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Overview of NLP

Natural Language Processing, or NLP, is a subset of computer science where computer scientists attempt to make a computer understand human language and be able to speak naturally to carry out conversation. The relationship between AI and NLP is an interesting one, where NLP is actually a subset of AI focused on human linguistics and natural conversation. Within NLP, there are two further subsets: natural language understanding and natural language generation. Natural language understanding, or NLU, is the part of NLP which focuses on understanding human language and deriving meaning from it, whereas natural language generation, or NLG, is focused on the generation of human-like text or speech. NLU is generally a more daunting task than NLG is, mostly because understanding human language is difficult given the ambiguity and vagueness of language in general. Both do share similarities in that they both are reliant on multiple machine learning models and large amounts of training data to make them work. Some ways in which NLP is used in in speech to text and vice versa, where text is converted to human understandable sound, and human language is interpreted into text. Another way NLP is used is in chatbots, where a human speaks with a chatbot the same way they would speak with a human, and they get their issue resolved in that way.

There are three primary approaches to NLP, of which statistical methods is one. Statistical methods is based off of using probability and statistics to understand natural language. The way this method works is by using tons of training data to learn from and outputs the most probable answer. An example of this is a sentiment analysis program, where the system can figure out what the sentiment of a statement is by first being trained on a set of words that are commonly associated with various feelings, then outputting the likelihood of different sentiments based on that information.

Another approach to NLP is rule-based systems. There are often very simple, with a set of pre-defined parameters and rules to process input. An example of this is a simple chatbot application, that can take user inputs and output a response using a set of rules. For instance, a customer service chatbot may know all the frequently asked questions and based on text in a query output a response or guide a user to what they need.

The last approach is neural network-based systems, which use neural networks to process text. These also require huge amounts of training data to work and are made to mimic the human brain on a smaller scale. An example of this is Google Lens, which has been trained on object classification and is able to figure out what object the camera is pointing at.

I am interested in NLP as it is still a developing field with potential to be what sci-fi movies were worried about – the thing that replaces humans at every job. Eventually, NLP will get good enough to the point where it can write code for itself and be able to separate legitimate training data from noise, thus being a perfect model. Once this stage is reached, there is no telling where NLP will go – perhaps it will take over the world and get rid of all humans, or it may create a perfect world where everyone can explore their interests and do what they want in life, instead of having to work day in and day out for their entire lives. The potential to have an enormous impact is what draws me to NLP, and I hope to gain some knowledge about the field and work on personal projects to increase my experience in the field.