```
!pip install nltk
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Requirement already satisfied: nltk in /usr/local/lib/python3.7/dist-packages (3.7)
Requirement already satisfied: click in /usr/local/lib/python3.7/dist-packages (from nltk) (7.1.2)
Requirement already satisfied: tqdm in /usr/local/lib/python3.7/dist-packages (from nltk) (4.64.0)
Requirement already satisfied: regex>=2021.8.3 in /usr/local/lib/python3.7/dist-packages (from nltk) (2022.6.2)
Requirement already satisfied: joblib in /usr/local/lib/python3.7/dist-packages (from nltk) (1.1.0)
```

- Exercici 1

Agafa un text en anglès que vulguis, i calcula'n la freqüència de les paraules.

```
#Loading NLTK
import nltk
```

```
nltk.download('punkt')
```

```
[nltk_data] Downloading package punkt to /root/nltk_data...
[nltk_data]   Unzipping tokenizers/punkt.zip.
True
```

El texto sale de aquí:

https://www.nltk.org/

```
from nltk.tokenize import sent_tokenize

text="""Natural Language Toolkit
NLTK is a leading platform for building Python programs to work with human language data. It provides ea

Thanks to a hands-on guide introducing programming fundamentals alongside topics in computational lingui

NLTK has been called “a wonderful tool for teaching, and working in, computational linguistics using Pyt

Natural Language Processing with Python provides a practical introduction to programming for language pr

tokenized_text=sent_tokenize(text)
print(tokenized_text)
```

```
['Natural Language Toolkit\nNLTK is a leading platform for building Python programs to work with human language data.', 'It
```

```
from nltk.tokenize import word_tokenize

tokenized_word=word_tokenize(text)
print(tokenized_word)
```

```
['Natural', 'Language', 'Toolkit', 'NLTK', 'is', 'a', 'leading', 'platform', 'for', 'building', 'Python', 'programs', 'to',
```

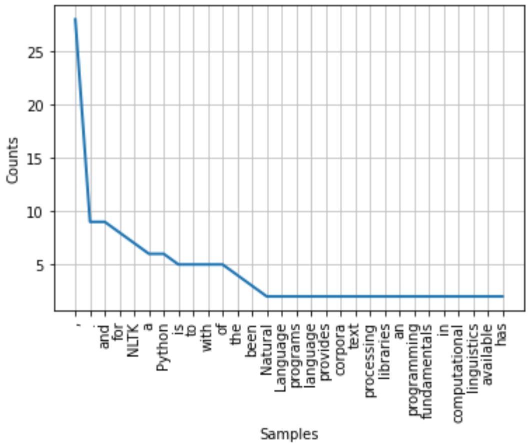
```
from nltk.probability import FreqDist
fdist = FreqDist(tokenized_word)
print(fdist)
```

```
<FreqDist with 137 samples and 247 outcomes>
```

```
fdist.most_common(5)
```

```
[(',', 28), ('.', 9), ('and', 9), ('for', 8), ('NLTK', 7)]
```

```
# Frequency Distribution Plot
import matplotlib.pyplot as plt
fdist.plot(30,cumulative=False)
plt.show()
```



- Exercici 2

Treu les stopwords i realitza stemming al teu conjunt de dades.

```
nltk.download('stopwords')
```

```
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data]   Package stopwords is already up-to-date!
True
```

```
from nltk.corpus import stopwords
#nltk.download('stopwords')

stop_words=set(stopwords.words("english"))
print(stop_words)
print(len(stop_words))
```

```
{'is', "don't", 'they', 'o', 'again', 'ourselves', "shan't", 'how', "you'd", "wasn't", 'while', 'didn', 'hadn', 'you', 'was'
179
```

