Data Sciences

Textual Data

Tussanakorn Rattanaburee 62070505205

Import Library

In [1]:

```
from collections import Counter
from wordcloud import WordCloud
import matplotlib.pyplot as plt
import seaborn as sns
import pandas as pd
import numpy as np
import regex as re
import nltk
```

In [2]:

```
from IPython.display import display_html
from itertools import chain,cycle
def display_side_by_side(*args,titles=cycle([''])):
    html_str=''
    for df,title in zip(args, chain(titles,cycle(['</br>'])) ):
        html_str+='<th style="text-align:center"><td style="vertical-align:top">'
        html_str+=f'<h3>{title}</h3>'
        html_str+=df.to_html().replace('table','table style="display:inline"')
        html_str+='</td></th>'
    display_html(html_str,raw=True)
```

Loading dataset

In [3]:

```
df = pd.read_csv('un-general-debates-blueprint.csv.gz')
```

In [4]:

```
df.sample(3)
```

Out[4]:

	session	year	country	country_name	speaker	position	text
5327	59	2004	NER	Niger	Mrs. Aïchatou MINDAOUDOU	Minister for Foreign Affairs	Allow me at the outset, Mr. President, to join...
4061	52	1997	SDN	Sudan	Ali Osman Mohamed Taha	Minister for Foreign Affairs	At\nthe outset I would like to express my con...
7312	69	2014	ZMB	Zambia	Harry Kalaba	Minister for Foreign Affairs	I extend our sincere \ncongratulations to Mr. ...

DataFrame summary statistics

In [5]:

```
df['length'] = df['text'].str.len()
```

In [6]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 7507 entries, 0 to 7506
Data columns (total 8 columns):
 #   Column        Non-Null Count  Dtype 
---  ------        --------------  ----- 
 0   session       7507 non-null   int64 
 1   year          7507 non-null   int64 
 2   country       7507 non-null   object
 3   country_name  7507 non-null   object
 4   speaker       7480 non-null   object
 5   position      4502 non-null   object
 6   text          7507 non-null   object
 7   length        7507 non-null   int64 
dtypes: int64(3), object(5)
memory usage: 469.3+ KB
```

In [7]:

```
df.describe().T
```

Out[7]:

	count	mean	std	min	25%	50%	75%	max
session	7507.0	49.610763	12.892155	25.0	39.0	51.0	61.0	70.0
year	7507.0	1994.610763	12.892155	1970.0	1984.0	1996.0	2006.0	2015.0
length	7507.0	17967.281604	7860.038463	2362.0	12077.0	16424.0	22479.5	72041.0

In [8]:

```
df[['country','speaker']].describe(include='O').T
```

Out[8]:

	count	unique	top	freq
country	7507	199	VEN	46
speaker	7480	5428	Seyoum Mesfin	12

Checking for missing data

In [9]:

```
#Checking
df.isna().sum()
```

Out[9]:

```
session            0
year               0
country            0
country_name       0
speaker           27
position        3005
text               0
length             0
dtype: int64
```

In [10]:

```
#Fixing
df['speaker'].fillna('unknown',inplace=True)
```

In [11]:

```
df.isna().sum()
```

Out[11]:

```
session            0
year               0
country            0
country_name       0
speaker            0
position        3005
text               0
length             0
dtype: int64
```

Define Functions

In [12]:

```
# Function Tokenization
def tokenize(text):
    return re.findall(r'[\w-]*\p{L}[\w-]*', text)
```

In [13]:

```
# Function Stopword Removal
stopwords = set(nltk.corpus.stopwords.words('english'))
def remove_stop(tokens):
    return [t for t in tokens if t.lower() not in stopwords]
```

In [14]:

```
## Function N-gram
def ngrams(tokens, n=2, sep=' '):
    return [sep.join(ngram) for ngram in zip(*[tokens[i:] for i in range(n)])]
```

In [15]:

```
pipeline = [str.lower, tokenize, remove_stop]

def prepare(text, pipeline):
    tokens = text
    for transform in pipeline:
        tokens = transform(tokens)
    return tokens
```

In [16]:

```
## Function Count Words
def count_words(df, column='bigrams', preprocess=None, min_freq = 2):

    # process tokens and update counter
    def update(doc):
        tokens = doc if preprocess is None else preprocess(doc)
        counter.update(tokens)

    # create counter and run through all data
    counter = Counter()
    df[column].map(update)

    # transform counter into a DataFrame
    freq_df = pd.DataFrame.from_dict(counter, orient='index', columns=['freq'])
    freq_df = freq_df.query('freq > @min_freq')
    freq_df.index.name = 'bigrams'

    return freq_df.sort_values('freq', ascending=False)
```

In [17]:

