NAME: Sofus Krogh Eriksen

KU: bzk131

Exercise 1

In [ ]:

```
import re
import pandas as pd
import requests
from nltk.tokenize import word_tokenize
from nltk.probability import FreqDist
import matplotlib.pyplot as plt
from cleantext import clean
from io import StringIO
```

```
Since the GPL-licensed package `unidecode` is not installed, using Python's `unic
odedata` package which yields worse results.
```

Part 1: Regular expression warmup

A

In [ ]:

```
cpr_pattern = re.compile(r'(\d{2})(\d{2})(\d{2})[-]?(\d{4})')

# Example usage:
cpr_number_1 = '0102031234'
cpr_number_2 = '010203-1234'
```

In [ ]:

```
test_1 = cpr_pattern.match(cpr_number_1)
test_2 = cpr_pattern.match(cpr_number_2)

if test_1:
    print(fr"Test 1 on {cpr_number_1}.")
    print("Test 1 groups:", test_1.groups())
    day, month, year, identifier = test_1.groups()
    print(f"DD: {day}, MM: {month}, YY: {year}, IIII: {identifier}")

if test_2:
    print(fr"Test 2 on {cpr_number_2}.")
    day, month, year, identifier = test_2.groups()
    print(f"DD: {day}, MM: {month}, YY: {year}, IIII: {identifier}")
```

```
Test 1 on 0102031234.
Test 1 groups: ('01', '02', '03', '1234')
DD: 01, MM: 02, YY: 03, IIII: 1234
Test 2 on 010203-1234.
DD: 01, MM: 02, YY: 03, IIII: 1234
```

B

In [ ]:

```
def cpr_century(cpr):
    cpr_pattern = re.compile(r'(\d{2})(\d{2})(\d{2})[-]?(\d{4})')
    match = cpr_pattern.match(cpr)
    if match:
        day, month, year, identifier = match.groups()
        identifier = int(identifier)
        year = int(year)

        if 1 <= identifier <= 3999:
            century = 1900 + year // 100
        elif 4000 <= identifier <= 4999 and 0 <= year <= 36:
            century = 2000 + year // 100
        elif 4000 <= identifier <= 4999 and 37 <= year <= 99:
            century = 1900 + year // 100
        elif 5000 <= identifier <= 8999 and 0 <= year <= 57:
            century = 2000 + year // 100
        elif 5000 <= identifier <= 8999 and 58 <= year <= 99:
            century = 1800 + year // 100
        elif 9000 <= identifier <= 9999 and 0 <= year <= 36:
            century = 2000 + year // 100
        elif 9000 <= identifier <= 9999 and 37 <= year <= 99:
            century = 1900 + year // 100
        else:
            raise ValueError("Invalid identifier or year range")

        return century
    else:
        raise ValueError("Invalid CPR format")
```

In [ ]:

```
cpr_lst = ['220197-8989', '2201650099', '121201-0976', '1224230973', '010124-900
```

In [ ]:

```
for cpr in cpr_lst:
    result = cpr_century(cpr)
    result_type = type(result)
    print(f'CPR:{cpr} is born in the {result}. The type of the result is: {resul
```

```
CPR:220197-8989 is born in the 1800. The type of the result is: <class 'int'>
CPR:2201650099 is born in the 1900. The type of the result is: <class 'int'>
CPR:121201-0976 is born in the 1900. The type of the result is: <class 'int'>
CPR:1224230973 is born in the 1900. The type of the result is: <class 'int'>
CPR:010124-9001 is born in the 2000. The type of the result is: <class 'int'>
```

Part 2: Processing the FakeNewsCorpus data set

In [ ]:

```
# URL of the CSV file
url = 'https://raw.githubusercontent.com/several27/FakeNewsCorpus/master/news_sa

# Fetching the content from the URL
response = requests.get(url)

# Checking if the request was successful (status code 200)
if response.status_code == 200:
    # Reading CSV data using pandas
    csv_data = StringIO(response.text)
    df = pd.read_csv(csv_data)

    # Displaying the first few rows of the DataFrame
    #print(df.head())
else:
    print(f"Failed to fetch data. Status code: {response.status_code}")
```

```
In [ ]: df.head(10)
```

Out[ ]:

	Unnamed: 0	id	domain	type	
0	0	141	awm.com	unreliable	http://awm.com/church-congreg
1	1	256	beforeitsnews.com	fake	http://beforeitsnews.com/awakening
2	2	700	cnnnext.com	unreliable	http://www.cnnnext.com/video/
3	3	768	awm.com	unreliable	http://awm.com/elusive-alien-of-the
4	4	791	bipartisanreport.com	clickbait	http://bipartisanreport.com/2018/01/
5	5	899	blackagendareport.com	unreliable	https://blackagendareport.com/art
6	6	1058	awarenessact.com	conspiracy	http://awarenessact.com/tag/wakir
7	7	1376	beforeitsnews.com	fake	http://beforeitsnews.com/home/feat
8	8	1411	beforeitsnews.com	fake	http://beforeitsnews.com/economy/
9	9	1422	canadafreepress.com	conspiracy	http://canadafreepress.com/article

