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Course 4395 -NLP

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**a, define NLP in your own words**

- NLP (Natural Language Processing) is the field which involves creating algorithms that allow computers to process natural human language.

**b, describe the relationship between AI and NLP**

Natural Language Processing is a branch of AI, as is Machine Learning. In a complex NLP project, some components may be purely NLP, others purely machine learning, and others in the general category of AI.

**C, write a sentence or two comparing and contrasting natural language understanding and natural language generation**

- in human dialog, natural language understanding, meaning that each party understood what the other person said, and natural language generation, the formation of spoken responses.

NLU – it uses computer software to understand input in the form of sentences using text or speech.

NLG- it uses to convert the artificial language into text and can convert the text into audible speech.

They both are  branch of AI.

**d,  list some examples of modern NLP applications**

examples of modern NLP applications are language translations, search engines, smart assistant, customer service automation, Email filters, survey analytics, chatbots, social media monitoring, text analytics, predictive text.

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

1. Rules-based approaches – this approach is the oldest technique of NLP. Rules-based approaches were difficult to scale up because human language is complex, constantly evolving, and simply can't be encapsulated fully in rules.  Examples of Rules-based approaches are: - converting plural forms of words to singular ones can involve a few regular expressions and a list of exceptions. context-free grammar, which lists production rules for sentences. These production rules could be used either to generate syntactically correct sentences, or to check

whether sentences are grammatically correct. Eliza famous rule-based approach in 1960 which used regular expressions to echo talking points back to the user, mimicking a talk therapist.

2. Statistical and probabilistic approaches – is a mathematical approach to text were developed late 1980s.  It is Simply counting words and finding the probabilities of words and sequences of words led to useful language models. These models can be part of machine translation systems. When translating 'big sister' from English to another language, a language model can determine that 'big sister' is better translated in the destination language as something that means 'older sister' rather than 'larger sister'. These language models can also be used for predictive text, as when you type a query into a search bar and receive suggestions for the most likely phrase you are typing. A good example is Classic machine learning algorithms such as Naive Bayes, Logistic Regression, SVMs, Decision Trees, and small Neural Networks are used today to solve many NLP problems. These approaches work well when only a moderate to large amount of data is available for training and may even outperform deep learning algorithms on smaller data sets. Statistical approach to a more sophisticated Eliza or other chatbot could involve learning prompt response pairs from a large corpus. This could be done with classic machine learning algorithms or specialized deep learning algorithms.

3. Deep learning- evolved from neural networks when huge amounts of data became available, and processing power increased through GPUs and cloud computing. The algorithms, including recurrent neural networks, convolutional neural networks, LSTMs, and more, are riffs off the basic neural network. New techniques are coming out every day with exciting results. However, not everyone has access to petabytes of data and the hardware to process it, so smaller-scale deep learning is still used in many NLP applications. In fact, many end-to-end NLP projects will involve techniques from rules-based approaches, statistical and probabilistic approaches, and deep learning, so all three approaches need to be understood. The dream of deep learning is to make more and more human-sounding interactions possible. Achieving this goes beyond just retrieving likely responses to a user's statement, to considering the context of the conversation, to remembering a user's previously stated preferences, and much more.

**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**

-When I was a kid, I used to love engineering. After I join software engineering at UTD I tried to take classes which I am interested. NLP is one of the courses I would like to involve and enrolled in this class. I am interested with NLP because it helps to solve problems in our day today life. this course is a part of AI which is growing fast, and it looks the hope for the future. I also love the language we used phyton to solve problems and do projects for my future career.

https://github.com/21Tobia/gersie_portfolio   This is the link for my portfolio.