```
## Function WordCloud
def wordcloud(word_freq, title=None, max_words=200, stopwords=None):

    wc = WordCloud(width=800, height=400,
                   background_color= "black", colormap="Set2",
                   max_font_size=150, max_words=max_words)

    # convert data frame into dict
    if type(word_freq) == pd.Series:
        counter = Counter(word_freq.fillna(0).to_dict())
    else:
        counter = word_freq

    # filter stop words in frequency counter
    if stopwords is not None:
        counter = {token:freq for (token, freq) in counter.items()
                              if token not in stopwords}
    wc.generate_from_frequencies(counter)

    plt.title(title)

    plt.imshow(wc, interpolation='bilinear')
    plt.axis("off")
```

In [18]:

```
## Function Count Keywords
def count_keywords(tokens, keywords):
    tokens = [t for t in tokens if t in keywords]
    counter = Counter(tokens)
    return [counter.get(k, 0) for k in keywords]
```

In [19]:

```
## Function Count Keywords
def count_keywords_by(df, by, keywords,column):
    freq_matrix = df[column].apply(count_keywords, keywords=keywords)
    freq_df = pd.DataFrame.from_records(freq_matrix, columns=keywords)
    freq_df[by] = df[by]

    return freq_df.groupby(by).sum().sort_values(by)
```

In [20]:

```
df['tokens'] = df['text'].apply(prepare, pipeline=pipeline)
```

Lab Textual Data

1. Find the top 10 word bigram from UN General Debates of years 1970 –1990

and compare with those of years 1990 –the latest (remove stopwords first)

In [21]:

```
pipeline = [str.lower, tokenize, remove_stop, ngrams]

def prepare(text, pipeline):
    tokens = text
    for transform in pipeline:
        tokens = transform(tokens)
    return tokens
```

In [22]:

```
df['bigrams'] = df['text'].apply(prepare, pipeline=pipeline)
```

In [23]:

```
df['num_bigrams'] = df['bigrams'].map(len)
```

In [24]:

```
df.head()
```

Out[24]:

	session	year	country	country_name	speaker	position	text	length	
0	25	1970	ALB	Albania	Mr. NAS	NaN	33: May I first convey to our President the co...	51419	c
1	25	1970	ARG	Argentina	Mr. DE PABLO PARDO	NaN	177.\t : It is a fortunate coincidence that pr...	29286	
2	25	1970	AUS	Australia	Mr. McMAHON	NaN	100.\t It is a pleasure for me to extend to y...	31839	\
3	25	1970	AUT	Austria	Mr. KIRCHSCHLAEGER	NaN	155.\t May I begin by expressing to Ambassado...	26616	
4	25	1970	BEL	Belgium	Mr. HARMEL	NaN	176. No doubt each of us, before coming up to ...	25911	

In [25]:

```
bigram_1 = df.query('1970 <= year <= 1990')
bigram_2 = df.query('year >= 1990')
```

In [26]:

