Start coding or generate with AI.

```python
import nltk
nltk.download('punkt')
nltk.download('stopwords')
nltk.download('wordnet')
nltk.download('punkt_tab')

!pip install spacy
!python -m spacy download en_core_web_sm
```

```
[nltk_data] Downloading package punkt to /root/nltk_data...
[nltk_data]    Package punkt is already up-to-date!
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data]    Package stopwords is already up-to-date!
[nltk_data] Downloading package wordnet to /root/nltk_data...
[nltk_data]    Package wordnet is already up-to-date!
[nltk_data] Downloading package punkt_tab to /root/nltk_data...
[nltk_data]    Unzipping tokenizers/punkt_tab.zip.
Requirement already satisfied: spacy in /usr/local/lib/python3.12/dist-packages (3.8.11)
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)
Requirement already satisfied: cymem<2.1.0,>=2.0.2 in /usr/local/lib/python3.12/dist-packages (from spacy) (2.0.13)
Requirement already satisfied: preshed<3.1.0,>=3.0.2 in /usr/local/lib/python3.12/dist-packages (from spacy) (3.0.12)
Requirement already satisfied: thinc<8.4.0,>=8.3.4 in /usr/local/lib/python3.12/dist-packages (from spacy) (8.3.10)
Requirement already satisfied: wasabi<1.2.0,>=0.9.1 in /usr/local/lib/python3.12/dist-packages (from spacy) (1.1.3)
Requirement already satisfied: srsly<3.0.0,>=2.4.3 in /usr/local/lib/python3.12/dist-packages (from spacy) (2.5.2)
Requirement already satisfied: catalogue<2.1.0,>=2.0.6 in /usr/local/lib/python3.12/dist-packages (from spacy) (2.0.10)
Requirement already satisfied: weasel<0.5.0,>=0.4.2 in /usr/local/lib/python3.12/dist-packages (from spacy) (0.4.3)
Requirement already satisfied: typer-slim<1.0.0,>=0.3.0 in /usr/local/lib/python3.12/dist-packages (from spacy) (0.20.0)
Requirement already satisfied: tqdm<5.0.0,>=4.38.0 in /usr/local/lib/python3.12/dist-packages (from spacy) (4.67.1)
Requirement already satisfied: numpy>=1.19.0 in /usr/local/lib/python3.12/dist-packages (from spacy) (2.0.2)
Requirement already satisfied: requests<3.0.0,>=2.13.0 in /usr/local/lib/python3.12/dist-packages (from spacy) (2.32.4)
Requirement already satisfied: pydantic!=1.8,!=1.8.1,<3.0.0,>=1.7.4 in /usr/local/lib/python3.12/dist-packages (from spacy) (2.1
Requirement already satisfied: jinja2 in /usr/local/lib/python3.12/dist-packages (from spacy) (3.1.6)
Requirement already satisfied: setuptools in /usr/local/lib/python3.12/dist-packages (from spacy) (75.2.0)
Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.12/dist-packages (from spacy) (25.0)
Requirement already satisfied: annotated-types>=0.6.0 in /usr/local/lib/python3.12/dist-packages (from pydantic!=1.8,!=1.8.1,<3.
Requirement already satisfied: pydantic-core==2.41.4 in /usr/local/lib/python3.12/dist-packages (from pydantic!=1.8,!=1.8.1,<3.0
Requirement already satisfied: typing-extensions>=4.14.1 in /usr/local/lib/python3.12/dist-packages (from pydantic!=1.8,!=1.8.1,
Requirement already satisfied: typing-inspection>=0.4.2 in /usr/local/lib/python3.12/dist-packages (from pydantic!=1.8,!=1.8.1,<
Requirement already satisfied: charset_normalizer<4,>=2 in /usr/local/lib/python3.12/dist-packages (from requests<3.0.0,>=2.13.0
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Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.12/dist-packages (from requests<3.0.0,>=2.13.0->spac
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.12/dist-packages (from requests<3.0.0,>=2.13.0->spac
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) (
Requirement already satisfied: confection<1.0.0,>=0.0.1 in /usr/local/lib/python3.12/dist-packages (from thinc<8.4.0,>=8.3.4->sp
Requirement already satisfied: click>=8.0.0 in /usr/local/lib/python3.12/dist-packages (from typer-slim<1.0.0,>=0.3.0->spacy) (8
Requirement already satisfied: cloudpathlib<1.0.0,>=0.7.0 in /usr/local/lib/python3.12/dist-packages (from weasel<0.5.0,>=0.4.2-
Requirement already satisfied: smart-open<8.0.0,>=5.2.1 in /usr/local/lib/python3.12/dist-packages (from weasel<0.5.0,>=0.4.2->s
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
Collecting en-core-web-sm==3.8.0
  Downloading https://github.com/explosion/spacy-models/releases/download/en_core_web_sm-3.8.0/en_core_web_sm-3.8.0-py3-none-any
                                ──────── 12.8/12.8 MB 80.7 MB/s eta 0:00:00
✓ Download and installation successful
You can now load the package via spacy.load('en_core_web_sm')
⚠ Restart to reload dependencies
If you are in a Jupyter or Colab notebook, you may need to restart Python in
order to load all the package's dependencies. You can do this by selecting the
'Restart kernel' or 'Restart runtime' option.
```

```python
import spacy
from nltk.corpus import stopwords
from nltk.stem import WordNetLemmatizer
from nltk.tokenize import word_tokenize

nlp = spacy.load('en_core_web_sm')
```