tokenized_text=sent_tokenize(text)

```
tokenized_sent = tokenized_word

filtered_sent=[]
for w in tokenized_sent:
    #print(w)
    if w not in stop_words:
        filtered_sent.append(w)
print("Tokenized Sentence:",tokenized_sent)
print("Filterd Sentence:",filtered_sent)
```

```
Tokenized Sentence: ['Natural', 'Language', 'Toolkit', 'NLTK', 'is', 'a', 'leading', 'platform', 'for', 'building', 'Python'
Filterd Sentence: ['Natural', 'Language', 'Toolkit', 'NLTK', 'leading', 'platform', 'building', 'Python', 'programs', 'work'
```

```
# Stemming
from nltk.stem import PorterStemmer
from nltk.tokenize import sent_tokenize, word_tokenize

ps = PorterStemmer()

stemmed_words=[]
for w in filtered_sent:
    stemmed_words.append(ps.stem(w))

print("Filtered Sentence:",filtered_sent)
print("Stemmed Sentence:",stemmed_words)
```

```
Filtered Sentence: ['Natural', 'Language', 'Toolkit', 'NLTK', 'leading', 'platform', 'building', 'Python', 'programs', 'work
Stemmed Sentence: ['natur', 'languag', 'toolkit', 'nltk', 'lead', 'platform', 'build', 'python', 'program', 'work', 'human',
nltk.download('wordnet')
```

```
[nltk_data] Downloading package wordnet to /root/nltk_data...
True
```

```
nltk.download('omw-1.4')
```

```
[nltk_data] Downloading package omw-1.4 to /root/nltk_data...
True
```

```
#Lexicon Normalization
#performing stemming and Lemmatization

from nltk.stem.wordnet import WordNetLemmatizer
lem = WordNetLemmatizer()

from nltk.stem.porter import PorterStemmer
stem = PorterStemmer()

word = "fly"
print("Lemmatized Word:",lem.lemmatize(word,"v"))
print("Stemmed Word:",stem.stem(word))
```

```
Lemmatized Word: fly
Stemmed Word: fli
```

- Exercici 2

Treu les stopwords i realitza stemming al teu conjunt de dades.

```
sent = "Albert Einstein was born in Ulm, Germany in 1879."

tokens=nltk.word_tokenize(sent)
print(tokens)
```

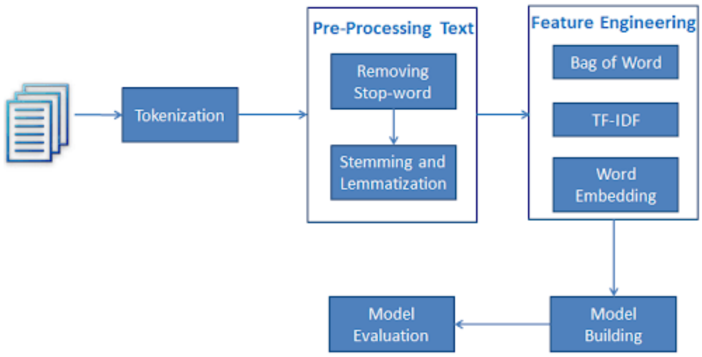
```
['Albert', 'Einstein', 'was', 'born', 'in', 'Ulm', ',', 'Germany', 'in', '1879', '.']
```

```
nltk.download('averaged_perceptron_tagger')
```

```
[nltk_data] Downloading package averaged_perceptron_tagger to
[nltk_data]     /root/nltk_data...
[nltk_data]   Unzipping taggers/averaged_perceptron_tagger.zip.
True
```

```
nltk.pos_tag(tokens)
```

```
[('Albert', 'NNP'),
 ('Einstein', 'NNP'),
 ('was', 'VBD'),
 ('born', 'VBN'),
 ('in', 'IN'),
 ('Ulm', 'NNP'),
 (',', ','),
 ('Germany', 'NNP'),
 ('in', 'IN'),
 ('1879', 'CD'),
 ('.', '.')]
```



```
# Activo Google Drive

from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
# Import pandas
import pandas as pd


data=pd.read_csv('/content/drive/MyDrive/01_COLAB/train.tsv', sep='\t')
```

```
data.head()
```

	PhraseId	SentenceId	Phrase	Sentiment
0	1	1	A series of escapades demonstrating the adage ...	1
1	2	1	A series of escapades demonstrating the adage ...	2
2	3	1	A series	2
3	4	1	A	2
4	5	1	series	2

```
data.iloc[0][2]
```

```
'A series of escapades demonstrating the adage that what is good for the goose is also good for the gander , some of which
occasionally amuses but none of which amounts to much of a story . '
```

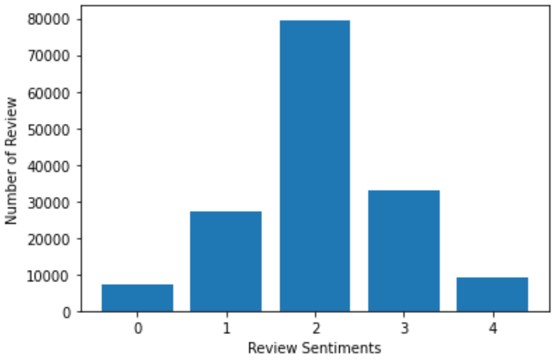
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 156060 entries, 0 to 156059
Data columns (total 4 columns):
 #   Column      Non-Null Count   Dtype 
---  ------      --------------   ----- 
 0   PhraseId    156060 non-null  int64 
 1   SentenceId  156060 non-null  int64 
 2   Phrase      156060 non-null  object
 3   Sentiment   156060 non-null  int64 
dtypes: int64(3), object(1)
memory usage: 4.8+ MB
```

