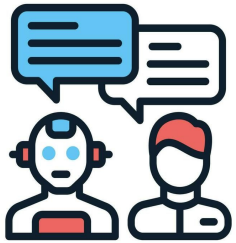
Natural Language Processing

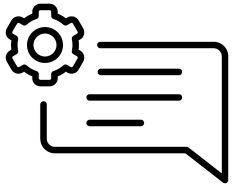
What is Natural Language Processing (NLP)

- Natural language processing (NLP) is the intersection of computer science, linguistics and machine learning.
- Natural language processing studies interactions between humans and computers to find ways for computers to process written and spoken words similar to how humans do.
- The field is divided into sub-parts

Speech recognition/Generation



Natural language understanding



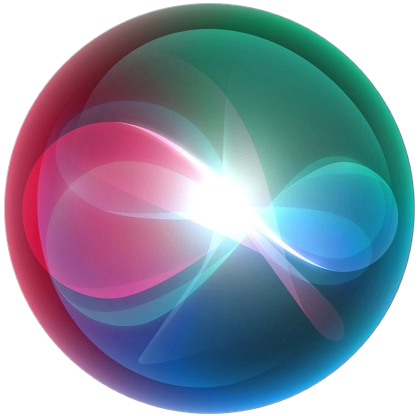
Natural language generation

NLP in real-life

👉 We can write a prompt. Which is related to Natural Language Understanding

Prompts are the textual inputs (e.g., questions, instructions) that you enter into ChatGPT to get responses.

👉 ChatGPT gives us responses. Which is related to Natural Language Generation



👉 We speak to Siri. Which is related to Speech Recognition

👉 Siri understand our speech. Which is related to Natural Language Understanding

👉 Siri response to our speech. Which is related to Natural Language Generation and Speech Generation

Why Natural Language Processing Is Difficult

- Human language is one of the important medium of communication.
- Human language is a complex system which need a lot of things going on.
- Understanding human language is considered a difficult task due to its complexity. For example, there are an infinite number of different ways to arrange words in a sentence.

Sentence	**Meaning**
1) I am having a light meal.	Talking about some small amount.
2) He doesn't like me reading light novels	Young adult fiction targeting teens
3) Use a light touch when applying cream or make-up.	Electromagnetic radiation

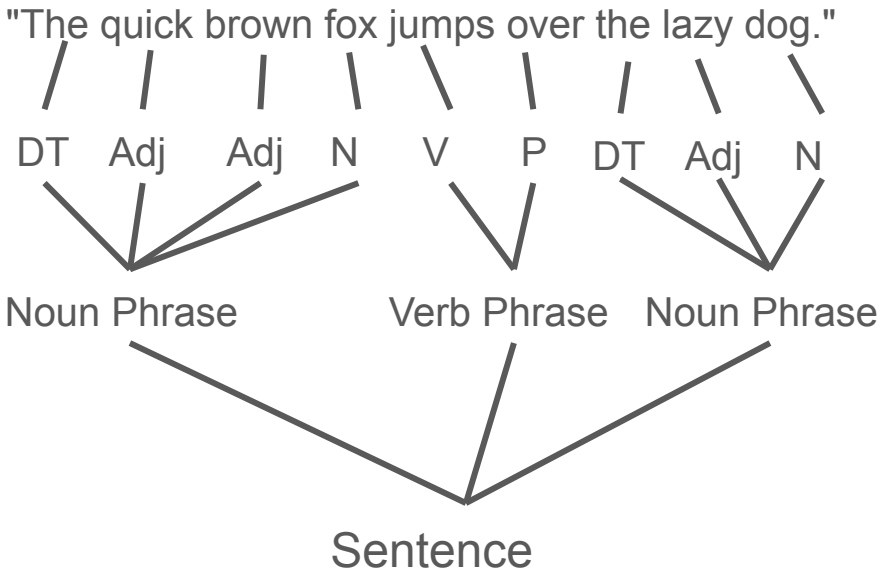
So, a single words can be used in many different ways.

