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Overview of NLP

a. Define NLP in your own words

- Natural Language Processing involves interpretation of the natural languages by a machine. This includes comprehending the language, and sentiment, and being able to draw conclusions from given information. Imprecise characteristics of language - including sarcasm, double entendre, and irony - make NLP a challenging task. However, the rapid development of technologies, including the recent BERT model, has significantly improved accuracies for language interpretation.

b. Describe the relationship between AI and NLP

- NLP is a specific field within AI. AI is a general category that refers to intelligence demonstrated by machines, and NLP is a component of this. Some projects can be purely NLP, while others can be a combination of AI and NLP.

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

- Both natural language understanding and generation are subsets of NLP. Natural Language Understanding is the understanding of words by one party, while natural language generation is the formulation of spoken responses.

d.List some examples of modern NLP applications

- Voice assistants such as Siri, Alexa, and Google Home.
- Chatbots for assistance on different websites.
- Search engines (most relevant search results on the first page)

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

- There are three approaches to NLP. Rules-based, Deep Learning, and Statistical and probabilistic approaches.

- The rules-based approach revolves around the idea of creating rules for different language tasks. For example, finding the plural or singular words or using the right tense in different sentences. This approach, although the first approach for NLP, is fundamentally difficult due to the ambiguity and inconsistency of human language.

- The statistical and probabilistic approach incorporates mathematics into language processing. By incorporating frequencies and probabilities of words into mathematical

models, language comprehension and inference improved. Machines learn better with numbers, and algorithms such as Naive-Bayes, Decision Trees, and neural networks helped overall accuracy in language processing. This approach is used extensively in the deep learning approach as well.

- The Deep learning approach is an extension of neural networks and includes advanced algorithms such as LSTMs, recurrent neural networks, and convolutional neural networks. The deep learning approach seeks to not only understand words but understand the context to get more meaning out of the conversation. Many present NLP applications make use of deep learning algorithms.

f. 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

- I believe that the world is heading towards incorporating technology into our everyday tasks. Consider, for example, chatbots used in banking apps, university websites, and other applications. I am interested in NLP because the idea of a machine learning to speak is quite fascinating; particularly incorporating statistics with language to help a machine learn better. I would like to learn more about NLP to apply it at an industry level.