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CS 4395.001
Professor Karen Mazidi
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Assignment 0

Link for the github: https://github.com/AmanuelKetema/Amanuels_Portfolio

A. Define NLP in your own words

Answer:

Natural Language Processing is a process in which computers are able to analyze and understand human languages. It touches on various subfields such as artificial intelligence and linguistics.

B. Describe the relationship between AI and NLP

Answer:

Natural Language Processing is a subfield of artificial intelligence that is concerned with processing human languages.

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

Answer:

While they are both subsets of natural language processing, natural language understanding aims to analyze the grammatical structure and the intended meaning to establish the meaning of a sentence in a language. On the other hand, natural language generation is the process in which the computer responds to or generates natural language based on some data provided to the model.

D. List some examples of modern NLP applications

Answer:

Sentiment analysis: determine if a given data is positive, negative, or neutral
Spam email filter: Identify potential spam emails by analyzing the data in emails
Search result recommendations: analyze input text to recommend potential search results to users

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

Rules-based approaches

This is one of the oldest approaches for natural language processing and in a rule-based approach, the process analyzes a language following a set of rules that are used to determine and categorize the data in a given language. It tends to focus on parsing the data usually using some regular expressions in order to analyze it. There are multiple uses for this approach and a few examples for the utility of this approach are spell checking and the Eliza chatbot. A major constraint for this approach is that it is highly dependent on the quality of the rules that were provided and is very difficult to scale to handle all the nuances of natural languages.

Statistical and Probabilistic approaches

A statistical and probabilistic approach makes use of traditional machine learning algorithms to analyze natural languages by learning from a corpus of data provided. In this approach, the system is able to infer patterns without needing to manually set up a new rule. This provides us with greater accuracy compared to the previous approach. However, the major constraint with this approach is the need for a sufficient amount of data for the machine learning models to learn from and also enough processing power for the models to analyze the data. Some examples are email filters and some search result recommendations.

Deep Learning

A deep learning approach in NLP utilizes artificial neural networks of an interconnected web of various neurons that are fed with massive amounts of data to analyze, categorize, and understand natural languages. Deep learning techniques increase the accuracy of NLP systems and further minimize any manual effort needed to be performed by humans. The approach attempts to emulate the learning process of the brain using artificial neural networks. However, this also requires sufficient amounts of data and processing power to process the data. Some examples of this approach are transcribing speech, speech recognition, and language generation.

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

Answer:

This is currently the first class that I am taking that is related to NLP or Machine Learning. I am currently taking both machine learning and natural language processing this semester. My enthusiasm for these domains really stemmed from my curiosity about the complex systems such as Siri, google search recommendations, etc help machines seamlessly interact and aid humans in everyday interactions. As I was taking my data structures and algorithms class I was motivated by my professor to take guided electives that I am genuinely interested in exploring; hence, why I have chosen to take these two classes as electives this semester. I currently like the project-focused approach we have taken for this class. I genuinely prefer the practical nature of projects as opposed to exams. I look exceedingly forward to the project we will be working on this semester. Thank you!