Afzal Patel

This notebook is an analysis of United Nations Speeches from 1970 to 2015

In [1]:

```
#required modules and packages

import pandas as pd
import string
from altair import Chart, X, Y, Color, Scale
import altair as alt
#!pip install nltk
import nltk
from nltk.corpus import stopwords
import wordcloud
#from textatistic import Textatistic
import matplotlib
import matplotlib.pyplot as plt
import psycopg2
import seaborn as sbn
from vega_datasets import data
import requests
from bs4 import BeautifulSoup
import numpy as np
from bs4 import BeautifulSoup
import ssl
# try:
#     _create_unverified_https_context = ssl._create_unverified_context
# except AttributeError:
#     pass
# else:
#     ssl._create_default_https_context = _create_unverified_https_context
matplotlib.style.use('ggplot')
nltk.download('punkt')
nltk.download('stopwords')
nltk.download('vader_lexicon')
```

```
[nltk_data] Downloading package punkt to /Users/afzal/nltk_data...
[nltk_data]   Package punkt is already up-to-date!
[nltk_data] Downloading package stopwords to /Users/afzal/nltk_data.
..
[nltk_data]   Package stopwords is already up-to-date!
[nltk_data] Downloading package vader_lexicon to
[nltk_data]     /Users/afzal/nltk_data...
[nltk_data]   Package vader_lexicon is already up-to-date!
```

Out[1]:

```
True
```

In [2]:

```
undf = pd.read_csv("un-general-debates.csv")
undf1 = undf
```

How do speeches in 1970 compare to those in 2015?

In [3]:

```
#1970 Analysis

speeches_1970 = undf[undf.year == 1970].copy()
speeches_1970['text'] = speeches_1970.text.apply(lambda x: x.lower())
speeches_1970['text'] = speeches_1970.text.apply(
    lambda x: x.translate(str.maketrans(
        string.punctuation, ' '*len(string.punctuation))))
speeches_1970['word_list'] = speeches_1970.text.apply(nltk.word_tokeni
ze)
```

Most Common Words in 1970?

In [4]:

```
from collections import Counter
c = Counter(speeches_1970.word_list.sum())
c.most_common(10)
```

Out[4]:

```
[('the', 25077),
 ('of', 16265),
 ('and', 9224),
 ('to', 9134),
 ('in', 6668),
 ('a', 4530),
 ('that', 3919),
 ('is', 3322),
 ('for', 2563),
 ('which', 2471)]
```

In [5]:

```
c.most_common()[-10:]
```

Out[5]:

```
[('shabby', 1),
 ('predatory', 1),
 ('siphoned', 1),
 ('crop', 1),
 ('outflow', 1),
 ('ashes', 1),
 ('pr', 1),
 ('bystander', 1),
 ('antiimperialist', 1),
 ('earn', 1)]
```

In [6]:

```
#stop words, used in both analyses to filter from most common word lists

sw = set(stopwords.words('english'))
len(sw)
```

Out[6]:

```
179
```

In [7]:

```
speeches_1970['word_list'] = speeches_1970.word_list.apply(
    lambda x: [y for y in x if y not in sw])

c = Counter(speeches_1970.word_list.sum())
c.most_common(25)
```

```
Out[7]: [('nations', 1997),
         ('united', 1996),
         ('international', 1251),
         ('world', 1101),
         ('peace', 1019),
         ('countries', 908),
         ('states', 897),
         ('organization', 763),
         ('would', 677),
         ('people', 649),
         ('development', 649),
         ('security', 594),
         ('general', 571),
         ('peoples', 567),
         ('assembly', 552),
         ('charter', 551),
         ('government', 544),
         ('one', 535),
         ('must', 474),
         ('also', 454),
         ('economic', 450),
         ('us', 401),
         ('years', 392),
         ('time', 371),
         ('great', 369)]
```

