

Experiment 2: Morphological Analysis

Morphological analysis is a fundamental task in Natural Language Processing (NLP) that involves the study of the internal structure and formation of words in a language. It is an essential component of linguistic analysis, and it plays a crucial role in various NLP applications. The primary goal of morphological analysis is to break down complex words into their smallest meaningful units, known as "morphemes." Morphemes are the building blocks of words and carry semantic and grammatical information. Morphological analysis helps NLP systems understand the structure of words, which is critical for tasks such as text processing, information retrieval, and machine translation. Let's delve deeper into the components of morphological analysis:

Morphemes are the smallest units of meaning in a language.

Morphemes can be classified into two main types:

Free Morphemes: These are morphemes that can stand alone as independent words.

For example, in the word "cat," both "cat" and "cat" are free morphemes.

Bound Morphemes: These are morphemes that must attach to free morphemes to convey meaning. Bound morphemes include prefixes, suffixes, infixes, and circumfixes.

For example:

The prefix "un-" in "undo" changes the meaning to "reverse." The suffix "-ed" in "walked" indicates the past tense.

Infixes, such as the infix "-um-" in "unhappiness," can change the meaning of a word.

Algorithm:

1. Install and Import Dependencies:

- Install the spaCy model for English by running `python -m spacy download en_core_web_sm`.
- Import the necessary libraries, including spaCy.

2. Load the spaCy Model:

- Load the English spaCy model using `spacy.load("en_core_web_sm")`.

3. Input Sentences:

- Obtain input sentences from the user for different types of sentences (interrogative, declarative, complex), or use predefined sentences.

4. Process Sentences with spaCy:

- Process each input sentence using the loaded spaCy model. This creates a Doc object for each sentence.

5. Morphological Analysis - Interrogative Sentence:

- Iterate through the tokens in the `interrogative_doc` (the processed interrogative sentence).
- For each token, print the token text and its part-of-speech (POS) tag.

6. Morphological Analysis - Declarative Sentence:

- Iterate through the tokens in the `declarative_doc` (the processed declarative sentence).
- For each token, print the token text and its part-of-speech (POS) tag.

7. Morphological Analysis - Complex Sentence:

- Iterate through the tokens in the `complex_doc` (the processed complex sentence).
- For each token, print the token text and its part-of-speech (POS) tag.

8. Display Results:

- View the morphological analysis results for all three types of sentences, including the token text and its corresponding POS tag.