<i>LIG-CRISAL Submission for the WMT 2017 Automatic Post-Editing Task</i> Alexandre Berard, Laurent Besacier and Olivier Pietquin	623
<i>Multi-source Neural Automatic Post-Editing: FBK's participation in the WMT 2017 APE shared task</i> Rajen Chatterjee, M. Amin Farajian, Matteo Negri, Marco Turchi, Ankit Srivastava and Santanu Pal	630
<i>The AMU-UEdin Submission to the WMT 2017 Shared Task on Automatic Post-Editing</i> Marcin Junczys-Dowmunt and Marcin Junczys-Dowmunt	639
<i>Ensembling Factored Neural Machine Translation Models for Automatic Post-Editing and Quality Estimation</i> Chris Hokamp	647
<i>Neural Post-Editing Based on Quality Estimation</i> Yiming Tan, Zhiming Chen, Liu Huang, Lilin Zhang, Maoxi Li and Mingwen Wang	655
<i>CUNI System for WMT17 Automatic Post-Editing Task</i> Dusan Varis and Ondřej Bojar	661
<i>The UMD Neural Machine Translation Systems at WMT17 Bandit Learning Task</i> Amr Sharaf, Shi Feng, Khanh Nguyen, Kianté Brantley and Hal Daumé III	667
<i>LIMSI Submission for WMT'17 Shared Task on Bandit Learning</i> Guillaume Wisniewski	674
<i>Variable Mini-Batch Sizing and Pre-Trained Embeddings</i> Mostafa Abdou, Vladan Gloncak and Ondřej Bojar	680
<i>The AFRL WMT17 Neural Machine Translation Training Task Submission</i> Jeremy Gwinnup, Grant Erdmann and Katherine Young	687

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*

Findings of the 2017 Conference on Machine Translation (WMT17)

Ondřej Bojar, Rajen Chatterjee, Christian Federmann, Yvette Graham, Barry Haddow, Shujian Huang, Matthias Huck, Philipp Koehn, Qun Liu, Varvara Logacheva, Christof Monz, Matteo Negri, Matt Post, Raphael Rubino, Lucia Specia and Marco Turchi

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

Findings of the Second Shared Task on Multimodal Machine Translation and Multilingual Image Description

Desmond Elliott, Stella Frank, Loïc Barrault, Fethi Bougares and Lucia Specia

10:10–10:30 *Shared Task: Biomedical Translation*

Findings of the WMT 2017 Biomedical Translation Shared Task

Antonio Jimeno Yepes, Aurelie Neveol, Mariana Neves, Karin Verspoor, Ondřej Bojar, Arthur Boyer, Cristian Grozea, Barry Haddow, Madeleine Kittner, Yvonne Lichtblau, Pavel Pecina, Roland Roller, Rudolf Rosa, Amy Siu, Philippe Thomas and Saskia Trescher

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*

CUNI submission in WMT17: Chimera goes neural

Roman Sudarikov, David Mareček, Tom Kocmi, Dusan Varis and Ondřej Bojar

LIMSI@WMT'17

Franck Burlot, Pooyan Safari, Matthieu Labeau, Alexandre Allauzen and François Yvon

SYSTRAN Purely Neural MT Engines for WMT2017

Yongchao Deng, Jungi Kim, Guillaume Klein, Catherine KOBUS, Natalia Segal, Christophe Servan, Bo Wang, Dakun Zhang, Josep Crego and Jean Senellart

FBK's Participation to the English-to-German News Translation Task of WMT 2017

Mattia Antonino Di Gangi, Nicola Bertoldi and Marcello Federico

The JHU Machine Translation Systems for WMT 2017

Shuoyang Ding, Huda Khayrallah, Philipp Koehn, Matt Post, Gaurav Kumar and Kevin Duh

The TALP-UPC Neural Machine Translation System for German/Finnish-English Using the Inverse Direction Model in Rescoring

Carlos Escolano, Marta R. Costa-jussà and José A. R. Fonollosa

LIUM Machine Translation Systems for WMT17 News Translation Task

Mercedes García-Martínez, Ozan Caglayan, Walid Aransa, Adrien Bardet, Fethi Bougares and Loïc Barrault

Extending hybrid word-character neural machine translation with multi-task learning of morphological analysis

Stig-Arne Grönroos, Sami Virpioja and Mikko Kurimo

The AFRL-MITLL WMT17 Systems: Old, New, Borrowed, BLEU

Jeremy Gwinnup, Timothy Anderson, Grant Erdmann, Katherine Young, Michael Kazi, Elizabeth Salesky, Brian Thompson and Jonathan Taylor

University of Rochester WMT 2017 NMT System Submission

Chester Holtz, Chuyang Ke and Daniel Gildea

Thursday, September 7, 2016 (continued)

LMU Munich's Neural Machine Translation Systems for News Articles and Health Information Texts

Matthias Huck, Fabienne Braune and Alexander Fraser

Rule-based Machine translation from English to Finnish

Arvi Hurskainen and Jörg Tiedemann

NRC Machine Translation System for WMT 2017

Chi-kiu Lo, Boxing Chen, Colin Cherry, George Foster, Samuel Larkin, Darlene Stewart and Roland Kuhn

The Helsinki Neural Machine Translation System

Robert Östling, Yves Scherrer, Jörg Tiedemann, Gongbo Tang and Tommi Niemi-

nen

The QT21 Combined Machine Translation System for English to Latvian

Jan-Thorsten Peter, Hermann Ney, Ondřej Bojar, Ngoc-Quan Pham, Jan Niehues, Alex Waibel, Franck Burlot, François Yvon, Mārcis Pinnis, Valters Šics, Joost Bastings, Miguel Rios, Wilker Aziz, Philip Williams, Frédéric Blain and Lucia Specia

The RWTH Aachen University English-German and German-English Machine Translation System for WMT 2017

Jan-Thorsten Peter, Andreas Guta, Tamer Alkhouli, Parnia Bahar, Jan Rosendahl, Nick Rossenbach, Miguel Graça and Hermann Ney

The Karlsruhe Institute of Technology Systems for the News Translation Task in WMT 2017

Ngoc-Quan Pham, Jan Niehues, Thanh-Le Ha, Eunah Cho, Matthias Sperber and Alexander Waibel

Tilde's Machine Translation Systems for WMT 2017

Mārcis Pinnis, Rihards Krišlauks, Toms Miks, Daiga Dekšne and Valters Šics

C-3MA: Tartu-Riga-Zurich Translation Systems for WMT17

Matīss Rikters, Chantal Amrhein, Maksym Del and Mark Fishel

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

PJIT'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 Duseles, 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, Eiichiro 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 Representions 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 Mascarell 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*

Friday, September 8, 2017 (continued)

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

Friday, September 8, 2017 (continued)

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-CRISAL 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, Kianté Brantley and Hal Daumé III

LIMS 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 Glončak and Ondřej 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 China-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, Lucia Specia and Frédéric Blain