In [8]:
```
c.most_common()[-25:]
```

Out[8]:
```
[('reliably', 1),
 ('polish', 1),
 ('sqon', 1),
 ('ultra', 1),
 ('nonapplicability', 1),
 ('statutory', 1),
 ('2391', 1),
 ('renovation', 1),
 ('russia', 1),
 ('gbout', 1),
 ('•', 1),
 ('prediction', 1),
 ('oceania', 1),
 ('fat', 1),
 ('1848th', 1),
 ('shabby', 1),
 ('predatory', 1),
 ('siphoned', 1),
 ('crop', 1),
 ('outflow', 1),
 ('ashes', 1),
 ('pr', 1),
 ('bystander', 1),
 ('antiimperialist', 1),
 ('earn', 1)]
```

Most Common Words in 2015?

In [9]:
```
#2015 Analysis

speeches_2015 = undf[undf.year == 2015].copy()
speeches_2015['text'] = speeches_2015.text.apply(lambda x: x.lower())
speeches_2015['text'] = speeches_2015.text.apply(
    lambda x: x.translate(str.maketrans(
        string.punctuation, ' '*len(string.punctuation))))
speeches_2015['word_list'] = speeches_2015.text.apply(nltk.word_tokeni
ze)
```

In [10]:

```
d = Counter(speeches_2015.word_list.sum())
d.most_common(10)
```

Out[10]:

```
[('the', 30833),
 ('of', 17302),
 ('and', 15956),
 ('to', 13798),
 ('in', 8963),
 ('that', 6892),
 ('a', 6605),
 ('we', 5777),
 ('is', 4599),
 ('for', 4428)]
```

In [11]:

```
d.most_common()[-10:]
```

Out[11]:

```
[('225', 1),
 ('tougher', 1),
 ('hazard', 1),
 ('pillagers', 1),
 ('intrusion', 1),
 ('corrective', 1),
 ('remitting', 1),
 ('invoice', 1),
 ('payable', 1),
 ('limb', 1)]
```

```
In [12]: speeches_2015['word_list'] = speeches_2015.word_list.apply(
             lambda x: [y for y in x if y not in sw])

         d = Counter(speeches_2015.word_list.sum())
         d.most_common(25)
```

```
Out[12]: [('nations', 2594),
          ('united', 2572),
          ('development', 1755),
          ('international', 1727),
          ('world', 1640),
          ('security', 1395),
          ('’', 1356),
          ('peace', 1286),
          ('people', 1242),
          ('countries', 1086),
          ('must', 1033),
          ('also', 1005),
          ('states', 999),
          ('human', 957),
          ('country', 915),
          ('us', 900),
          ('70', 857),
          ('global', 830),
          ('rights', 789),
          ('new', 745),
          ('sustainable', 739),
          ('years', 700),
          ('one', 699),
          ('climate', 683),
          ('—', 683)]
```

```
In [13]: d.most_common()[-25:]
```

```
Out[13]: [('displeasing', 1),
          ('homosexual', 1),
          ('depart', 1),
          ('entertaining', 1),
          ('adult', 1),
          ('spouses', 1),
          ('clad', 1),
          ('inheritance', 1),
          ('myths', 1),
          ('falsehoods', 1),
          ('traction', 1),
          ('arresting', 1),
          ('incessant', 1),
          ('distracted', 1),
          ('exigency', 1),
          ('225', 1),
          ('tougher', 1),
          ('hazard', 1),
          ('pillagers', 1),
          ('intrusion', 1),
          ('corrective', 1),
          ('remitting', 1),
          ('invoice', 1),
          ('payable', 1),
          ('limb', 1)]
```