In [ ]:

```
# Get info from dataframe
print(df.info())
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 250 entries, 0 to 249
Data columns (total 16 columns):
 #   Column            Non-Null Count  Dtype  
---  ------            --------------  -----  
 0   Unnamed: 0        250 non-null    int64  
 1   id                250 non-null    int64  
 2   domain            250 non-null    object 
 3   type              238 non-null    object 
 4   url               250 non-null    object 
 5   content           250 non-null    object 
 6   scraped_at        250 non-null    object 
 7   inserted_at       250 non-null    object 
 8   updated_at        250 non-null    object 
 9   title             250 non-null    object 
 10  authors           170 non-null    object 
 11  keywords          0 non-null      float64
 12  meta_keywords     250 non-null    object 
 13  meta_description  54 non-null     object 
 14  tags              27 non-null     object 
 15  summary           0 non-null      float64
dtypes: float64(2), int64(2), object(12)
memory usage: 31.4+ KB
None
```

Datainspection

There a multiple all null columns. #11 and #15 are completly empty, and others are partly empty, ie. missing data.

Missing Values:

The 'authors', 'keywords', 'meta_keywords', 'meta_description', and 'tags' columns contain empty lists ('[]'), which may imply missing or incomplete information. Date Representation:

The 'scraped_at', 'inserted_at', and 'updated_at' columns seem to contain timestamp values. OIt is importtant to ensure that these columns are correctly parsed as datetime objects if used.

Text Data Cleaning:

The 'content' column contains HTML tags, line breaks, and special characters. Depending on the analysis chosen, one might want to clean or preprocess the text data to remove HTML tags and unnecessary characters. Categorical Values:

The 'type' column appears to categorize news into 'unreliable' and 'fake.' One must ensure that these categories are well-defined and consistent throughout the dataset.

Column Names:

Some column names contain spaces, which might cause inconvenience in handling them. I could consider renaming columns for ease of use later.

Encoding Issues:

The 'title' column does not contain duplicate entries, as each news article should have a unique title.

Column Data Types:

Confirm that each column has the correct data type. For example, 'type' might be categorical, 'scraped_at,' 'inserted_at,' and 'updated_at' should be datetime, etc.

In [ ]:

```
def clean_text(raw_text):
   cleaned_text = re.sub(r'\s+', ' ', raw_text)

   # Replace uppercase letters with lowercase
   cleaned_text = re.sub(r'[A-Z]', lambda match: match.group().lower(), cleaned_

   cleaned_text = re.sub(r'\b\d+\b', '<NUM>', cleaned_text)
   cleaned_text = re.sub(r'\b[A-Za-z0-9._%+-]+@[A-Za-z0-9.-]+\.[A-Z|a-z]{2,}\b',
   cleaned_text = re.sub(r'https?://\S+', '<URL>', cleaned_text)
   cleaned_text = re.sub(r'\b\d{4}-\d{2}-\d{2}\b', '<DATE>', cleaned_text)


   return cleaned_text
```

In [ ]:

```
# Creating new column with the cleaned text
df['content_1'] = df['content'].apply(clean_text)
```

In [ ]:

```
def clean_text_with_library(raw_text):
    # Use clean-text library for text cleaning
    cleaned_text = clean(
        raw_text,
        fix_unicode=True,
        to_ascii=True,
        lower=True,
        no_line_breaks=True,
        no_urls=True,
        no_emails=True,
        no_numbers=True,
        no_digits=True,
        no_punct=True,
        replace_with_url="<URL>",
        replace_with_email="<EMAIL>",
        replace_with_number="<NUM>",
        replace_with_digit="<NUM>"
    )
    cleaned_text = re.sub(r'\b\d{4}-\d{2}-\d{2}\b', '<DATE>', cleaned_text)

    return cleaned_text
```

In [ ]:

```
# Creating another new column with the cleaned text with the library
df['content_2'] = df['content'].apply(clean_text_with_library)
```

