

rgpt3: Making requests from R to the GPT-3 API

4 October 2022

Summary

The past decade has seen leap advancements in the field of Natural Language Processing (NLP, i.e., using computational methods to study human language). Of particular importance are generative language models which - among standard NLP tasks such as text classification - are able to produce text data that are often indistinguishable from human-written text. The most prominent language model is GPT-3 (short for: Generative Pre-trained Transformer 3) developed by Open AI and released to the public in 2020 (Brown et al. 2020). While these models offer an exciting potential for the study of human language at scale, models such as GPT-3 were also met with controversy (Bender et al. 2021). Part of the criticism stems from the opaque nature of the model and the potential biases it may hence propagate in generated text data. As a consequence, there is a need to understand the model and its limitations so researchers can use it in a responsible and informed manner. This package makes it possible to use the GPT-3 model from the R programming language, thereby opening access to this tool to the R community and enabling more researchers to use and test the powerful GPT-3 model.

Statement of need

The GPT-3 model has pushed the boundaries the language abilities of artificially intelligent systems. Many tasks that were deemed unrealistic or too difficult for computational models are now solvable.

powerful tool with many promises and dangers bias bias bias

GPT-3 changes how we do research and what NLP/AI can do van der maas binz stevenson miotto

temperature need to understand the system researchers have recently started to study GPT-3 in a “machine behaviour” (Rahwan et al. 2019) approach need to use it need to have R access on it current barrier to using it

Especially the performances of the model on tasks originating from Psychology show the enormous potential of large language models. For example, when asked to formulate creative use cases of everyday objects (e.g., a fork), the GPT-3 model produced alternative uses of the objects that were rated of higher utility but lower originality and surprise compared to creative use cases produced by human participants (**STEVENSON?**). Others found that the GPT-3 model shows verbal behaviour similar to humans on cognitive tasks so much so that the model made the same intuitive mistakes that are observed in humans (Binz and Schulz 2022). Aside from these efforts to understand how the model *thinks*, others started to study the model in the same way as psychological research is studying human participants. Asked to fill-in a standard personality questionnaire, the GPT-3 model showed as response pattern comparable with human samples (Miotto, Rossberg, and Kleinberg 2022). The same paper also showed that the model reports to hold values

mention on the API key issue

Since the model has been released to the public under the Open AI API, the official libraries to interact with the model are limited to python and node.js and community libraries do not yet include access to the model via R. Since a large part of the social and behavioural science research community are using R, this package is intended to widen the access to the GPT-3 model direct from R.

Examples

The `rgpt3` package allows users to interact via R with the GPT-3 API to perform the two core functionalities:
i) prompting the model for text completions and ii) obtaining embeddings representations from text input.

requests (what they are) (how they are used) (why they are controversial)

embeddings (brief example)

References

- Bender, Emily M, Timnit Gebru, Angelina McMillan-Major, and Shmargaret Shmitchell. 2021. “On the Dangers of Stochastic Parrots: Can Language Models Be Too Big?” In *Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency*, 610–23.
- Binz, Marcel, and Eric Schulz. 2022. “Using Cognitive Psychology to Understand GPT-3.” *arXiv Preprint arXiv:2206.14576*.
- Brown, Tom, Benjamin Mann, Nick Ryder, Melanie Subbiah, Jared D Kaplan, Prafulla Dhariwal, Arvind Neelakantan, et al. 2020. “Language Models Are Few-Shot Learners.” *Advances in Neural Information Processing Systems* 33: 1877–1901.
- Miotto, Marilù, Nicola Rossberg, and Bennett Kleinberg. 2022. “Who Is GPT-3? An Exploration of Personality, Values and Demographics,” September. <https://doi.org/10.48550/arXiv.2209.14338>.
- Rahwan, Iyad, Manuel Cebrian, Nick Obradovich, Josh Bongard, Jean-François Bonnefon, Cynthia Breazeal, Jacob W Crandall, et al. 2019. “Machine Behaviour.” *Nature* 568 (7753): 477–86.