

## Applications of deep learning: generating text

This includes problems such as: answering questions, captioning images, completing a sentence.

### 4a. Efficient text generation with Reformer

Citation: Nikita Kitaev, Lukasz Kaiser, Anselm Levskaya. Reformer: The Efficient Transformer. In Proceedings of the 2020 International Conference on Learning Representations (ICLR '20). [[PDF](#)] [[Open review](#)] [[Github](#)] (official, in Trax) [[Blog post](#)] [[Notebook](#)] (official, Trax) [[Notebook](#)] (PyTorch) [[Github](#)] (PyTorch) [You can compare its time on long sequences to the Trax transformer: [notebook](#)]

### 4b. Controlled text generation

Citation: Sumanth Dathathri, Andrea Madotto, Janice Lan, Jane Hung, Eric Frank, Piero Molino, Jason Yosinski, Rosanne Liu. Plug and Play Language Models: A Simple Approach to Controlled Text Generation. In Proceedings of the 2020 International Conference on Learning Representations (ICLR '20).

[[PDF](#)] [[Blog post](#)] [[Notebook](#)] [[Github](#)]

For comparison: typically you fine-tune a language model to control its output, like: [[Notebook](#): Fine-tune GPT-2 on Elon Musk tweets] [[Notebook](#): Colbert AI]

### 4c. Decoding methods for language generation

Citation (top-k sampling): Angela Fan, Mike Lewis, Yann Dauphin. Hierarchical Neural Story Generation. In Proceedings of the 56th Annual Meeting of the Association for Computational Linguistics (ACL '18). [[PDF](#)] [[Github](#)]

Citation (nucleus sampling): Ari Holtzman, Jan Buys, Li Du, Maxwell Forbes, Yejin Choi. The Curious Case of Neural Text Degeneration. In Proceedings of the 2020 International Conference on Learning Representations (ICLR '20). [[PDF](#)] [[Github](#)] [[Notebook](#)] overview of several methods [Some good videos for background: [picking most likely sequence](#), [beam search](#), [refinements](#)]

### 4d. Dialogue

Citation: Emily Dinan, Stephen Roller, Kurt Shuster, Angela Fan, Michael Auli, Jason Weston. Wizard of Wikipedia: Knowledge-Powered Conversational agents. In Proceedings of the 2019 International Conference on Learning Representations (ICLR '19). [[PDF](#)] [[Model in ParlAI](#)]; here's a ParlAI [tutorial](#), for a different model]

Citation: Yizhe Zhang, Siqi Sun, Michel Galley, Yen-Chun Chen, Chris Brockett, Xiang Gao, Jianfeng Gao, Jingjing Liu, Bill Dolan. DialoGPT: Large-Scale Generative Pre-training for Conversational Response Generation. In Proceedings of the 2020 Annual Meeting of the Association for Computational Linguistics (ACL '20). [[PDF](#)] [[Github](#)] [[Notebook](#)]

4e. Question answering with Longformer

Citation: Iz Beltagy, Matthew E. Peters, Arman Cohan. Longformer: The Long-Document Transformer. arXiv:2004.05150 (2020). [[PDF](#)][[Github](#) (official)]  
[Notebooks (via HuggingFaces): [Notebook 1](#), [Notebook 2](#)]  
[Also: [notebook](#) on how to turn another model into a "long" one]  
[Also: check out [haystack](#) for question answering]

4f. Image captioning

Basic image captioning with attention:

Citation: Kelvin Xu, Jimmy Ba, Ryan Kiros, Kyunghyun Cho, Aaron Courville, Ruslan Salakhutdinov, Richard Zemel, Yoshua Bengio. Show, Attend and Tell: Neural Image Caption Generation with Visual Attention. In Proceedings of the 2015 International Conference on Machine Learning (ICML '15). [[PDF](#)]  
[[Website](#)][[Notebook](#) (via Tensorflow)] [O'Reilly [article](#) with code]

Image captioning with personality

Citation: Kurt Shuster, Samuel Humeau, Hexiang Hu, Antoine Bordes, Jason Weston. Engaging Image Captioning via Personality. In Proceedings of the 2019 The IEEE Conference on Computer Vision and Pattern Recognition (CVPR '19). [[PDF](#)]  
[[Model in ParlAI](#)]

4g. GPT

Citation: Radford et al. Improving Language Understanding by Generative Pre-Training (GPT-1).

Citation: Radford et al. Language Models are Unsupervised Multitask Learners (GPT-2)

Citation: Brown et al. Language Models are Few-Shot Learners (GPT-3). [[PDF](#)]  
[[GitHub](#) - minGPT] This is an extremely minimal re-implementation of GPT. The idea behind this project is to explore the model in depth, and understand how and why it works. [Slightly [less "real"](#) minimal GPT]

4h. Restoring missing text

Citation: Yannis Assael, Thea Sommerschild, Jonathan Prag. Restoring ancient text using deep learning: a case study on Greek epigraphy. In Proceedings of the 2019 Conference on Empirical Methods in Natural Language Processing and 9th International Joint Conference on Natural Language Processing (EMNLP-IJCNLP '19) [[PDF](#)] [[Github](#)] [[Notebook](#)]