## Communications in Computer and Information Science 1464

Editorial Board Members

Joaquim Filipe Polytechnic Institute of Setúbal, Setúbal, Portugal Ashish Ghosh Indian Statistical Institute, Kolkata, India Raquel Oliveira Prates Federal University of Minas Gerais (UFMG), Belo Horizonte, Brazil Lizhu Zhou Tsinghua University, Beijing, China More information about this series at http://www.springer.com/series/7899

Jinsong Su · Rico Sennrich (Eds.)

# Machine Translation

17th China Conference, CCMT 2021 Xining, China, October 8–10, 2021 Revised Selected Papers



*Editors* Jinsong Su Xiamen University Xiamen, China

Rico Sennrich The University of Edinburgh Edinburgh, UK

 ISSN 1865-0929
 ISSN 1865-0937 (electronic)

 Communications in Computer and Information Science
 ISBN 978-981-16-7511-9

 ISBN 978-981-16-7511-9
 ISBN 978-981-16-7512-6 (eBook)

 https://doi.org/10.1007/978-981-16-7512-6
 ISBN 978-981-16-7512-6

© Springer Nature Singapore Pte Ltd. 2021

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd. The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

#### Preface

The China Conference on Machine Translation (CCMT) is a national annual academic conference held by the Machine Translation Committee of the Chinese Information Processing Society of China (CIPSC), which brings together researchers and practitioners in the area of machine translation, providing a forum for those in academia and industry to exchange and promote the latest developments in methodologies, resources, projects, and products, with a special emphasis on the languages in China. Since the first session of CCMT in 2005, 16 sessions have been successfully organized (the previous 14 sessions were called CWMT), and a total of 10 machine translation evaluations (2007, 2008, 2009, 2011, 2013, 2015, 2017, 2018, 2019, 2020) have been organized, as well as one open source system module development (2006) and two strategic seminars (2010, 2012). These activities have made a substantial impact on advancing the research and development of machine translation in China. The conference has been a highly productive forum for the progress of this area and is considered a leading and important academic event in the natural language processing field in China.

This year, the 17th CCMT took place in Haidong, Qinghai. This conference continued the tradition of being the most important academic event dedicated to advancing machine translation research in China. It hosted the 11th Machine Translation Evaluation Campaign, featured two keynote speeches delivered by Minlie Huang (Tsinghua University) and Lei Li (University of California), and included two tutorials delivered by Zhongjun He (Baidu) and Liangyou Li (Huawei). The conference also organized five panel discussions, bringing attention to pre-training and machine translation, end-to-end speech translation, the industry of machine translation, the frontier of machine translation, and the forum for PhD students. A total of 85 submissions (including 25 English papers and 60 Chinese papers) were received for the conference. All papers were carefully reviewed in a double-blind manner and each paper was evaluated by at least three members of an international Program Committee. From the submissions, 10 English papers were accepted. These papers address all aspects of machine translation, including improvement of translation models and systems, translation quality estimation, document-level machine translation, low-resource machine translation, etc. We would like to express our thanks to every person and institution involved in the organization of this conference, especially the members of the Program Committee, the machine translation evaluation campaign, the invited speakers, the local organization team, our generous sponsors, and the organizations that supported and promoted the event. Last but not least, we greatly appreciate Springer for publishing the proceedings.

August 2021

Jinsong Su Rico Sennrich

# Organization

#### **General Chair**

Nyima Tashi	Tibet University, China		
Program Committee Co-chairs			
Jinsong Su Rico Sennrich	Xiamen University, China The University of Edinburgh, UK		
<b>Evaluation Chairs</b>			
Muyun Yang Yating Yang	Harbin Institute of Technology, China Xinjiang Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, China		
Organizing Co-chairs			
Rangjia Cai Jiajun Zhang	Qinghai Normal University, China Institute of Automation, Chinese Academy of Sciences, China		
Tutorial Co-chairs			
Yang Feng	Institute of Computing Technology, Chinese Academy of Sciences, China		
Rui Wang	Shanghai Jiao Tong University, China		
Student Forum Co-chairs			
Chong Feng Changliang Li	Beijing Institute of Technology, China Kingsoft, China		
Front-Trends Forum Co-chairs			
Shujian Huang Tong Xiao	Nanjing University, China Northeastern University, China		
Workshop Co-chair			

Hui Huang	University of Macau, China
-----------	----------------------------

#### **Publication Co-chair**

Yanqing He	Institute of Scientific and Technical Information
	of China, China

#### **Sponsorship Co-chairs**

Guoping Huang	Tencent, China
Cunli Mao	Kunming University of Science and Technology, China

