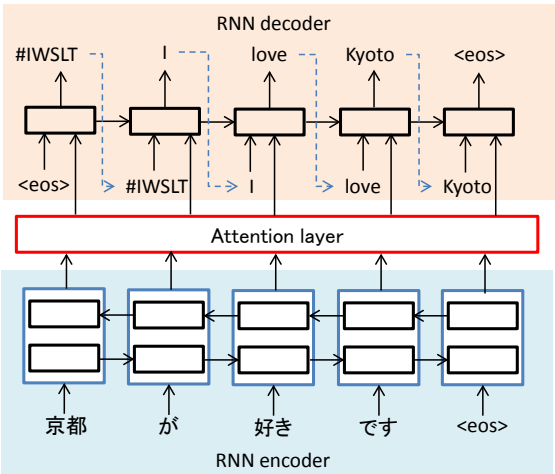
12 How to get your favorite translation

- Controlling neural machine translation by prefix constraints -

Abstract

Neural machine translation is attracting attention because it can generate very fluent translation compared with conventional statistical machine translation. However, since neural machine translation learns the probabilistic model expressing the relationship between the source sentence and the target sentence only from the parallel bilingual text, there is a problem that it is difficult for the users to finely control the sentence output by the translation system. In this exhibition, we show how users can customize the output of neural machine translation systems by using tags which represent arbitrary features of the sentence output.

How neural machine translation works



Examples of prefix tags

京都が好きです → #3 I love Kyoto (sentence length)
京都が好きです → #L2R I love Kyoto (Left-to-right Generation)
京都が好きです → #R2L Kyoto love I (Right-to-left Generation)
京都が好きです → #IWSLT I love Kyoto (Travel domain)

Translation accuracy (BLEU)

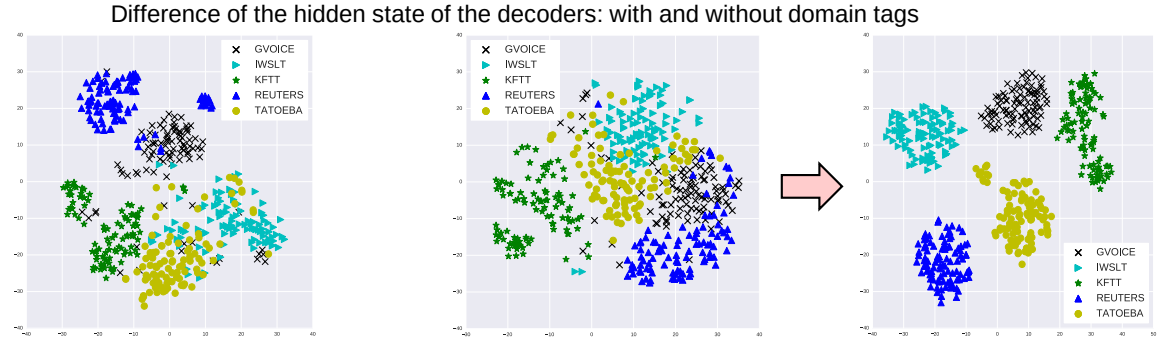
Direction	IWSLT	KFTT	REUTERS
Left-to-right	34.8	20.9	19.7
Right-to-left	32.8	20.1	19.6
predict	35.6	21.5	20.6

Example of joint generation

どういたしまして
→ #IWSLT you're welcome
→ #TATOEBA don't mention it

Domain	single	all	predict	designate
GVOICES (blog, 40K)	6.31	16.9	17.0	17.1
IWSLT (travel conv., 20K)	34.8	36.8	37.1	37.1
KFTT (Wikipedia, 43K)	20.9	20.8	21.1	21.1
REUTERS (news, 50K)	19.7	24.6	25.0	25.0
TATOEBA (examples, 190K)	36.0	59.4	59.5	59.7

Difference of the hidden state of the decoders: with and without domain tags



Without domain tags | With domain tags (Initial state) | (After generating domain tag)

References

[1] S. Takeno, M. Nagata, K. Yamamoto, "Generating Oracle Sentence by Projecting Unaligned Words from Target to Source for Machine Translation," *Technical Report of IEICE*, Vol. 116, No.379, NLC2016-38, pp.135-140, 2016.

[2] S. Takeno, M. Nagata, K. Yamamoto, "Analysis on Missing Words in Japanese-to-English Neural Machine Translation," in *Proc. 23rd Annual Meeting of the Association of Natural Language Processing,* pp. 659-662, 2017.

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