CS 4395.001
Motalib Rahim
Mxr170012

2a. Define NLP in your own words.

Natural language processing (NLP) gives computers the ability to process natural human language. One of the subsets of artificial intelligence along with machine learning. NLP uses a few underlying techniques called rules-based approaches, statistical and probabilistic approaches and deep learning. NLP have learned and developed so much with these techniques that makes it easy to decipher the human language even more today. However, it still lacks in certain areas as human language can be very complex. As the context of a language can be hard to interpret. Though NLP usage in systems increased so much that it is apparent almost everywhere. Such as virtual assistants, translations, predictive text, filtering, and search engines etc.

b. Describe the relationship between AI and NLP

A way that enables computers to simulate human intelligence is artificial intelligence. Artificial intelligence makes computer systems possible to perform human-like tasks. Natural language processing is only one part of artificial intelligence. NLP does play a major role in artificial intelligence as it processes the human language. Therefore, artificial intelligence is capable of understanding and interpreting the human language. Basically, NLP gives communication power to artificial intelligence and carry out tasks accordingly.

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

For NLP to understand the natural language it learns through the semantic and syntactic qualities of a language. The NLP tries understanding the language through interpretation of the data and through finding patterns within the data. This gives the ability to a computer to read. Once the computer read it can manipulate the data and respond. Natural language generation give the ability to write and mimic human language.

d. list some examples of modern NLP applications

Virtual assistants – Siri, OK google

Language translation – Google translation

Chatbots – ChatGPT

Search engines – Google, Bing

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

Rules-based approaches – Rules-based approach, one of the very first approach of NLP to analyze the human language and filter the language under the rules. The rules are a set of data for to follow by the NLP. The sentence form within the rules which is based on context-free grammar. One approach can be done with some regular expression and set of exceptions. This

can be a useful approach for a basic problem. However given the complexity of the human language it is difficult for this approach to evolve / improvise. It is restrictive to the rules and its exceptions. One example is the Eliza chatbot.

Statistical and probabilistic approaches – Statistical and probabilistic approach is way the NLP analyzes the data which helps a lot in terms of accuracy. This approach learns through the corpus of the data. Unlike rules-based this approach can provide a better result through learning of huge amounts of data and different machine learning algorithms. Once trained, the results are from the retrieval of learnt data. As said huge amount of data is required and with it a great amount of processing power is also required.

Deep learning - With deep learning NLP is able to learn the context of the language. Deep learning made various methods are possible today. Such as language translation, generation and understanding. Through neural networks deep learning evolves though for that again large amounts of data and power is required. Deep learning has massively improved in mimicking humans and still much more to do.

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

Natural language processing have been useful ever since 1960 and is still continuing to be so. It may not be 100% the future of artificial intelligence but it is today. It is the 21's century and there is this is still a lot of room for development. I find NLP to be interesting and I believe with the projects or professional application, ideas could emerge within anyone into further developing NLP to better simulate humans or improve artificial intelligence.