Conversing verses - haiku generation using a LSTM-based auto-encoder matching model

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ABSTRACT
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Categories and Subject Descriptors
H.4 [**Information Systems Applications**]: Miscellaneous

General Terms
Theory

Keywords
text generation, neural networks, LSTM

1. INTRODUCTION
Deep learning is an emerging machine learning approach that can already be seen applied in many industries. Example use cases include identifying people and objects in images and videos, understanding voice commands (smartphones, cars, smart houses) and providing better results for internet search queries. This technology brought machines the closest they have ever been to how we humans think and talk. Having learned the rules and grammar of our natural language, machines are now able to generate text for various applications that is in some cases indistinguishable from human written text. [6]

2. RELATED WORK
Many methods have been developed for text generation. Song, Huang and Ruan [8] achieved Abstractive Text Summarization (ATS) using and LSTM-CNN based ATS framework (ATSDL). You et al. [9] researched ways to generate natural language descriptions of images. They proposed a model of semantic attention which combines the established top-down and buttom-up approaches. CNN is used for image classification, followed by RNN and LSTM for the caption generation. Bhagavatula et al. [2] investigated the viability of natural language-based abductive reasoning.

We face several obstacles trying to evaluate our text generation methods automatically and objectively regarding the semantics. This problem is further divided into cases when we know the target optimal result we strive for [5][1] and when even that is unknown (e.g., creating a poem). [10][4]

Our work is based off the following papers the most. Luo et al. [3] propose a novel Auto-Encoder Matching model to learn utterance-level dependency for generating everyday dialogue. Three neural networks are used: LSTM for encoding a reply into it's semantical representation, then a feedforward network for mapping the reply semantic into the answer semantic. Lastly a LSTM decoder is used for the sentence generation. Potash, Romanov and Rumshisky [7] demonstrated the generation of rap songs using LSTM. Netzer et al. [4] explored the usage of Word Association Norms (WAN) to generate Haiku poetry.

In our approach of generating Haiku poetry we used LSTM as this enabled us to replicate the rhytm and other specifics of Haikus (e.g., frequent phrases and writing style). [7] We tried a new approach regarding the relation between verses by trating them as replies in a dialog. Our method therefore consists of first generating the starting verse using LSTM, then using the encoder/decoder approach for generating the next two verses, treating it like a dialog generation.

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4. CONCLUSIONS
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5. ACKNOWLEDGMENTS
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6. REFERENCES

[1] S. Banerjee and A. Lavie. Meteor: An automatic metric for mt evaluation with improved correlation with human judgments. In *Proceedings of the acl workshop on intrinsic and extrinsic evaluation measures for machine translation and/or summarization*, pages 65–72, 2005.

[2] C. Bhagavatula, R. L. Bras, C. Malaviya, K. Sakaguchi, A. Holtzman, H. Rashkin, D. Downey,

S. W. tau Yih, and Y. Choi. Abductive commonsense reasoning, 2020.

[3] L. Luo, J. Xu, J. Lin, Q. Zeng, and X. Sun. An auto-encoder matching model for learning utterance-level semantic dependency in dialogue generation, 2018.

[4] Y. Netzer, D. Gabay, Y. Goldberg, and M. Elhadad. Gaiku: Generating haiku with word associations norms. In *Proceedings of the Workshop on Computational Approaches to Linguistic Creativity*, pages 32–39, 2009.

[5] K. Papineni, S. Roukos, T. Ward, and W.-J. Zhu. Bleu: a method for automatic evaluation of machine translation. In *Proceedings of the 40th annual meeting of the Association for Computational Linguistics*, pages 311–318, 2002.

[6] D. Pawade, A. Sakhapara, M. Jain, N. Jain, and K. Gada. Story scrambler-automatic text generation using word level rnn-lstm. *International Journal of Information Technology and Computer Science (IJITCS)*, 10(6):44–53, 2018.

[7] P. Potash, A. Romanov, and A. Rumshisky. Ghostwriter: Using an lstm for automatic rap lyric generation. In *Proceedings of the 2015 Conference on Empirical Methods in Natural Language Processing*, pages 1919–1924, 2015.

[8] S. Song, H. Huang, and T. Ruan. Abstractive text summarization using lstm-cnn based deep learning. *Multimedia Tools and Applications*, 78(1):857–875, 2019.

[9] Q. You, H. Jin, Z. Wang, C. Fang, and J. Luo. Image captioning with semantic attention. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, June 2016.

[10] X. Zhang and M. Lapata. Chinese poetry generation with recurrent neural networks. In *Proceedings of the 2014 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, pages 670–680, 2014.