

Overview of NLP

Artificial intelligence (AI) represents the simulation of human intelligence in machines. These machines utilize algorithms to solve different tasks. AI consists of multiple subfields. These subfields specialize in addressing diverse applications. One subfield, Natural Language Processing (NLP), involves algorithms that process human language. These algorithms can be found in modern NLP applications (e.g., text summarization, sentiment analysis, and spam filtering).

Human language can be characterized by human-to-human dialog. This area refers to the relationship between natural language understanding and generation. Natural language understanding emphasizes the comprehension of responses. In contrast, natural language generation creates responses that adhere to human-language standards. NLP analyzes textual information via three methods: rules-based approach, statistical and probabilistic approaches, and deep learning.

The rules-based approach defines a series of rules for text analysis. By identifying various characteristics, these rules enable computers to parse textual information. Some examples of rule-based approaches are regular expressions and context-free grammars. The rules-based approach can solve fast and simple tasks. However, it struggles with complex tasks. Specifically, its rules cannot fully model the tasks' requirements.

Statistical and probabilistic approaches leverage math models to analyze text. These approaches maintain differing levels of complexity. For instance, some language models can incorporate simple word count and text probability. Other language models utilize classical machine learning algorithms (e.g., Decision Trees, Logistic Regression, SVMs). If they are trained on moderately large datasets, these particular algorithms can perform well on NLP tasks.

Deep learning refers to a subset of machine learning algorithms. With multiple levels of representation, these algorithms can capture detailed characteristics and model complex tasks. GPUs and cloud computing provide high processing power for these algorithms. The algorithms are trained on large datasets. Some examples of deep learning are recurrent neural networks and LSTMs.

I became interested in NLP due to large language models. Specifically, I liked how one model (Chat GPT-3) generated detailed text. Through this course, I hope to understand the usage and applications of NLP. I would like to leverage NLP in personal projects. I want to learn how it can augment existing workflows and functionalities.