



# Vidyavardhini's College of Engineering & Technology

## Department of Computer Engineering

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**Aim:** Apply Various text preprocessing techniques Lemmatization / Stemming.

**Objective:** To study and implement lemmatization and stemming in python.

**Theory:**

**Stemming:**

Stemming is a technique used to reduce an inflected word down to its word stem. For example, the words “programming,” “programmer,” and “programs” can all be reduced down to the common word stem “program.” In other words, “program” can be used as a synonym for the prior three inflection words.

Performing this text-processing technique is often useful for dealing with sparsity and/or standardizing vocabulary. Not only does it help with reducing redundancy, as most of the time the word stem and their inflected words have the same meaning, it also allows NLP models to learn links between inflected words and their word stem, which helps the model understand their usage in similar contexts.

Stemming algorithms function by taking a list of frequent prefixes and suffixes found in inflected words and chopping off the end or beginning of the word. This can occasionally result in word stems that are not real words; thus, we can affirm this approach certainly has its pros, but it's not without its limitations.

**Lemmatization:**

Lemmatization is another technique used to reduce inflected words to their root word. It describes the algorithmic process of identifying an inflected word's “lemma” (dictionary form) based on its intended meaning.

As opposed to stemming, lemmatization relies on accurately determining the intended part-of-speech and the meaning of a word based on its context. This means it takes into consideration where the inflected word falls within a sentence, as well as within the larger context surrounding that sentence, such as neighboring sentences or even an entire document.

**Program:**

```
from nltk import PorterStemmer

import spacy

nlp = spacy.load('en_core_web_sm')

doc = nlp(u"hello")

for token in doc:
```



```
# print(token , "-" , token.lemma_)  
  
print(token , "-" , token.pos_)  
  
stemmer = PorterStemmer()  
  
words = ['run', 'runner', 'ran', 'runs', 'easily', 'fairly']  
  
for word in words:  
  
    print(word + '-' + stemmer.stem(word))
```

### Output:

hello - INTJ

run-run

runner-runner

ran-ran

runs-run

easily-easili

fairly-fairli

**Conclusion:** Lemmatization and stemming serve as textual normalization techniques within the realm of natural language processing, yet they diverge in their approaches and results. Lemmatization takes into account a word's context and part of speech, with the goal of condensing words into their legitimate base or dictionary forms. This entails, for instance, converting "running" to "run" and "better" to "good." In contrast, stemming constitutes a more aggressive approach, primarily concerned with removing prefixes or suffixes, without regard for the linguistic context. As a result, stemming often produces non-dictionary words, such as transforming "running" into "run" and "better" into "better." The choice between lemmatization and stemming hinges on the specific NLP task and the desired level of linguistic precision.