⌄ Medical Text

Patient Report: Diabetes is a chronic disease that affects how the body processes blood sugar. If untreated, diabetes may cause heart disease, kidney failure, nerve damage and vision problems. Early diagnosis and proper treatment help improve patient outcomes. """

```
medical_text = """
Diabetes is a chronic disease that affects how the body processes blood sugar.
If untreated, diabetes may cause heart disease, kidney failure, nerve damage and vision problems.
Early diagnosis and proper treatment help improve patient outcomes.
"""
print(medical_text)
```

```
Diabetes is a chronic disease that affects how the body processes blood sugar.
If untreated, diabetes may cause heart disease, kidney failure, nerve damage and vision problems.
Early diagnosis and proper treatment help improve patient outcomes.
```

```
sentences = word_tokenize(medical_text)
print(sentences)
```

```
', 'and', 'vision', 'problems', '.', 'Early', 'diagnosis', 'and', 'proper', 'treatment', 'help', 'improve', 'patient', 'outcomes
```

```
from nltk.tokenize import sent_tokenize

sentences_tokenized = sent_tokenize(medical_text)
print(sentences_tokenized)
```

```
f untreated, diabetes may cause heart disease, kidney failure, nerve damage and vision problems.', 'Early diagnosis and proper tr
```

```
from nltk.stem import PorterStemmer

stemmer = PorterStemmer()
word_tokens = word_tokenize(medical_text.lower()) # Tokenize and convert to lowercase

stemmed_words = [stemmer.stem(word) for word in word_tokens if word.isalpha()] # Stem only alphabetic words
print(stemmed_words)
```

```
['diabet', 'is', 'a', 'chronic', 'diseas', 'that', 'affect', 'how', 'the', 'bodi', 'process', 'blood', 'sugar', 'if', 'untreat',
```

```
lemmatizer = WordNetLemmatizer()
word_tokens_lower = word_tokenize(medical_text.lower())

lemmatized_words = [lemmatizer.lemmatize(word) for word in word_tokens_lower if word.isalpha()]
print(lemmatized_words)
```

```
['diabetes', 'is', 'a', 'chronic', 'disease', 'that', 'affect', 'how', 'the', 'body', 'process', 'blood', 'sugar', 'if', 'untrea
```

```
import pandas as pd

original_words = [word for word in word_tokenize(medical_text.lower()) if word.isalpha()]

# Ensure all lists have the same length for DataFrame creation
# Since original_words, stemmed_words, and lemmatized_words were derived from the same filtered list
# (isalpha()), they should have the same length.
comparison_df = pd.DataFrame({
    'Original Word': original_words,
    'Stemmed Word': stemmed_words,
    'Lemmatized Word': lemmatized_words
})

display(comparison_df)
```

	Original Word	Stemmed Word	Lemmatized Word
0	diabetes	diabet	diabetes
1	is	is	is
2	a	a	a
3	chronic	chronic	chronic
4	disease	diseas	disease
5	that	that	that
6	affects	affect	affect
7	how	how	how
8	the	the	the
9	body	bodi	body
10	processes	process	process
11	blood	blood	blood
12	sugar	sugar	sugar
13	if	if	if
14	untreated	untreat	untreated
15	diabetes	diabet	diabetes
16	may	may	may
17	cause	caus	cause
18	heart	heart	heart
19	disease	diseas	disease
20	kidney	kidney	kidney
21	failure	failur	failure
22	nerve	nerv	nerve
23	damage	damag	damage
24	and	and	and
25	vision	vision	vision
26	problems	problem	problem
27	early	earli	early
28	diagnosis	diagnosi	diagnosis
29	and	and	and
30	proper	proper	proper
31	treatment	treatment	treatment
32	help	help	help
33	improve	improv	improve
34	patient	patient	patient
35	outcomes	outcom	outcome

Next steps: Generate code with `comparison_df`   New interactive sheet