In [14]:

```
#Normalize 2015 Data

#2015
print(sum(d.values()) )
#list of tuples
x = d.most_common(20)

#list of lists
y = [list(ele) for ele in x]

#before
#print(y)

for elem in y:
    val = elem[1]
    elem[1] = (val / 217965) * 100

print(y)
```

```
217965
[['nations', 1.1900993278737413], ['united', 1.1800059642603171], ['
development', 0.8051751427981557], ['international', 0.7923290436537
977], ['world', 0.7524143784552566], ['security', 0.6400110109421238
], ['’', 0.6221182299910536], ['peace', 0.5900029821301586], ['peopl
e', 0.5698162549033101], ['countries', 0.4982451310990297], ['must',
0.47392930057578053], ['also', 0.46108320143142245], ['states', 0.45
83304659004886], ['human', 0.4390613171839515], ['country', 0.419792
1684674145], ['us', 0.41291032964007984], ['70', 0.39318239166838714
], ['global', 0.38079508177918475], ['rights', 0.3619847223178033],
['new', 0.341797995090955]]
```

In [15]:

```
#find 2015 words in 1970 to compare
wordsin1970 = []

#y is list of top words for normalized 2015 data
for elem in y:
    #y is a list of lists

    #143095 words in 1970 list w/o stop words

    #top words in 2015 w/o stopwords
    word = elem[0]

    #normalized occurrences in 1970 for top word in 2015

    freq = d[word]
    newFreq = (freq / 143095) * 100

    newElem = [word,newFreq]
    wordsin1970.append(newElem)

print(wordsin1970)
```

```
[['nations', 1.8127817184387995], ['united', 1.7974073168174989], ['
development', 1.2264579475173836], ['international', 1.2068905272720
92], ['world', 1.1460917572242217], ['security', 0.9748768300779204]
, ['’', 0.9476222090219785], ['peace', 0.8987036584087494], ['people
', 0.8679548551661485], ['countries', 0.758936370942381], ['must', 0
.7218980397637933], ['also', 0.7023306195185016], ['states', 0.69813
76008945106], ['human', 0.6687864705265733], ['country', 0.639435340
1586359], ['us', 0.6289527935986582], ['70', 0.598902826793389], ['g
lobal', 0.5800342429854293], ['rights', 0.5513819490548237], ['new',
0.5206331458122226]]
```

In [16]:

```
df1 = pd.DataFrame(y, columns = ['word', '2015'])  #2015 words
df2 = pd.DataFrame(wordsin1970, columns = ['word', '1970'])  #2015 wor
ds in 1970
```

In [17]:

```
#merge to dataframes above, where word is the unique identifier
df = df2.merge(df1[['word',"2015"]])
```

In [18]:

```
#save copy of old df
oldDF = df

#wide-form to long-form to graph with altair
df = df.melt(id_vars =['word'])
df = df.rename(columns={'variable': 'year'})
df
```

Out[18]:

