Technology Review

What makes TensorFlow such as useful tool in NLP?

Introduction:

Machine learning is a sophisticated science. However, employing machine learning models is considerably easier and less complex than ever before, owing to machine learning frameworks such as TensorFlow that make it easier than ever to ingest data, train models, generate predictions, and enhance future outcomes.

Natural language processing, abbreviated as NLP, is an area of artificial intelligence that processes interactions between computers and people using natural language. The primary goal of NLP is to read, interpret, comprehend, and profit from human language. Unlike computer language, human speech is not always accurate and ordered. Language structures can contain ambiguity and complicated features such as slang, regional dialects, and social settings. To translate into different languages, Google Translate employs natural language processing. NLP is also used by personal assistant applications such as Siri, Alexa, and Bixby to produce dialogues and comprehend speech.

Let us now discuss TensorFlow. TensorFlow is used in text apps, picture recognition, voice search, and a variety of other applications. TensorFlow discovers picture identification applications in Facebook's image recognition technology. It is also used for voice recognition by Apple's Siri. TensorFlow is also used by Google in practically every application to improve the user experience.

Birth of TensorFlow:

DistBelief, a machine learning framework for deep neural network learning, was designed for internal use by the Google Brain team in 2011. Google Brain is a research group inside Google's artificial intelligence research and development division dedicated to the study and application of machine learning and natural language processing. The initiative was a success since DistBelief quickly blended with various internal systems, including Google's picture search function. Google had abandoned DistBelief as a first-generation technology by 2015 in favor of the TensorFlow library, which was spearheaded by prominent computer scientists.

TensorFlow has evolved into the machine learning foundation for many Google products. In a public unveiling of TensorFlow, Google CEO Sundar Pichai stated that the company is using TensorFlow internally for "everything from voice recognition in Google products to smart email responses and Google Photos searches." Furthermore, using TensorFlow, Google was able to create and train neural networks five times faster than DistBelief. In an announcement similar to this, TensorFlow was provided as open source for an endless number of commercial uses. As a result, TensorFlow was widely regarded as the first iteration of the fourth generation of open source machine learning frameworks. However, looking back, like all newly-developed techniques, it had an unavoidable limit.

Development:

Just as PyTorch progressed with insight for TensorFlow's weaknesses, Google recognized PyTorch's benefits and sought to replicate them. In 2019, the company

released TensorFlow 2, an update that increased its potential while also addressing weaknesses. Indeed, TensorFlow developer Ray Johnsremarks that "the TensorFlow team [accepted] several of PyTorch's most well-known capabilities." Johns specifically said that keen execution, or the rapid evaluation of operations without the creation of graphs, "inspired TensorFlow 2.0."

Not only does this imply that graphs should not be defined statically, but it also significantly simplifies the coding API. At this time, Johns discovered that "the APIs for both [frameworks] suddenly seem lots identical." Similarly, Jocopo Mangiavacchi, Senior Data Scientist at Microsoft, found that "APIs are extremely comparable" and "provided us very equivalent outcomes" when teaching simple models and the use of auto-differentiation and gradient descent.

TensorFlow 2.0 further enhances concurrency and adds support for multiple GPUs, resulting in up to three times quicker training performance. Google, on the other hand, has yet to catch up to Facebook with the 2.0 release. TensorFlow also provided support for a variety of programming languages and situations that PyTorch does not. PyTorch, as the name implies, is designed especially for Python, but it offers less obvious interfaces to C++ and Julia. TensorFlow, on the other hand, supports these languages as well as C, Java, Go, JavaScript, R, and Swift.

Although Python is one of the most popular languages among researchers owing to the abundance of excellent NLP and AI frameworks, many commercial programs are written in C and Java, client-side web scripts require JavaScript compatibility, and iOS applications do not. prompt assistance Instead, PyTorch apps should be wrapped in

RESTful web APIs that conduct machine learning operations on a distant internal Python server.

TensorFlow, on the other hand, is slower than PyTorch and only works with NVIDIA GPUs. One business discovered an image processing performance test of multiple models that revealed the same accuracy and that TensorFlow 2 was only approximately 72% as fast as PyTorch, despite TensorFlow consuming less than half the memory. Another characteristic of TensorFlow is that, while version 2.x increased its own debugging capabilities, it still extensively relies on its own debugging and rendering tools. PyTorch's weak visualization features for plotting graphical data, on the other hand, have driven many PyTorch users to link it to rival TensorBoard visualization tools.

Conclusion:

We discovered that TensorFlow provides a comprehensive set of tools for building RNNs using LSTMs, transforming text on big data sets, and doing sentiment analysis. Similar models may be used for various categories of NLP issues with a few adjustments, and TensorFlow collaborates with other libraries such as ScikitLearn and Keras to give a wide variety of capabilities to allow you construct applications for many fundamental NLP problems.

Overall, TensorFlow looks to have caught up with and excelled PyTorch in several areas where PyTorch had previously surpassed the research community. Both libraries are open source, however they were mostly created by their respective development firms. The distinction is that, although Facebook is largely a social networking company, Google, as one observer put it, is "no longer a search firm, but a

machine learning corporation." PyTorch is well-known for being utilized for research and development rather than manufacturing. These two perspectives, when paired with TensorFlow's expanded language support and deployment capabilities, are anticipated to provide greater benefits to TensorFlow for non-research uses.