#### **Publicity Co-chairs**

Junhui Li	Soochow University, China
Hao Yang	Huawei, China

#### **Program Committee**

Hailong Cao	Harbin Institute of Technology, China	
Kehai Chen	NICT, Japan	
Yidong Chen	Xiamen University, China	
Yufeng Chen	Beijing Jiaotong University, China	
Yong Cheng	Google, USA	
Cunli Mao	Kunming University of Science and Technology, China	
Jinhua Du	Investments AI, AIG, UK	
Xiangyu Duan	Soochow University, China	
Yang Feng	Institute of Computing Technology, Chinese Academy of Sciences, China	
Xiaocheng Feng	Harbin Institute of Technology, China	
Shengxiang Gao	Kunming University of Science and Technology, China	
Zhengxian Gong	Soochow University, China	
Zhongjun He	Baidu, China	
Yanqing He	Institute of Scientific and Technical Information	
of China, China		
Guoping Huang	Tencent, China	
Shujian Huang	Nanjing University, China	
Degen Huang	Dalian University of Technology, China	
Yves Lepage	Waseda University, Japan	
Junhui Li	Soochow University, China	
Maoxi Li	Jiangxi Normal University, China	
Liangyou Li	Huawei, China	
Yachao Li	Soochow University, China	
Hui Li	Xiamen University, China	
Xiang Li	Xiaomi, China	
Yang Liu	Tsinghua University, China	
Qun Liu	Huawei, China	
Lemao Liu	Tencent, China	

Fandong Meng Haitao Mi Toshiaki Nakazawa Kai Song Linfeng Song Jinsong Su Xu Tan Zhaopeng Tu Xing Wang Shaonan Wang Mingxuan Wang Rui Wang Longyue Wang Hui Huang Shuangzhi Wu Changxing Wu Xiaofeng Wu Tong Xiao Jun Xie Hongfei Xu Jinan Xu Muyun Yang Baosong Yang Yating Yang Heng Yu Jiajun Zhang Dakun Zhang Wen Zhang **Biao** Zhang

Tencent WeChat, China Ant Financial, USA Kyoto University, Japan Alibaba, China Tencent, USA Xiamen University, China Microsoft. China Tencent, China Tencent. China Institute of Automation, Chinese Academy of Sciences, China ByteDance, China Shanghai Jiao Tong University, China Tencent, China University of Macau, China Tencent, China East China Jiaotong University, China Apple, UK Northeastern University, China Alibaba. China Saarland University, Germany Beijing Jiaotong University, China Harbin Institute of Technology, China Alibaba, China Xinjiang Institute of Physics and Chemistry, Chinese Academy of Sciences, China Alibaba. China Institute of Automation, Chinese Academy of Sciences, China Systran, France Tencent, China University of Edinburgh, UK Alibaba, China ByteDance, China Alibaba, China

#### Organizer

Haibo Zhang

Hao Zhou

Muhua Zhu

Chinese Information Processing Society of China, China



x Organization

#### **Co-organizer**

Qinghai Normal University, China



**Sponsors** 

#### **Diamond Sponsors**

Global Tone Communication Technology Co., Ltd.



Volctrans



#### **Platinum Sponsors**

NiuTrans Research



Youdao



NEWTRANX Technology



Transn



Tencent TranSmart



**Gold Sponsors** 

Xiaomi Corporation



Baidu



Cloud Translation



Silver Sponsor

Jeemaa



### Contents

A Document-Level Machine Translation Quality Estimation Model Based on Centering Theory	1
SAU'S Submission for CCMT 2021 Quality Estimation Task Yanan Li, Na Ye, and Dongfeng Cai	16
BJTU-Toshiba's Submission to CCMT 2021 QE and APE Task Hui Huang, Hui Di, Hongjie Ren, Kazushige Ouchi, Jiahua Guo, Hanming Wu, Jian Liu, Yufeng Chen, and Jin'an Xu	25
Low-Resource Neural Machine Translation Based on Improved Reptile	20
Meta-learning Method Nier Wu, Hongxu Hou, Xiaoning Jia, Xin Chang, and Haoran Li	39
Semantic Perception-Oriented Low-Resource Neural Machine Translation Nier Wu, Hongxu Hou, Haoran Li, Xin Chang, and Xiaoning Jia	51
Semantic-Aware Deep Neural Attention Network for Machine Translation Detection	63
Routing Based Context Selection for Document-Level Neural Machine Translation Weilun Fei, Ping Jian, Xiaoguang Zhu, and Yi Lin	77
Generating Diverse Back-Translations via Constraint Random Decoding Yiqi Tong, Yidong Chen, Guocheng Zhang, Jiangbin Zheng, Hongkang Zhu, and Xiaodong Shi	92
ISTIC's Neural Machine Translation System for CCMT' 2021 Hangcheng Guo, Wenbin Liu, Yanqing He, Zhenfeng Wu, You Pan, Tian Lan, and Hongjiao Xu	105
BJTU's Submission to CCMT 2021 Translation Evaluation Task Xiang Li, Xuanxuan Wu, Shuaibo Wang, Xiaoke Liang, Li Yin, Hui Huang, Yufeng Chen, and Jin'an Xu	117
Author Index	125