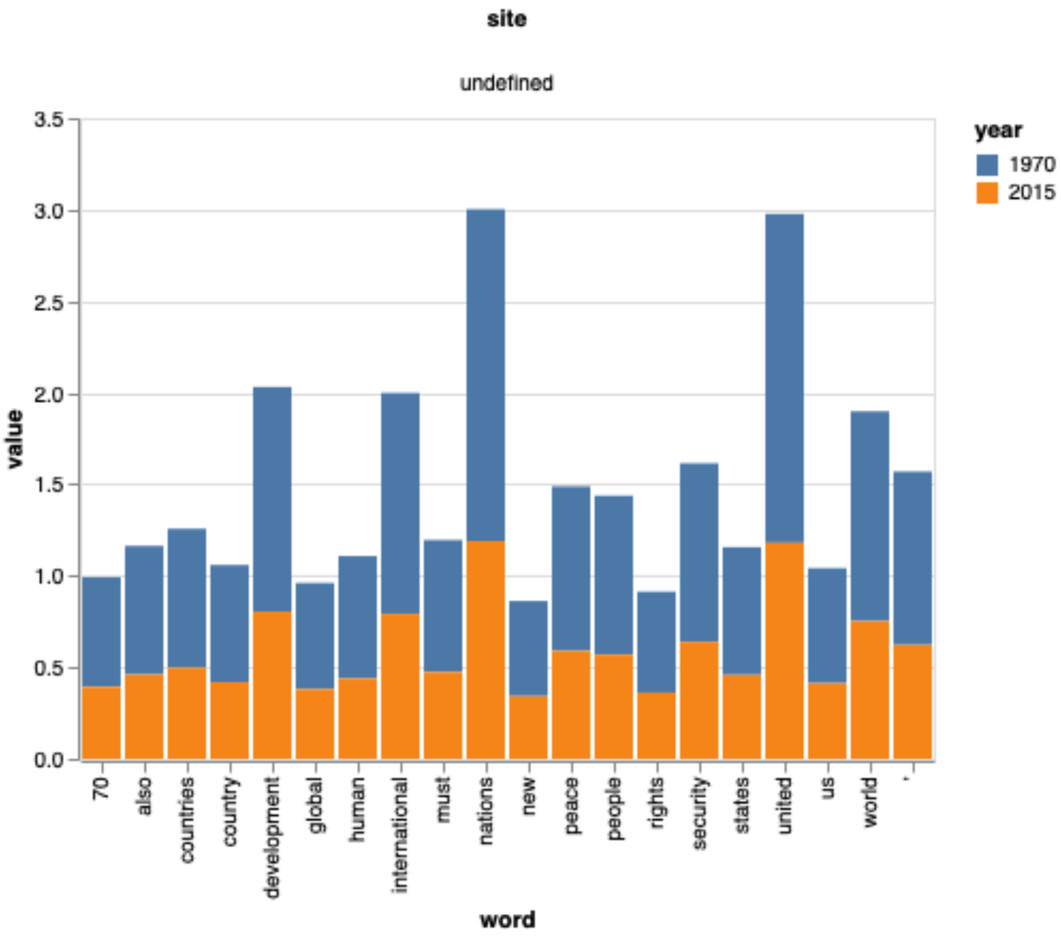
	word	year	value
0	nations	1970	1.812782
1	united	1970	1.797407
2	development	1970	1.226458
3	international	1970	1.206891
4	world	1970	1.146092
5	security	1970	0.974877
6	’	1970	0.947622
7	peace	1970	0.898704
8	people	1970	0.867955
9	countries	1970	0.758936
10	must	1970	0.721898
11	also	1970	0.702331
12	states	1970	0.698138
13	human	1970	0.668786
14	country	1970	0.639435
15	us	1970	0.628953
16	70	1970	0.598903
17	global	1970	0.580034
18	rights	1970	0.551382
19	new	1970	0.520633
20	nations	2015	1.190099
21	united	2015	1.180006
22	development	2015	0.805175
23	international	2015	0.792329
24	world	2015	0.752414
25	security	2015	0.640011
26	’	2015	0.622118
27	peace	2015	0.590003
28	people	2015	0.569816
29	countries	2015	0.498245

30	must	2015	0.473929
31	also	2015	0.461083
32	states	2015	0.458330
33	human	2015	0.439061
34	country	2015	0.419792
35	us	2015	0.412910
36	70	2015	0.393182
37	global	2015	0.380795
38	rights	2015	0.361985
39	new	2015	0.341798

In [19]:

```
#graph a grouped bar chart to compare top 2015 UN speech words also found in 1970

#those same words were, overall, used more frequently in 1970

source = df

alt.Chart(source).mark_bar().encode(
    x='word:O',
    y='value:Q',
    color='year:N',
    column='site:N'
)

#Frequency Histogram
```

Out[19]:



WordCloud visualizations for most common words in UN speeches in 1970 and 2015

In [20]:

```
wc2015 = d.most_common(20)
wc1970 = c.most_common(20)
```

In [21]:

```
wc2015_2 = []
wc1970_2 = []

for elem in wc2015:
    word = elem[0]
    wc2015_2.append(word)

for elem in wc1970:
    word = elem[0]
    wc1970_2.append(word)
```

```
In [22]: print(wc1970_2)
```

```
['nations', 'united', 'international', 'world', 'peace', 'countries'
, 'states', 'organization', 'would', 'people', 'development', 'secur
ity', 'general', 'peoples', 'assembly', 'charter', 'government', 'on
e', 'must', 'also']
```

