

Research Assessment

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Subject: Hugging Face Transformers

MLA citation(s):

Wolf, Thomas, et al. "Huggingface's Transformers: State-of-the-Art Natural Language Processing." *ArXiv.org*, ArXivLabs, 14 July 2020, <https://doi.org/10.48550/arXiv.1910.03771>.

Assessment:

As I start my Original Work to explore natural language processing (NLP), I aspire to research multiple algorithms such as recurrent neural networks, long short-term memory models, and transformers. This week, I plan to look at transformers as they provide many benefits to the efficiency and effectiveness of NLP models that can analyze text with the best performance. Since my interview with Mr. Alexander Moini and my background research on the Hugging Face library, I found a no better topic than to explore the Hugging Face library and how they provide pre-trained efficient transformers for use in projects and research. To learn more about this library, I found a journal article, "Huggingface's Transformers: State-of-the-Art Natural Language Processing," which went over the concept of transformers in the Hugging Face library, capabilities of the Hugging Face library, and its benefits in natural language processing.

Through the journal article, I learned about the architecture of transformers that make them so much more useful than other NLP algorithms. I first learned about the benefits of the architecture that “scales with training data and model size” to provide “efficient parallel training, and captures long-range sequence features” (Wolf et al. 1). This also relates to my knowledge from my interviews with Mr. Moini and Mr. Zhu, where I learned that pre-trained transformers have become very cost-efficient for companies to use the technology in the business context of multiple topics such as text generation and text classification. The ability to scale as a working product is a critical need, and for my Original Work, I hope to focus on the deployment and usability of such transformer models to solve problems in machine translation, text style transfer, and other possible fields of interest in NLP. Furthermore, I learned about leveraging the Hugging Face library’s design for using transformers with 3 main components: “(a) a tokenizer, which converts raw text to sparse index encodings, (b) a transformer, which transforms sparse indices to contextual embeddings, and (c) a head, which uses contextual embeddings to make a task-specific problem” (Wolf et al. 2). I was able to learn that the architecture, or structure, of transformers, depend on these three main components, which all are configured and fine-tuned to meet specific industrial needs with pre-trained models. Each of these components is very important in its own regard to developing a model that can classify text into indexes, create relationships between those indexes (words), and use the textual relationships to perform the desired task of sentiment analysis, machine translation, etc. Based on my ISM 1 research with my mentor, I was able to connect the principle of transfer learning with pre-trained models to understand the usability and easy implementation of the Hugging Face transformers library that could help me design solutions to specific problems. Another major benefit of the Hugging Face library that I learned through the article was its deployment, where Hugging Face is supported in

“Pytorch and Tensorflow,” platforms that I used last year, and their easy integration with “no required research or ML expertise” (Wolf et al. 6). This is very assuring to me as I would love to easily integrate a technology that I design into solving an issue without much complexity to create a working product for my Original Work.

Since I have established my primary focus on transformers in natural language processing this year, I hope to continue to learn about new technology in this subfield of machine learning through these scholarly articles and research interviews with professionals in the field. I will continue to explore transformers on a mathematical level and their implementations with the Hugging Face Library by starting my Original Work projects. I will focus on how I could use this information to create my Original Work that could help the community.