

Overview of NLP

Natural language processing is the procedure by which machines can “understand” human language. It uses its computing power to transform the data and then provide meaningful insights for humans to interpret. NLP can work with either written or spoken language.

Artificial intelligence is a rapidly expanding domain. The refinement of NLP is a catalyst for the expansion of AI. Rather than being limited to numerical algorithms, for example, for decision-making, AI agents can understand what they are given from a different perspective. The connection gap between the end user (who speaks a human language) and the complex AI agent shrinks.

The “processing” part of the operation has two parts: understanding and generation. Understanding refers to receiving human language input and digesting it in a way that is meaningful to the machine. In contrast, generation is the forming of human language (semantics and syntax considered) in a way meaningful to the message recipient.

Many smart assistants (Siri, Alexa, “Ok, Google”) use both natural language understanding and generation to simulate a conversation. Less obvious examples are present in daily browsing activities. Autocorrect and autocomplete help humans with their language generation.

The first approach to NLP was rule-based learning. This simple method uses a few regular expressions and a list of exceptions to achieve tasks such as converting plural words to singular form as well as checking sentences for correct syntax. This cannot scale because human language is too complex; no number of rules can capture that. However, rule-based methods are still effective for simple text processing without requiring the overhead of a huge neural network.

The next approach to NLP was statistical and probabilistic methods. This involves counting words and finding probabilities of words and sequences of words through classic machine learning algorithms: Naïve-Bayes, Logistic Regression, Support Vector Machines, Decision Trees, small Neural Networks, etc. This requires a large amount of data for training. A couple of applications might be predictive text or translation systems.

The latest approach to NLP is deep learning. This was made possible by recent advances granting higher availability of data and processing power. This approach aims to add conversation context consideration and recollection of past exchanges of that conversation. Most algorithms used are specialized neural networks (Artificial Neural Networks, Convolution NN, Long-Short-Term-Memory). In reality, most NLP projects use techniques from a combination of the three approaches.

I am particularly interested in NLP because I am fascinated with how closely entwined humans have become with technology. Taking a unique approach to having machines understand our language makes using technology in our daily lives much more effortless. Because human language is so frequently used without much active conscience, many novel insights about human behavior may have yet to be discovered. This, paired with my interest in data science (machine learning) makes learning about modern technological advances very enjoyable.