Supraj Punnam

CS 4395.001

28 January, 2023

Overview of NLP

Natural language processing, or NLP, is a computer program's ability to understand natural human language.

NLP is basically a branch of artificial intelligence within the field of computer science. It is the branch of AI that gives computers the ability to understand humans.

Natural language understanding uses an analysis of the input text by a human to understand and determine the meaning of the input. While natural language understanding focuses on the computer's ability to comprehend, natural language generation focuses on enabling the computer to write back and respond to input by a human.

One example of a modern NLP application is autocomplete used in search engines such as Google. Another example is online translator tools such as google translate. Another example of a modern NPL application is chatbots such as ChatGPT.

The first main approach to NLP is rule-based approaches. This approach uses large libraries of human language rules to understand any given input. The system will only be able to understand an input if a rule for it exists. For example, the Eliza chatbox responded with a canned response that did not make sense to a human in the context if it was presented with an input it couldn't understand. Another example of a rule-based approach is spell check. Though rule-based approaches do have the drawback discussed with Eliza, they are still used a lot because they are a lot more simple compared to the approaches and are sometimes all you need.

The second approach to NLP is statistical and probabilistic approaches. These approaches take a mathematical approach to NLP and use the probabilities of different words

and sequences. An example of this approach would be online translator tools. These tools would know that the input 'big brother' means 'older brother' rather than 'larger brother' through this approach. Other examples of this approach are traditional machine learning algorithms. A drawback to these approaches is that a moderate to large amount of training data and processing power is needed.

The third approach to NLP is deep learning. Deep learning evolved from the machine learning involved in the previous approach. With more data being available and processing power greatly increasing, the capabilities of NLP applications are continuously increasing. However, one drawback is the fact that most people don't have access to large enough amounts of data and processing power. Some examples of this approach can be seen in more advanced language translators and language generators.

My personal interest in NLP stems from my interest in AI in general. I was really interested in how chatbots and virtual assistants functioned and interacted with human users which led me to be interested in the subfield of NLP. I would be interested in learning more about how computers are able to detect tone in spoken human language for future personal projects I might want to do.