```
data.Sentiment.value_counts()
```

```
2    79582
3    32927
1    27273
4     9206
0     7072
Name: Sentiment, dtype: int64
```

```
Sentiment_count=data.groupby('Sentiment').count()
plt.bar(Sentiment_count.index.values, Sentiment_count['Phrase'])
plt.xlabel('Review Sentiments')
plt.ylabel('Number of Review')
plt.show()
```



```
from sklearn.feature_extraction.text import CountVectorizer
from nltk.tokenize import RegexpTokenizer
#tokenizer to remove unwanted elements from out data like symbols and numbers
token = RegexpTokenizer(r'[a-zA-Z0-9]+')
cv = CountVectorizer(lowercase=True,stop_words='english',ngram_range = (1,1),tokenizer = token.tokenize)
text_counts= cv.fit_transform(data['Phrase'])
```

```
print(text_counts)
```

```
  (0, 11671)	1
  (0, 4517)	1
  (0, 3444)	1
  (0, 294)	1
  (0, 5735)	2
  (0, 5751)	1
  (0, 5512)	1
  (0, 9065)	1
  (0, 593)	1
  (0, 584)	1
  (0, 12673)	1
  (1, 11671)	1
  (1, 4517)	1
  (1, 3444)	1
  (1, 294)	1
  (1, 5735)	1
  (1, 5751)	1
  (2, 11671)	1
  (4, 11671)	1
  (5, 4517)	1
  (5, 3444)	1
  (5, 294)	1
  (5, 5735)	1
  (5, 5751)	1
  (7, 4517)	1
  :	:
  (156050, 11305)	1
  (156050, 9054)	1
  (156051, 11305)	1
  (156051, 9054)	1
  (156052, 11305)	1
  (156053, 11281)	1
  (156053, 1281)	1
  (156053, 5252)	1
  (156053, 6156)	1
  (156053, 1006)	1
  (156053, 2271)	1
  (156054, 11281)	1
  (156054, 5252)	1
  (156054, 6156)	1
  (156054, 1006)	1
  (156054, 2271)	1
  (156055, 11281)	1
  (156055, 6156)	1
  (156056, 5252)	1
  (156056, 1006)	1
  (156056, 2271)	1
  (156057, 1006)	1
  (156057, 2271)	1
  (156058, 1006)	1
  (156059, 2271)	1
```

```python
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(
    text_counts, data['Sentiment'], test_size=0.3, random_state=1)
```

```python
from sklearn.naive_bayes import MultinomialNB
#Import scikit-learn metrics module for accuracy calculation
from sklearn import metrics
# Model Generation Using Multinomial Naive Bayes
clf = MultinomialNB().fit(X_train, y_train)
predicted= clf.predict(X_test)
print("MultinomialNB Accuracy:",metrics.accuracy_score(y_test, predicted))
```

```
MultinomialNB Accuracy: 0.6049169122986885
```

```python
from sklearn.feature_extraction.text import TfidfVectorizer
tf=TfidfVectorizer()
text_tf= tf.fit_transform(data['Phrase'])
```

```python
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(
    text_tf, data['Sentiment'], test_size=0.3, random_state=123)
```

```python
from sklearn.naive_bayes import MultinomialNB
from sklearn import metrics
# Model Generation Using Multinomial Naive Bayes
clf = MultinomialNB().fit(X_train, y_train)
predicted= clf.predict(X_test)
print("MultinomialNB Accuracy:",metrics.accuracy_score(y_test, predicted))
```

```
MultinomialNB Accuracy: 0.5865265496176684
```

```python
import nltk
sentence = """At eight o'clock on Thursday morning Arthur didn't feel very good."""

tokens = nltk.word_tokenize(sentence)
tokens
tagged = nltk.pos_tag(tokens)
tagged[0:6]
```

```
[('At', 'IN'),
 ('eight', 'CD'),
 ("o'clock", 'NN'),
 ('on', 'IN'),
 ('Thursday', 'NNP'),
 ('morning', 'NN')]
```

```python
nltk.download('maxent_ne_chunker')
nltk.download('words')
```

```
[nltk_data] Downloading package maxent_ne_chunker to
[nltk_data]     /root/nltk_data...
[nltk_data]   Package maxent_ne_chunker is already up-to-date!
[nltk_data] Downloading package words to /root/nltk_data...
[nltk_data]   Package words is already up-to-date!
True
```

