

Editorial

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In the past few years, we have witnessed an explosion in the number of applications of neural networks in machine translation (MT).

One of the fundamental differences between the neural network approaches and traditional approaches to MT is the way in which they define the translation problem: in neural network approaches, the translation problem is defined in a continuous space, whereas in traditional approaches it is defined in a symbolic space. This difference has brought about great changes in this area.

The most obvious change is the new state-of-the-art created by neural MT (NMT). But beyond this, many other changes may also have profound and long-term impacts in this area and should not be overshadowed.

In the five papers in this special issue, we are very happy to see the various aspects of research by using neural network approaches to MT.

Word embedding is the first step to convert the definition of the translation problem from a symbolic space to a continuous space. The paper “The representational geometry of word meanings acquired by neural machine translation models” analyses the differences between the word embeddings derived from a monolingual corpus and those from a parallel corpus by NMT training. The authors found that word embeddings

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learned on a parallel corpus by the NMT system capture more semantic information than word embeddings derived from a monolingual corpus.

Expressions of languages in a continuous space break down the barriers between languages and other modalities like speech, image and video, and make it possible to make use of information from other modalities to improve MT. In this special issue, we see two papers extending MT research in this way.

The paper “Zero-resource Machine Translation by Multimodal Encoder-decoder Network with Multimedia Pivot” demonstrates the possibility to use images rather than a third language as a pivot for MT between languages without a parallel corpus. In terms of the type of image information used in MT, the paper “Chinese-Spanish Neural Machine Translation Enhanced with Character and Word Bitmap Fonts” goes even further by using images of bitmap fonts of Chinese characters rather than pictures of real world objects.

In contrast to building MT systems under a pure neural framework, neural network approaches can also be integrated into a traditional statistical MT (SMT) framework. The paper “A Comparison of Discriminative Training Criteria for Continuous Space Translation Models” treats translation models, which are one of the key components in SMT, in a continuous space and investigates how to improve these translation models by exploring a new discriminative training procedure. In the paper “A novel and robust approach for pro-drop language translation”, the authors propose a neural network approach to restore dropped pronouns in the source language and significantly improve translation quality in the resultant SMT system.

We hope you enjoy all these excellent papers in this special issue.