Overview of NLP

- Natural Language Processing, NLP for short, is the discipline of interpreting human language with computer programs. This language can be written or spoken.
- NLP is generally considered a subset of Artificial Intelligence (AI); the processing of human language is typically related to the actions of a rational agent, the key concept of artificial intelligence.
- NLP encompasses both natural language understanding and natural language generation: understanding is used when an entity derives meaning from human language, generation is used when an entity designs a string of words to convey some meaning. Both generation and understanding are important to conversation since parties involved in an information exchange need to both interpret and convey information to exchange it.
- Modern examples of NLP applications include Apple's Siri and Amazon's Alexa, which interpret and respond to human prompts. OpenAI's ChatGPT and DALL·E 2 are both advanced generative models that use NLP, with ChatGPT generating text and DALL·E 2 using text as a basis for image generation. NLP has many more applications, such as email spam filters and web browser search autofill predictions.
- There are 3 main approaches to NLP:
    - Rules Based approaches are the oldest of the NLP approaches. A rules-based approach processes language according to a set of rules that describe the behavior of the language for a task. This approach is the simplest but does not scale well to large datasets because the rules required to describe the complex nuances of human language rarely scale well as examples increase in complexity. Some examples of the rules-based approach to NLP are Eliza, a text-based therapist developed in the early days of natural language processing around the 1960's, and context free grammars, which use production rules to generate or parse a sentence of tokens with a specific semantic structure.
    - Statistical/Probabilistic approaches analyzes language from a numerical analysis standpoint, such as counting words and predicting the probability of the next word appearing in a sentence. This approach saw more traction beginning in the 1980s and encompasses most of the 'classic' machine learning approaches, since classic machine learning is based in statistics. Examples of use include spam filters on email that determine which emails are more likely to be spam from the wordcounts of different words and autofill algorithms that predict words that are likely to follow previous words.
    - Deep Learning approaches evolved recently (early 2000s) as the rise of the internet gave way to enormous datasets in the millions and even billions of examples. Deep learning uses more complex learning models, like convolutional neural networks, often utilizing special algorithms designed for high volumes of data. Some examples of deep learning applications are the recent ChatGPT and the DALL·E models from OpenAI; ChatGPT generates text in response to a prompt, and the DALL·E models generate an image that visually describes a text prompt it is given, spanning from NLP into image generation as well.
- My own interest in NLP stems from a more general interest in AI; I know quite a bit about machine learning and I am looking to expand my horizons to other branches of AI such as NLP. I'm interested in the commercial applications of NLP, and by discovering more about those, I will

also develop the tools I need to apply NLP to smaller personal projects. I hope to explore some projects with practical uses for NLP in my quest for knowledge.