How can we use Tensorflow for NLP tasks?

To understand how Tensorflow can be used for NLP tasks, it is important to delve into the details of firstly comprehending the concept of NLP tasks. NLP, also known as National Language Processing, describes the interaction between human language and computers and further provides a means of processing the vast amount of data that is available in today's world. The growing popularity of NLP stems from its ability to outperform humans in the amount of language and data it is able to sort and lends itself to everyday use technologies such as spell check, autocomplete, and Google assistant. In recent years, NLP has played a growing role in enterprise solutions that help streamline business operations, increase employee productivity, and simplify mission-critical business processes. The combination of the efficient deep learning framework, Tensorflow, and its aid to carrying out NLP tasks such as Tokenization, Named Entity Recognition, Part-of-Speech (PoS) tagging, Language generation, Question Answering, and Machine Translation has become increasing popular and the rest of this piece will focus on addressing the complexities of how Tensorflow exactly achieve these tasks within NLP.

One such NLP task that we can use to illustrate how Tensorflow can be used for NLP tasks is Machine translation, which is the use of automated software that translates text from a source language into a target language without human involvement. Similar to Google Translate, this type of technology requires utmost precision as it is not a one-to-one transformation and has different morphological structures. To assess how tensorflow can be used to carry out specifically Google Translate, this mechanism uses a Google Neural Machine Translation, a sequence-to-sequence model that is an open source seq2seq framework in TensorFlow that makes it easy to experiment with. A Seq2Seq model is a model that takes a sequence of items such as words and letters and outputs another sequence of items. For example, inputting German

words and outputting the English translation. A typical sequence model in Tensorflow uses an encoder and decoder. According to an article detailing the magic behind sequence to sequence models and tensorflow, “The encoder reads in one word or a word piece at a time, creating some intermediate representation. Then, the decoder receives a start token that triggers decoding—also a single word or word piece at time—in the target language. On admitting a token, the decoder feeds it back into the next time step, so that the token and the previous state are used to figure out what to emit next” (Eugene Brevdo). With this model that Tensorflow provides, machine translation can be achieved and is an important feature that company’s are continuing to enhance and produce today.

Another NLP task that we can analyze to see how tensorflow technology can be used to achieve that task is Question answering, which is a technique similar to Google Assistant and Siri that helps answer straightforward questions and can be used by companies for customer support. This technique allows for the removal of human intervention and allows the company to prioritize other important tasks as well. According to the textbook *Natural Language Processing with TensorFlow*, since question answering is a highly complex process, the process must be broken down into “two broad categories: analysis (analyzing existing text) and generation (generating new text) tasks. Then we divide analysis into three different categories: syntactic (language structure-based tasks), semantic (meaning-based tasks), and pragmatic (open problems difficult to solve)” (Thushan Ganegedara). Specifically, the application Siri uses a Deep Neural Network, part of tensorflow, to convert the pattern of your voice and then uses a temporal integration process to compute a confidence score to decide if the phrase said was “Hey Siri”. Through these tensorflow frameworks, the ability of Siri to understand certain commands is established.

To conclude, the power of deep learning frameworks such as TensorFlow can greatly help tasks such as NLP tasks to be carried out and executed. In this piece we analyzed how important tasks such as machine translation and question answering are developed and how TensorFlow can help in making these tasks doable. We can see through this that TensorFlow is used for several NLP tasks.