



# A user-study on online adaptation of neural machine translation to human post-edits

Sariya Karimova<sup>1,2</sup>  · Patrick Simianer<sup>1</sup> · Stefan Riezler<sup>1</sup>

Received: 17 November 2017 / Accepted: 17 October 2018 / Published online: 9 November 2018  
© Springer Nature B.V. 2018

## Abstract

The advantages of neural machine translation (NMT) have been extensively validated for offline translation of several language pairs for different domains of spoken and written language. However, research on interactive learning of NMT by adaptation to human post-edits has so far been confined to simulation experiments. We present the first user study on online adaptation of NMT to user post-edits in the domain of patent translation. Our study involves 29 human subjects (translation students) whose post-editing effort and translation quality were measured on about 4500 interactions of a human post-editor and an NMT system integrating an online adaptive learning algorithm. Our experimental results show a significant reduction in human post-editing effort due to online adaptation in NMT according to several evaluation metrics, including hTER, hBLEU, and KSMR. Furthermore, we found significant improvements in BLEU/TER between NMT outputs and professional translations in granted patents, providing further evidence for the advantages of online adaptive NMT in an interactive setup.

**Keywords** Online adaptation · Post-editing · Neural machine translation

## 1 Introduction

The attention-based encoder-decoder framework for neural machine translation (NMT) (Bahdanau et al. 2015) has been shown to be advantageous over the well-

---

✉ Sariya Karimova  
karimova@cl.uni-heidelberg.de

Patrick Simianer  
simianer@cl.uni-heidelberg.de

Stefan Riezler  
riezler@cl.uni-heidelberg.de

<sup>1</sup> Department of Computational Linguistics, Heidelberg University, 69120 Heidelberg, Germany

<sup>2</sup> Kazan Federal University, Kazan, Russia 420008