

## Overview of NLP

Natural language processing refers to the branch of computer science which utilized machine learning and artificial intelligence concepts in order to give computers the ability to understand text and words in a similar manner to a human being.

The link between AI and NLP is quite defined. Artificial Intelligence is a broad concept which focuses the demonstration of intelligence of some shape or form from a machine. NLP in this case is a very specific application of artificial intelligence as it focuses on demonstrating a machine's intelligence in understanding human speech and language patterns.

There are some important distinctions that can be made in between the concepts of natural language understanding and natural language generation. Natural language understanding focuses on the concept of understanding what is being said or communicated. On the other hand, natural language generation focuses on the formation of the responses of communication.

Some great examples of modern applications of NLP include spam filters, chat bots, Chat GPT, language translation softwares, and even voice recognition softwares such as Alexa.

One approach to NLP is the rules-based approach. In this approach, there are a given set of rules that are given which are then used in order to analyze the language being given. As language is constantly changing and is not constant, it is found to be generally quite difficult to use this approach generally speaking. An example of this approach is context-free grammar.

Another approach to NLP is the statistical and probabilistic approach. These approaches consist of using machine translation systems in order to find patterns and probabilities of words in order to create a language model. This approach consistently ends up using classic machine learning approaches such as Naïve Bayes and Logistic Regression.

Last but not least, the final of the three approaches to NLP is deep learning. Deep learning consists of utilizing neural networks as well as other complex algorithms in order to analyze large amounts of data and create a language model. These models tend to be deeply complex. Examples of these include recurrent neural networks, LSTMs, and convolutional neural networks.

I personally have become quite interested in machine learning as a field in general. After taking a ML course at UTD, I realized that I really enjoyed the mathematical approach to understanding intelligence and being able to apply that to machines. As a result, one of the steps to gaining a better understanding for myself was to take NLP as it is a very specific but important application of AI as a whole. Especially with technology such as Chat GPT being so capable recently.