

Memory-Enhanced Text Style Transfer with Dynamic Style Learning and Calibration

Fuqiang LIN¹, Yiping SONG^{1*}, Zhiliang TIAN², Wangqun CHEN¹,
Diwen DONG¹ & Bo LIU^{1*}

¹National University of Defense Technology, Changsha 410073, China;

²The Hong Kong University of Science and Technology, Hong Kong 999077, China

Abstract The goal of text style transfer is to rephrase a sentence to match the desired style while retaining the original content. As a controllable generation task, mainstream approaches use content-independent style embedding as control variables to guide stylistic generation. Nonetheless, stylistic properties are sensitive to the context even under the same style. For example, both “delicious” and “helpful” convey *positive* sentiment, while they are more likely to describe food and person, respectively. Therefore, desired style signals require to vary with the content. To the end, we propose a memory-enhanced transfer method, which learns fine-grained style representation concerning content to assist transfer. Rather than employing static style embedding or latent variables, our method abstracts linguistic characteristics from training corpora and memorizes subdivided content with corresponding style representations. The style signal is dynamically retrieved from memory using the content as a query, which provides a more expressive and flexible latent style space. To tackle the imbalance of quantity and quality under different content, we further introduce a calibration method to augment the construction of memory by modeling the relationship between styles. Experimental results on three benchmark datasets verify the superior performance of our model compared to competitive approaches. The evaluation metrics and case study also indicate that our model can generate diverse stylistic phrases matching context.

Keywords style transfer, memory-enhanced method, text generation, deep learning, text representation

Citation Lin F Q, Song Y P, Tian Z L, et al. Memory-Enhanced Text Style Transfer with Dynamic Style Learning and Calibration. *Sci China Inf Sci*, for review

1 Introduction

As an essential task of controllable text generation, text style transfer (TST) aims to modify the stylistic attributes (e.g., sentiment, genre, and formality) of text while maintaining underlying content. TST has been a research problem of interest due to broad applications, such as sentiment modification [21, 37], stylistic summarization [8], and text simplification [4]. Because of the difficulty of collecting parallel corpus, related research is typically conducted in the unsupervised learning setting.

To control style attributes of text, dominant approaches learn one individual style embedding or static latent style variables, and leverage such style signals for guiding transfer. One line of methods disentangles text into separated style and content representations, and applies a style-specific decoder to conduct transfer conditioned on non-stylistic content and desired style embedding. Representative works [14, 17, 30, 42] adopt adversarial discriminators on the latent space to achieve disentanglement. Following the trend, several methods [20, 21, 31] apply pipeline word-level processing that first obtains content-only sentence by explicitly removing stylistic tokens, and then merges it with target style signals for transfer. To enhance content preservation, another line [5, 39] proposes to encode text into entangled representation without explicit disentanglement, and incorporates the style embedding to attention-based structure for style control. Typically, Dai et al. [5] make no assumption of disentanglement and apply the Transformer architecture with attention mechanisms to learn style transfer, which achieves considerable improvement on content preservation.

* Corresponding author (email: songyiping@nudt.edu.cn, kyle.liu@nudt.edu.cn)