Natural Language Processing

An overview

Generate an image that shows a simple graphic illustrating the interaction between human language and computers/devices, with icons representing speech, text, and digital processing.

NLP

- allows computers to **understand/interpret**, and **respond** to human language.
- As of 2024, it is the most interesting AI topic!

- Objective: Provide a foundation for future learning!
- How is this done? -> Why does this work?

History

- The Dawn of NLP: 1950s to 1970s
  - Turing test (1950), ELIZA(1966), SHRDLU (1970)
- NLP Evolution: 1980s-1990s
  - Rules-based -> Statistical methods
- Machine Learning and NLP: 2000s+
  - machine learning, especially neural networks, revolutionizes NLP
  - WordEmbeddings (early 2000s)
  - Deep learning (2006)
  - RNNs (2010)
  - Word2Vec (2013)
  - Attention Mechanisms (2014)
  - BERT (2018)
  - GPT-3 (2020), GPT-3.5 (2022), GPT-4 (2023)

NLP

- Our plan this week:
  - History
  - Applications
  - Non-sequential text processing tools
- Future weeks:
  - Sequential text processing techniques
  - Word embeddings, Language Models, Transformers etc.

Non-sequential vs sequential

- Non-sequential processing tools: Spellcheck, tokenization, lowercasing, padding, stopword removal etc.
  - Applications: SPAM filter, word clouds, pre-processing for sequential methods

- Sequential - order of words matter!
  - Machine translation:

    The dog bit the man. VS The man bit the dog.
  - Chatbot

    What is the weather in Nice? VS What is the Nice in Weather?
  - Sentiment Analysis

    The movie was fun and exciting. VS The fun was exciting and movie.

- Can you tell me the weather in Austin?
- Set an alarm for five minutes.

- The sun set behind the rolling hills
- As the sun set behind the rolling hills, painting the sky in hues of orange and pink, the travelers, weary yet content from their day's journey, gathered around the crackling campfire, sharing stories and laughter, while the aroma of the evening meal, a hearty stew simmering in a large pot, filled the air, promising warmth and comfort in the cool night.