

main idea

- ▶ same approach as Luise Schricker 2018

learn a representation for arguments

- ▶ using a variational autoencoder
- ▶ pick out useful dimensions with a l1-regularized logistic classifier

evaluate the representation

- ▶ hierarchical agglomerative clustering
- ▶ adjusted rand index and v-measure

data

training

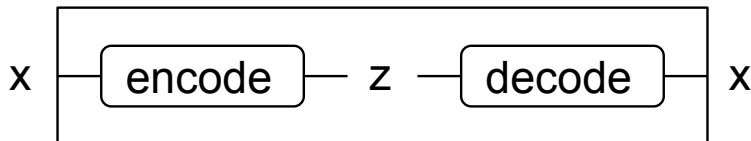
- ▶ IBM project debater datasets 1.49 million sentences
- ▶ google research datasets (reddit) 9 473 threads comprised of 116 347 comments

evaluation

- ▶ reason and stance dataset (Hasan and Ng 2014) ¹

¹<http://www.hlt.utdallas.edu/~vince/papers/emnlp14-reason.pdf>

- ▶ variational autoencoder (Kingma and Welling 2013)²



- ▶ trained by maximizing the variational lowerbound

$$\begin{aligned}\mathcal{L}(\theta; x) &= \mathbb{E}_{q_{\theta}(z|x)}[\log p_{\theta}(x|z)] - \text{KL}(q_{\theta}(z|x) \parallel p(z)) \\ &\leq \log p(x)\end{aligned}$$

²<https://arxiv.org/abs/1312.6114>

vae for sentences

- ▶ Bowman et al. (2015)^{3, 4, 5}
- ▶ challenges (Vani and Birodkar 2016)⁶
- ▶ comparisons (Čířka et al. 2018)⁷

main challenge

- ▶ the kl divergence term vanishes
- ▶ the decoder becomes a language model
- ▶ the encoder becomes useless

³<https://arxiv.org/abs/1511.06349>

⁴<https://github.com/timbmj/Sentence-VAE>

⁵<https://nicgian.github.io/text-generation-vae/>

⁶<http://nevitus.com/reports/inf-report.pdf>

⁷<https://arxiv.org/abs/1804.07972>

solutions

- ▶ annealed kl divergence (Bowman et al. 2015)
- ▶ word dropout (Bowman et al. 2015)
- ▶ convolutional network (Semeniuta, Severyn, and Barth 2017; Yang et al. 2017)^{8, 9}
- ▶ bag-of-word loss (Zhao, Zhao, and Eskenazi 2017)¹⁰
(learning discourse-level diversity)

⁸<https://arxiv.org/abs/1702.02390>

⁹<https://arxiv.org/abs/1702.08139>

¹⁰<https://arxiv.org/abs/1703.10960>

related research

- ▶ topic model (Srivastava and Sutton 2017)¹¹ dirichlet vae (Xiao, Zhao, and Wang 2018)¹²
- ▶ abstractive sentence summarization (Schumann 2018)¹³
- ▶ target-level sentiment analysis (Xu and Tan 2018)¹⁴
- ▶ rnn with attention (Jang, Seo, and Kang 2018)¹⁵

¹¹<https://arxiv.org/abs/1703.01488>






¹²<https://arxiv.org/abs/1811.00135>

¹³<https://arxiv.org/abs/1809.05233>





¹⁴<https://arxiv.org/abs/1810.10437>

¹⁵<https://arxiv.org/abs/1802.03238>





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