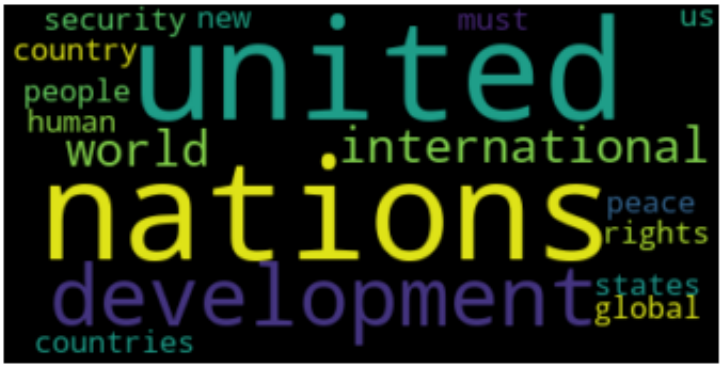
```
In [23]: print(wc2015_2)
```

```
['nations', 'united', 'development', 'international', 'world', 'secu
rity', '’', 'peace', 'people', 'countries', 'must', 'also', 'states'
, 'human', 'country', 'us', '70', 'global', 'rights', 'new']
```

```
In [24]: from wordcloud import WordCloud
```

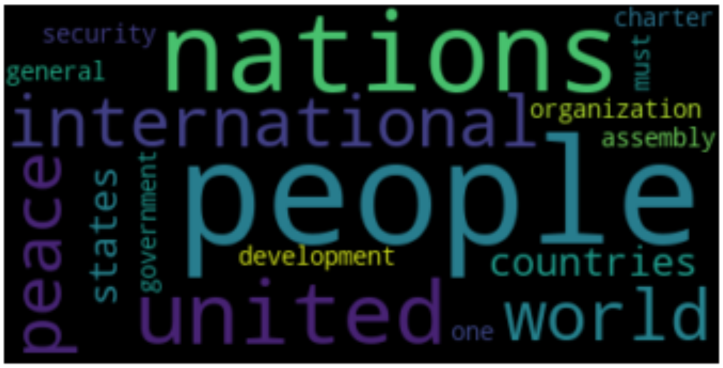
```
In [25]: #turn words into a string of text, the words are already in order of m
ost common to least (top 20 for each year)
text1970 = ' '.join(word for word in wc1970_2)
text2015 = ' '.join(word for word in wc2015_2)

wordcloud1970 = WordCloud().generate(text1970)
wordcloud2015 = WordCloud().generate(text2015)
```

```
In [26]: #2015 word cloud
plt.imshow(wordcloud2015, interpolation='bilinear')
plt.axis("off")
plt.show()
```



In [27]:

```
#1970 wordcloud
plt.imshow(wordcloud1970, interpolation='bilinear')
plt.axis("off")
plt.show()
```



In [28]:

```
#Countries that start with M

startsWithM = np.count_nonzero(undf.country.str.startswith('M'))
print(startsWithM)
```

```
663
```

In [29]:

```
uniqueM = undf.drop_duplicates("country")
```

In [30]:

```
#Unique countries that start with M

uniqueStartsWithM = np.count_nonzero(uniqueM.country.str.startswith('M'))
print(uniqueStartsWithM)
```

```
18
```

In [31]:

```
#lowercase text since 'global' is lower case
undf["text"] = undf.text.str.lower()

#add column checking if the speech text contains global
undf["Global"] = undf.text.str.contains("global")
print(undf.shape)
```

```
(7507, 5)
```

In [32]:

```
#remove false entries in global column
textWithGlobal = undf[undf.Global]
textWithGlobal.shape
```

