Ryan Dimaranan

rtd180003

CS 4395.001

31 August 2022

NLP Overview

NLP is a subfield of computer science that focuses on using computers to study how humans communicate with each other by processing and analyzing large amounts of ordinary language. NLP is considered a variant of AI that uses AI principles to study natural human language to enable computers to understand, generate or interpret the human language. Natural language generation and natural language understanding are two different subsets of NLP that differ in action but go hand in hand when studying NLP. NLU is the part of NLP that seeks to allow a computer to understand the meaning of a sentence or more of natural language, while NLG seeks to allow a computer to generate a piece of natural language based on conversational context or need. Some modern NLP applications are using sentiment analysis to determine if a stock should be bought, targeted advertising based on search queries, and survey analysis.

A rule-based approach to NLP uses predetermined rules to categorize the language that it is analyzing. Rules can be created for different properties of each word in the data, for example rules to figure out the part of speech of a word or detecting a pattern in the text can be used. A caveat to using this approach is that it can be difficult to scale and generalize since the rules may only work for a smaller subset of data. Some examples of rule-based approaches are using context free grammar to generate sentences or regex to generate a response to a question.

A statistical and probabilistic approach to NLP uses frequency of words and sequences of words to predict and calculate the probability of a word appearing given a certain sentence context. This approach involves a large amount of training data to create a model that can be used to make inferences about the text and its next possible words. Some implementations include training a machine learning model on a corpus of data to learn how to respond to given prompts over time.

Deep learning is a modern approach to NLP that uses a vast amount of data and builds off of techniques learned from the previous two approaches to NLP to try and emulate human interaction more closely. Using more data is possible now due to the advances in processing power from modern GPUs and cloud computing, and the technology is rapidly evolving with faster algorithms and larger amounts of data. Some features that is made possible by deep learning is considering sentence context and remembering previous statements in a conversation.

Personally, my interest in NLP stems originally from an interest in AI/ML and developed into an interest in the practical application of NLP and how they work (how does Amazon determine what I would be interested in or how can NLP play a role in the finance world). I would like to learn more about NLP and how I can implement these techniques myself in order to keep up with the growing world of AI/ML.