```
df_bigram_1 = count_words(bigram_1, column='bigrams')
df_bigram_2 = count_words(bigram_2, column='bigrams')
display_side_by_side(df_bigram_1.head(10),df_bigram_2.head(10),
                     titles=['10 word of years 1970–1990','10 word of years 1990- the lates
```

10 word of years 1970–1990

bigrams	freq
united nations	43846
general assembly	13915
developing countries	11991
international community	11506
south africa	9300
united states	7718
middle east	7608
security council	7500
peace security	6755
human rights	6569

10 word of years 1990- the latest

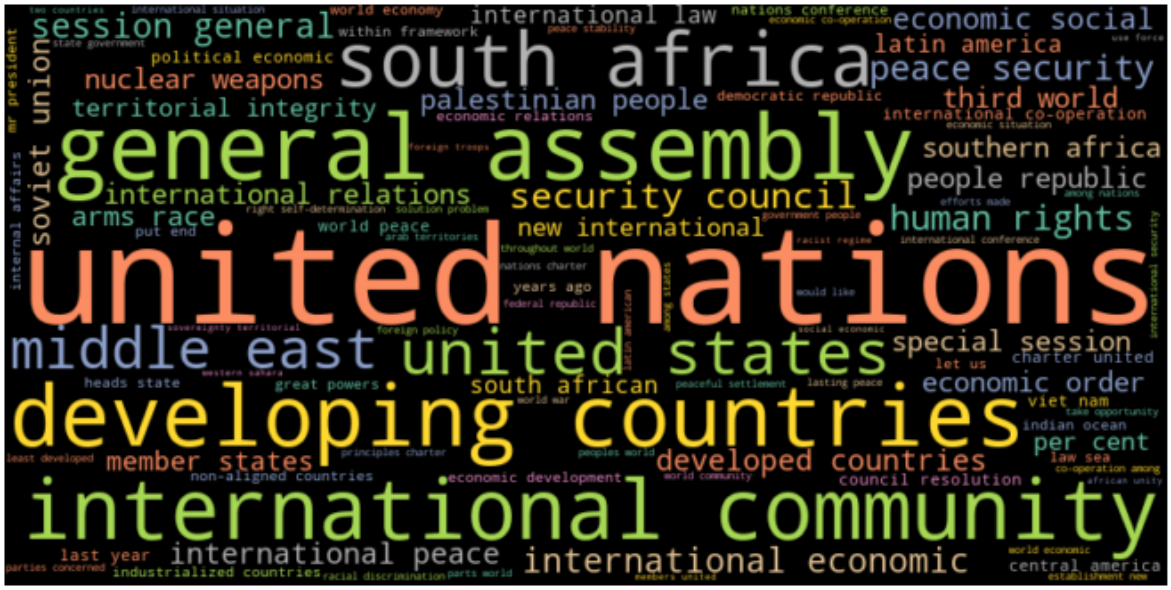
bigrams	freq
united nations	61529
international community	16924
security council	14040
general assembly	13694
human rights	13658
peace security	8704
developing countries	7027
member states	6037
sustainable development	5281
climate change	5159

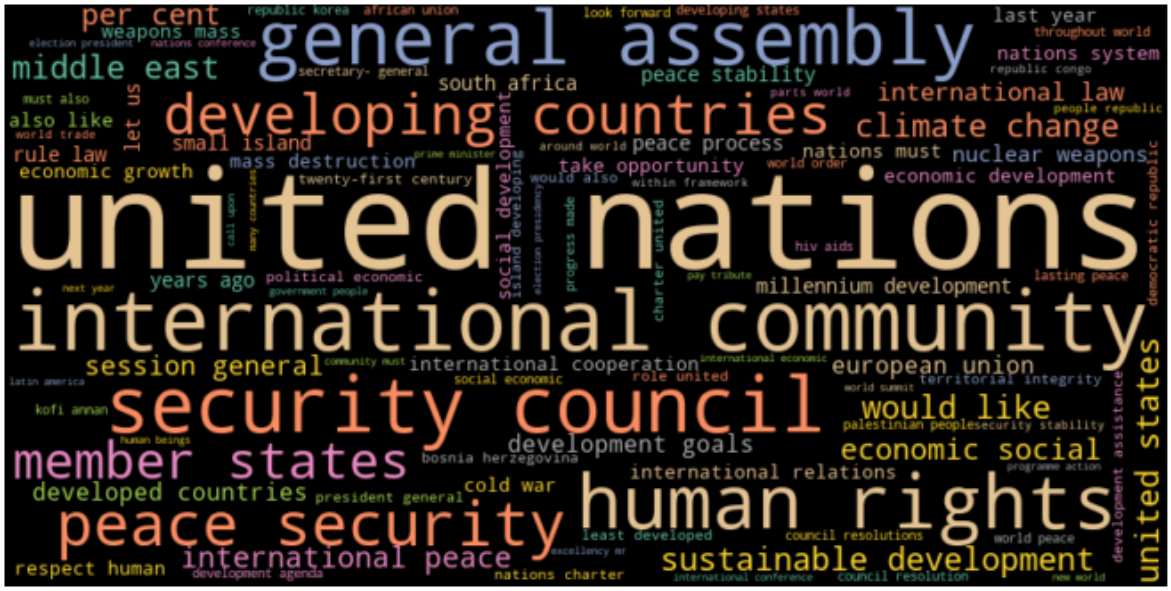
2. Create a bigram word cloud of the UN General Debates dataset of years 1970 – 1990 and 1990 to the latest (remove stopwords first)

In [27]:

```
plt.figure(figsize=(16,6))
wordcloud(df_bigram_1['freq'], max_words=100)

plt.figure(figsize=(16,6))
wordcloud(df_bigram_2['freq'], max_words=100)
```





3. Create a trend graph showing the bigram and word trend of “climate change”, “global warming”, “wars” and 3 others of your choices

In [28]:

```
keywords = ['climate change','global warming','human rights','peace security','economic soc
keywords1 = ['wars']
```

In [29]:

```
freq_df = count_keywords_by(df, by='year', keywords=keywords, column='bigrams')
freq_df1 = count_keywords_by(df, by='year', keywords=keywords1, column='tokens')
```

In [30]:

```
freq_result = pd.concat([freq_df, freq_df1], axis=1)
```

In [31]:

```
sns.set_style("darkgrid")
freq_result.plot(kind='line', figsize=(16,8))
```

Out[31]:

```
<AxesSubplot:xlabel='year'>
```