Define NLP in your own words

- NLP stands for natural language processing, and it is a relatively new field of study in computer science related to allowing computers to understand and apply text and words in the same way humans do.
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Describe the relationship between AI and NLP

- AI (artificial intelligence) is a more general term that describes the ability for computers to understand and behave like humans. Some sub categories of AI include natural language processing, machine learning, computer vision, and more. NLP is a more specific application and study of AI related to text and language.

Write a sentence or two comparing and contrasting natural language understanding and natural language generation

- Natural language understanding focuses on allowing the computer to process and convert the data into something it can understand, for example, a chatbot receiving and processing a customer's input. On the other hand, natural language generation involves creating text based on the data it has, for example, a chatbot writing a response to the customer input.

List some examples of modern NLP applications

- One common example of NLP applications would be chatbots. Websites have chatbots or virtual assistants that are able to understand a customer's questions and respond accordingly. Another example of a practical application of NLP would be translation tools such as Google translate. The translation process has been trained and fine tuned many times to be able to determine the best text translation for a language given a user input.

Write 3 paragraphs describing each of the 3 main approaches to NLP, and list examples of each approach

- The first approach to NLP is rules-based. Rule-based approaches utilize NLP following some "rules" to perform basic text tasks, such as spell checking, interacting with chat bots, grammar checking, and more. All the examples focus on pattern matching specific text using basic text processing like regular expressions and context free grammars. This approach is considered the outdated and most basic usage of natural language processing.
- The second approach is statistical and probabilistic. This approach is focused more on gathering data from large datasets for machine learning in order to perform NLP tasks. Various machine learning algorithms are employed to train data based on parameters and fitting models to test data. Statistical and probabilistic approaches use traditional machine learning techniques to create working models, but lack the power and accuracy that comes with the next generation of NLP approaches. Since they do not have as much power or data, these approaches are commonly used for data labeling, text prediction, and primitive versions of language translation and generation.
- The last approach is the deep learning, or neural networks approach. It's a more advanced version of the previous approach, utilizing the latest techniques such as word

embeddings, recurrent and convolutional neural networks, and transformers. Much more processing power and data is needed for this approach. Modern implementations of deep learning in NLP have shown better results in language translation, generation, and understanding. Examples of applications of deep learning in NLP include document summarizers, language translators, and more.

Write a paragraph describing your personal interest in NLP and whether/how you would like to learn more about NLP for personal projects and/or professional application

- My personal interest in NLP has stemmed back to my first semester of sophomore year, where I participated in a research group to learn more about the different fields of computer science. I was assigned to a group researching about NLP, and I really enjoyed learning about NLP. It was exciting getting to play around with different models to parse text and generate an output. At the time, I was only really scratching the surface level of NLP with my limited experience, but now that I have a stronger foundation, I want to satisfy the curiosity of knowing how it really works under the hood and how the pieces fit together.