Out[32]:

```
(5771, 5)
```

In [33]:

```
def getIndexPositionsOfWordsAfterGlobal(listOfElements, element):
    #Returns the indexes of all occurrences of given element in listOfElements

    indexPosList = []
    indexPos = 0
    while True:
        try:
            # Search for item in list from indexPos to the end of list
            indexPos = listOfElements.index(element, indexPos)
            # Add the index position in list
            indexPosList.append(indexPos)
            indexPos += 1
        except ValueError as e:
            break
    #add 1 to each index in list to find index of word after global
    indexPosList = [x+1 for x in indexPosList]
    return indexPosList

#apply function above
sub = "global"
textWithGlobal["LocationsAfterGlobal"] = textWithGlobal["text"].apply(lambda text: getIndexPositionsOfWordsAfterGlobal(text.split(),sub))
textWithGlobal.head()
```

```
<ipython-input-33-431593420ade>:21: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pand
as-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-co
py
  textWithGlobal["LocationsAfterGlobal"] = textWithGlobal["text"].ap
ply(lambda text: getIndexPositionsOfWordsAfterGlobal(text.split(),su
b))
```

Out[33]:

	session	year	country	text	Global	LocationsAfterGlobal
0	44	1989	MDV	it is indeed a pleasure for me and the member...	True	[357, 639, 967, 2112, 2233, 2328, 2466, 2919, ...
1	44	1989	FIN	\nmay i begin by congratulating you. sir, on ...	True	[401, 411, 474, 512, 614, 635, 1563, 2687, 2692]
3	44	1989	URY	\nduring the debate at the fortieth session o...	True	[71, 1588]
4	44	1989	ZWE	i should like at the outset to express my del...	True	[744, 1332]
5	44	1989	PHL	before you began to occupy that exalted seat,...	True	[33, 1001, 1500]

In [34]:

```python
def fn1(row):
    #creates a dict with k:v pairs of words and their frequency in the text
    tempDict = {}
    for index in row["LocationsAfterGlobal"]:
        word = row["lists"][index]
        if(word in tempDict.keys()):
            tempDict[word] = tempDict[word] + 1
        else:
            tempDict[word] = 1
    return tempDict


def helperfn(text):
    #returns a list of words from a string of text
    return text.split()


def keywithmaxval(d):
    #returns key in dict with highest value, in this case frequency
    try:
        k=list(d.keys())
        v=list(d.values())

        return k[v.index(max(v))]
    except:
        pass



#split text
textWithGlobal["lists"] = textWithGlobal['text'].apply(lambda txt: helperfn(txt))
#apply other two helpers
textWithGlobal['wordDict'] = textWithGlobal.apply(lambda row: fn1(row), axis=1)
textWithGlobal['topWordAfterGlobal'] = textWithGlobal['wordDict'].apply(lambda dictOfWords: keywithmaxval(dictOfWords))

textWithGlobal.head()
```

```
<ipython-input-34-747d9db57853>:31: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pand
as-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-co
py
  textWithGlobal["lists"] = textWithGlobal['text'].apply(lambda txt:
helperfn(txt))
<ipython-input-34-747d9db57853>:33: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pand
as-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-co
py
  textWithGlobal['wordDict'] = textWithGlobal.apply(lambda row: fn1(
row), axis=1)
<ipython-input-34-747d9db57853>:34: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pand
as-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-co
py
  textWithGlobal['topWordAfterGlobal'] = textWithGlobal['wordDict'].
apply(lambda dictOfWords: keywithmaxval(dictOfWords))
```