How can we understand a language

- There are two different analysis for understanding a language.
    - Syntactic Analysis
        - Syntactic analysis, also known as parsing, involves analyzing words in a sentence for grammar and arranging words in a manner that shows their relationship to one another according to the rules of the language
        - Syntactic analysis uses grammatical rules to assemble words into phrases, clauses, and sentences. This includes identifying parts of speech, phrases, and sentence structures.
    - Semantic Analysis
        - Semantic analysis is the process of understanding the meaning of words, phrases, and sentences in context. It goes beyond the grammatical structure to interpret what the sentences actually mean.
        - Semantic analysis involves understanding the meanings that are not explicit in the text. This includes identifying the meanings of words in context, understanding relationships among words and the overall meaning conveyed by the text.

Example

Syntactic Analysis:



Semantic Analysis:

"The bank will close at 3 PM due to flooding."

Here,

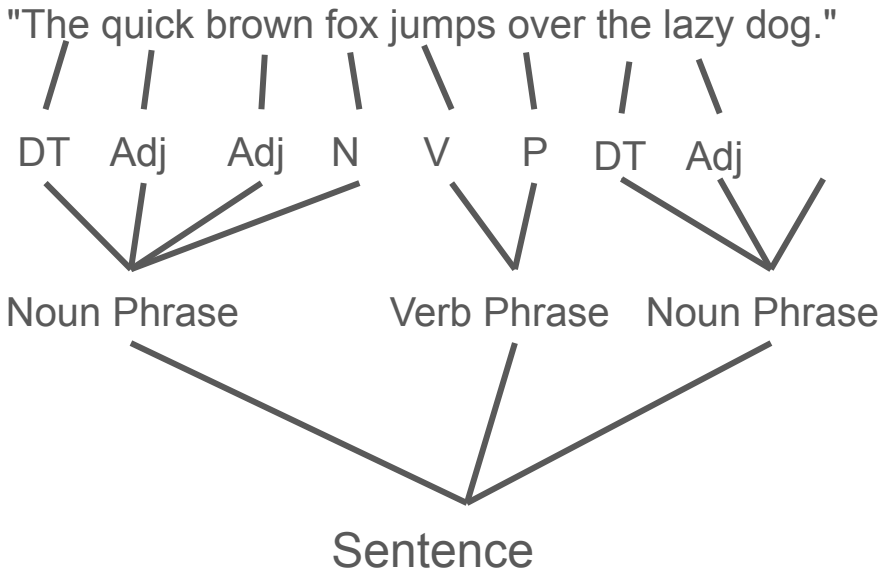
Word Sense Disambiguation: Understanding that "bank" refers to a financial institution, not the side of a river.

Semantic Role Labeling: Identifying that "the bank" is the entity performing the action of "closing," the time "at 3 PM" is when the action occurs, and "due to flooding" is the reason for the action.

Techniques for Understanding Text

- **Parsing**
  - Parsing is the process of converting formatted text into a data structure.

Syntactic Analysis:



Techniques for Understanding Text

- Parsing
- **Stemming**
  - It is a text processing techniques that eliminates prefixes and suffixes from words, transforming them into their fundamental or root form.

Change

Changes

Changing

Changed

Changer

Techniques for Understanding Text

- Parsing
- **Stemming**
  - It is a text processing techniques that eliminates prefixes and suffixes from words, transforming them into their fundamental or root form.

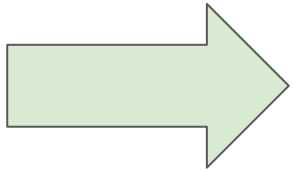
Change

Changes

Changing

Changed

Changer



Chang

Techniques for Understanding Text

- Parsing
- Stemming
- **Lemmatization**
  - It will reduce a word to its root form, also called a lemma.

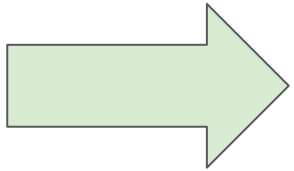
Change

Changes

Changing

Changed

Changer

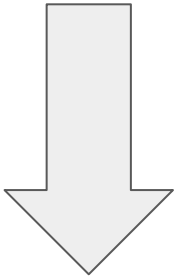


Chang

Techniques for Understanding Text

- Parsing
- Stemming
- Lemmatization
- Tokenization
  - It is a process of transforming text into meaningful units like words.