Part 3: Descriptive frequency analysis of the data

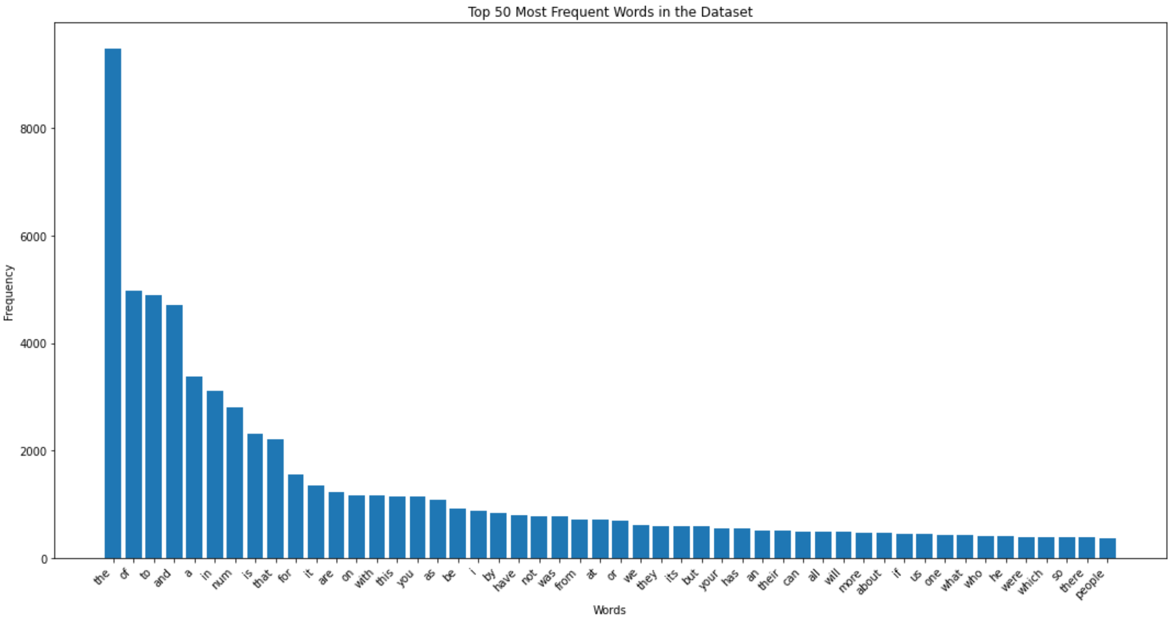
In [ ]:

```
# Tokenize text and calculate unique words before preprocessing
raw_text_words = set(word_tokenize(' '.join(df['content'])))
num_unique_words_raw = len(raw_text_words)

# Tokenize cleaned text and calculate unique words after preprocessing
cleaned_text_words = set(word_tokenize(' '.join(df['content_2'])))
num_unique_words_cleaned = len(cleaned_text_words)

# Display the results
print("Number of unique words before preprocessing:", num_unique_words_raw)
print("Number of unique words after preprocessing:", num_unique_words_cleaned)
```

```
Number of unique words before preprocessing: 20948
Number of unique words after preprocessing: 16499
```

In [ ]:

```
raw_text = ' '.join(df['content_2'])

words = [word.lower() for word in word_tokenize(raw_text) if word.isalnum()]

# Calculate word frequencies
freq_dist = FreqDist(words)

# Calculate word frequencies
freq_dist = FreqDist(words)

# Get the 50 most frequent words
top_words = freq_dist.most_common(50)

# Create a DataFrame for plotting
df_top_words = pd.DataFrame(top_words, columns=['Word', 'Frequency'])

# Plot the barplot
plt.figure(figsize=(15, 8))
plt.bar(df_top_words['Word'], df_top_words['Frequency'])
plt.xlabel('Words')
plt.ylabel('Frequency')
plt.title('Top 50 Most Frequent Words in the Dataset')
plt.xticks(rotation=45, ha='right')  # Rotate x-axis labels for better visibilit
plt.tight_layout()
plt.show()
```


Top 50 Most Frequent Words in the Dataset
Frequency
8000
6000
4000
2000
0
the
of
to
and
a
in
num
is
that
for
it
are
on
with
this
you
as
be
i
by
have
not
was
from
at
or
we
they
its
but
your
has
an
their
can
all
will
more
about
if
us
one
what
who
he
were
which
so
there
people
Words

```
In [ ]: df.head(10)
```

Out[ ]:

	Unnamed: 0	id	domain	type	
0	0	141	awm.com	unreliable	http://awm.com/church-congreg
1	1	256	beforeitsnews.com	fake	http://beforeitsnews.com/awakening
2	2	700	cnnnext.com	unreliable	http://www.cnnnext.com/video/
3	3	768	awm.com	unreliable	http://awm.com/elusive-alien-of-the
4	4	791	bipartisanreport.com	clickbait	http://bipartisanreport.com/2018/01/
5	5	899	blackagendareport.com	unreliable	https://blackagendareport.com/art
6	6	1058	awarenessact.com	conspiracy	http://awarenessact.com/tag/wakir
7	7	1376	beforeitsnews.com	fake	http://beforeitsnews.com/home/feat
8	8	1411	beforeitsnews.com	fake	http://beforeitsnews.com/economy/
9	9	1422	canadafreepress.com	conspiracy	http://canadafreepress.com/article

Unnamed: 0	id	domain	type