

```
!pip install nltk spacy
```

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Requirement already satisfied: nltk in /usr/local/lib/python3.12/dist-packages (3.9.1)
Requirement already satisfied: spacy in /usr/local/lib/python3.12/dist-packages (3.8.11)
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Requirement already satisfied: spacy-legacy<3.1.0,>=3.0.11 in /usr/local/lib/python3.12/dist-packages (from spacy) (3.0.12)
Requirement already satisfied: spacy-loggers<2.0.0,>=1.0.0 in /usr/local/lib/python3.12/dist-packages (from spacy) (1.0.5)
Requirement already satisfied: murmurhash<1.1.0,>=0.28.0 in /usr/local/lib/python3.12/dist-packages (from spacy) (1.0.15)
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Requirement already satisfied: thinc<8.4.0,>=8.3.4 in /usr/local/lib/python3.12/dist-packages (from spacy) (8.3.10)
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Requirement already satisfied: blis<1.4.0,>=1.3.0 in /usr/local/lib/python3.12/dist-packages (from thinc<8.4.0,>=8.3.4->spacy)
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Requirement already satisfied: cloudpathlib<1.0.0,>=0.7.0 in /usr/local/lib/python3.12/dist-packages (from weasel<0.5.0,>=0.4.3->spacy)
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Requirement already satisfied: MarkupSafe>=2.0 in /usr/local/lib/python3.12/dist-packages (from Jinja2->spacy) (3.0.3)
Requirement already satisfied: wrapt in /usr/local/lib/python3.12/dist-packages (from smart-open<8.0.0,>=5.2.1->weasel<0.5.0,>=0.4.3->spacy) (1.15.0)
```

```
import nltk
import spacy
```

```
# Medical text (sample, not real patient data)
medical_text = """
Patients with diabetes often require regular monitoring of blood glucose levels.
The treatment includes insulin therapy, dietary control, and physical activity.
Doctors diagnose the condition based on symptoms and laboratory tests.
Early diagnosis and proper management can prevent serious complications.
"""

print(medical_text)
```

```
Patients with diabetes often require regular monitoring of blood glucose levels.
The treatment includes insulin therapy, dietary control, and physical activity.
Doctors diagnose the condition based on symptoms and laboratory tests.
Early diagnosis and proper management can prevent serious complications.
```

```
# Sentence tokenization
sentences = sent_tokenize(medical_text)

print("Sentence Tokens:")
for s in sentences:
    print("-", s)
```

```
Sentence Tokens:
-
Patients with diabetes often require regular monitoring of blood glucose levels.
- The treatment includes insulin therapy, dietary control, and physical activity.
- Doctors diagnose the condition based on symptoms and laboratory tests.
- Early diagnosis and proper management can prevent serious complications.
```

```
import nltk
nltk.download('punkt')
from nltk.tokenize import word_tokenize

# Word tokenization using NLTK
words_nltk = word_tokenize(medical_text)
```

```
print("NLTK Word Tokens:")
print(words_nltk)
```

```
NLTK Word Tokens:
['Patients', 'with', 'diabetes', 'often', 'require', 'regular', 'monitoring', 'of', 'blood', 'glucose', 'levels', '.', 'The']
[nltk_data] Downloading package punkt to /root/nltk_data...
[nltk_data]   Package punkt is already up-to-date!
```

```
# Load spaCy model
nlp = spacy.load("en_core_web_sm")

# Tokenization using spaCy
doc = nlp(medical_text)
words_spacy = [token.text for token in doc]

print("spaCy Word Tokens:")
print(words_spacy)
```

```
spaCy Word Tokens:
['\n', 'Patients', 'with', 'diabetes', 'often', 'require', 'regular', 'monitoring', 'of', 'blood', 'glucose', 'levels', '.',
```

```
from nltk.stem import PorterStemmer

# Initialize Porter Stemmer
stemmer = PorterStemmer()

# Apply stemming
stemmed_words = [stemmer.stem(word) for word in words_nltk if word.isalpha()]

print("Stemmed Words:")
print(stemmed_words)
```

```
Stemmed Words:
['patient', 'with', 'diabet', 'often', 'requir', 'regular', 'monitor', 'of', 'blood', 'glucos', 'level', 'the', 'treatment',
```

```
import nltk
nltk.download('wordnet')
from nltk.stem import WordNetLemmatizer

# Initialize WordNet Lemmatizer
lemmatizer = WordNetLemmatizer()

lemmatized_words_nltk = [lemmatizer.lemmatize(word) for word in words_nltk if word.isalpha()]

print("NLTK Lemmatized Words:")
print(lemmatized_words_nltk)
```

```
[nltk_data] Downloading package wordnet to /root/nltk_data...
NLTK Lemmatized Words:
['Patients', 'with', 'diabetes', 'often', 'require', 'regular', 'monitoring', 'of', 'blood', 'glucose', 'level', 'The', 'tre
```

```
lemmatized_words_spacy = [token.lemma_ for token in doc if token.is_alpha]

print("spaCy Lemmatized Words:")
print(lemmatized_words_spacy)
```

```
spaCy Lemmatized Words:
['patient', 'with', 'diabete', 'often', 'require', 'regular', 'monitoring', 'of', 'blood', 'glucose', 'level', 'the', 'treat
```

```
print("Word\t\tStemmed\t\tLemmatized")
print("-"*50)

for word in ["diagnosis", "patients", "treated", "monitoring", "includes"]:
    print(f"{word}\t\t{stemmer.stem(word)}\t\t{lemmatizer.lemmatize(word)}")
```

Word	Stemmed	Lemmatized
diagnosis		diagnosi
patients		patient
treated	treat	treated
monitoring		monitor
includes		includ