We are learning Natural language Processing.



We	are	Learning	Natural	language	Processing	.

Techniques for Understanding Text

- Parsing
- Stemming
- Lemmatization
- Tokenization
- Named Entity Recognition
  - Named entity recognition (NER) concentrates on determining which items in a text can be located and classified into predefined categories, like names of persons, organizations and locations to monetary values and percentages.

When Sebastian Thrun started working on self-driving cars at Google in 2007, few people outside of the company took him seriously. “I can tell you very senior CEOs of major American car companies would shake my hand and turn away because I wasn’t worth talking to,” said Thrun, now the co-founder and CEO of online higher education startup Udacity, in an interview with Recode earlier this week.

A little less than a decade later, dozens of self-driving startups have cropped up while automakers around the world clamor, wallet in hand, to secure their place in the fast-moving world of fully automated transportation.

Link: https://wordcount.com/entity-extractor

Techniques for Understanding Text

- Parsing
- Stemming
- Lemmatization
- Tokenization
- Named Entity Recognition
  - Named entity recognition (NER) concentrates on determining which items in a text can be located and classified into predefined categories, like names of persons, organizations and locations to monetary values and percentages.

When Sebastian Thrun started working on self-driving cars at Google in 2007, few people outside of the company took him seriously. “I can tell you very senior CEOs of major American car companies would shake my hand and turn away because I wasn’t worth talking to,” said Thrun, now the co-founder and CEO of online higher education startup Udacity, in an interview with Recode earlier this week.

A little less than a decade later, dozens of self-driving startups have cropped up while automakers around the world clamor, wallet in hand, to secure their place in the fast-moving world of fully automated transportation.

Link: https://wordcount.com/entity-extractor

Techniques for Understanding Text

- Parsing
- Stemming
- Lemmatization
- Tokenization
- Named Entity Recognition
- Sentiment Analysis
  - With sentiment analysis we want to determine the sentiment of a speaker or writer with respect to a document, interaction or event.

Let check this review:

I have had an exceptional experience with my kitchen / laundry Reno Kitchen Connection Tweed Heads particularly Tom and the tradies he employs exceeded my expectations with their professionalism and expertise I am very happy with their work and would highly recommend

Link: https://text2data.com/Demo

Techniques for Understanding Text

- Parsing
- Stemming
- Lemmatization
- Tokenization
- Named Entity Recognition
- Sentiment Analysis
  - With sentiment analysis we want to determine the sentiment of a speaker or writer with respect to a document, interaction or event.

Let check this review:

I have had an exceptional experience with my kitchen / laundry Reno Kitchen Connection Tweed Heads particularly Tom and the tradies he employs exceeded my expectations with their professionalism and expertise I am very happy with their work and would highly recommend.

Link: https://text2data.com/Demo

Techniques for Understanding Text

- Parsing
- Stemming
- Lemmatization
- Tokenization
- Named Entity Recognition
- Sentiment Analysis
  - With sentiment analysis we want to determine the sentiment of a speaker or writer with respect to a document, interaction or event.

Let check this review:

Shocking can’t understand English one bit total crap. Going to report it.

Link: https://text2data.com/Demo

Techniques for Understanding Text

- Parsing
- Stemming
- Lemmatization
- Tokenization
- Named Entity Recognition
- Sentiment Analysis
  - With sentiment analysis we want to determine the sentiment of a speaker or writer with respect to a document, interaction or event.

Let check this review:

Shocking can’t understand English one bit total crap. Going to report it.

Link: https://text2data.com/Demo

Benefits of Natural Language Processing

Some of the benefits of NLPs are:

1) Enhanced Communication
    i) Customer Support Automation
    ii) Language Translation
2) Improved Efficiency and Productivity
    i) Automated Document Analysis
    ii) Speech Recognition
3) Enhanced Data Insights
    i) Sentiment Analysis
    ii) Content Recommendations
4) Innovation in Content Creation