```python
entities = nltk.chunk.ne_chunk(tagged)
#entities
```

```python
nltk.download('treebank')
```

```
[nltk_data] Downloading package treebank to /root/nltk_data...
[nltk_data]   Unzipping corpora/treebank.zip.
True
```

```python
from nltk.corpus import treebank
t = treebank.parsed_sents('the father')[0]
```

```
t.draw()
```

```
---------------------------------------------------------------------------
OSError                                   Traceback (most recent call last)
<ipython-input-83-7c3566bbf033> in <module>
      1 from nltk.corpus import treebank
----> 2 t = treebank.parsed_sents('the father')[0]
      3 t.draw()

                                  5 frames
/usr/local/lib/python3.7/dist-packages/nltk/data.py in __init__(self, _path)
    310         _path = os.path.abspath(_path)
    311         if not os.path.exists(_path):
--> 312             raise OSError("No such file or directory: %r" % _path)
    313         self._path = _path
    314 

OSError: No such file or directory: '/root/nltk_data/corpora/treebank/combined/the father'
```

SEARCH STACK OVERFLOW

- Exercici 3

Realitza sentiment analysis al teu conjunt de dades.

```
import nltk
nltk.download('vader_lexicon')
nltk.download('punkt')
```

```
[nltk_data] Downloading package vader_lexicon to /root/nltk_data...
[nltk_data] Downloading package punkt to /root/nltk_data...
[nltk_data]   Package punkt is already up-to-date!
True
```

```
import nltk
tokenizer = nltk.data.load('tokenizers/punkt/english.pickle')
sentences = tokenizer.tokenize(text)
```

```
from nltk.sentiment.vader import SentimentIntensityAnalyzer
from nltk import sentiment
from nltk import word_tokenize
```

```
analizador = SentimentIntensityAnalyzer()
```

```
import statistics

valores=[]

neg=[]
neu=[]
pos=[]
compound=[]


for i, sentence in enumerate(sentences):
    #print(sentence)
    scores = analizador.polarity_scores(sentence)
    print('i= ', i, scores, type(scores))
    neu.append(scores['neu'])
    neg.append(scores['neg'])
    compound.append(scores['compound'])
    pos.append(scores['pos'])
    valores.append(scores)





    '''
    for key in scores:
        print(key, ': ', scores[key])
        #print()
        '''
print('\n Valores: ')
valores[2]['neu']

print('neutros:', neu,'    -> ', round(statistics.mean(neu),2))
print('pos:    ', pos,'    -> ', round(statistics.mean(pos),2))
print('neg:    ', neg,'    -> ', round(statistics.mean(neg),2))
print('Compound:','    -> ', compound, round(statistics.mean(compound),2))
```

```
i=  0 {'neg': 0.0, 'neu': 0.865, 'pos': 0.135, 'compound': 0.3612} <class 'dict'>
i=  1 {'neg': 0.0, 'neu': 0.935, 'pos': 0.065, 'compound': 0.4019} <class 'dict'>
i=  2 {'neg': 0.0, 'neu': 0.846, 'pos': 0.154, 'compound': 0.5994} <class 'dict'>
i=  3 {'neg': 0.0, 'neu': 1.0, 'pos': 0.0, 'compound': 0.0} <class 'dict'>
i=  4 {'neg': 0.0, 'neu': 0.516, 'pos': 0.484, 'compound': 0.8176} <class 'dict'>
i=  5 {'neg': 0.0, 'neu': 0.689, 'pos': 0.311, 'compound': 0.9313} <class 'dict'>
i=  6 {'neg': 0.0, 'neu': 1.0, 'pos': 0.0, 'compound': 0.0} <class 'dict'>
i=  7 {'neg': 0.0, 'neu': 1.0, 'pos': 0.0, 'compound': 0.0} <class 'dict'>
i=  8 {'neg': 0.0, 'neu': 0.777, 'pos': 0.223, 'compound': 0.3182} <class 'dict'>

 Valores: 
neutros: [0.865, 0.935, 0.846, 1.0, 0.516, 0.689, 1.0, 1.0, 0.777]     ->  0.85
pos:     [0.135, 0.065, 0.154, 0.0, 0.484, 0.311, 0.0, 0.0, 0.223]     ->  0.15
neg:     [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0]     ->  0.0
Compound:     ->  [0.3612, 0.4019, 0.5994, 0.0, 0.8176, 0.9313, 0.0, 0.0, 0.3182] 0.38
```

✓ 0 s completado a las 8:23 ● ✕