Out[34]:

	session	year	country	text	Global	LocationsAfterGlobal	lists	w
0	44	1989	MDV	it is indeed a pleasure for me and the member...	True	[357, 639, 967, 2112, 2233, 2328, 2466, 2919, ...	[it, is, indeed, a, pleasure, for, me, and, t...	{'poli 'progran 'peace
1	44	1989	FIN	\nmay i begin by congratulating you. sir, on ...	True	[401, 411, 474, 512, 614, 635, 1563, 2687, 2692]	[, may, i, begin, by, congratulating, you., s...	{'challen 'level': 1
3	44	1989	URY	\nduring the debate at the fortieth session o...	True	[71, 1588]	[, during, the, debate, at, the, fortieth, se...	{'st 'solida
4	44	1989	ZWE	i should like at the outset to express my del...	True	[744, 1332]	[i, should, like, at, the, outset, to, expres...	{' 'warm
5	44	1989	PHL	before you began to occupy that exalted seat,...	True	[33, 1001, 1500]	[before, you, began, to, occupy, that, exalte...	{'counter 1, 'att 'underp

In [35]:

```
#Most frequent word

#top and freq, does not consider columns where 'economic' is tied with
another for most occurrences.

textWithGlobal['topWordAfterGlobal'].describe()
```

Out[35]:

```
count          5509
unique         1078
top        economic
freq            285
Name: topWordAfterGlobal, dtype: object
```

In [36]:

```
#clean-up text data
undf['text'] = undf.text.str.replace('\ufeff','') # remove strange character
undf['text'] = undf.text.str.strip() # eliminate whitespace from beginning and end

undf.head()
```

Out[36]:

	session	year	country	text	Global
0	44	1989	MDV	it is indeed a pleasure for me and the members...	True
1	44	1989	FIN	may i begin by congratulating you. sir, on you...	True
2	44	1989	NER	mr. president, it is a particular pleasure for...	False
3	44	1989	URY	during the debate at the fortieth session of t...	True
4	44	1989	ZWE	i should like at the outset to express my dele...	True

In [37]:

```
#What is the average word count per speech?

def helperfn2(text):
    return len(text.split())

#column with length (# of words) in speed text
undf["wordCount"] = undf['text'].apply(lambda txt: helperfn2(txt))

print(undf.wordCount.mean())
```

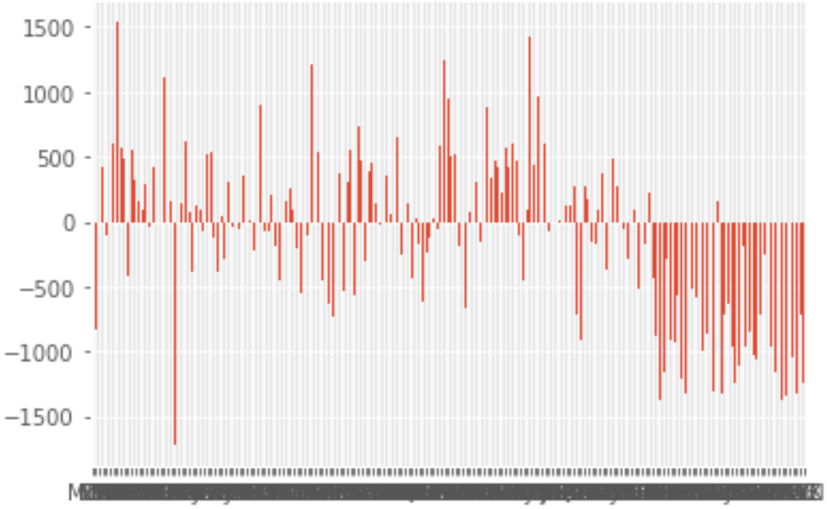
```
2865.413747169309
```

In [38]:

```
#How does that average word count compare across all of the countries' speeches?

listOfUniqueCountries = undf.country.unique()

dictOfUniqueCountryWC = {}

def findAverageWC(tempDict):
#this function returns a dictionary where keys are unique countries
#and values are their average word count

    for uniqueCountry in listOfUniqueCountries:

        #focus on each unique country's data
        tempDF = undf[undf.country == uniqueCountry]

        #word count already in undf
        avgWC = tempDF.wordCount.mean()

        #create entry in dictionary
        dictOfUniqueCountryWC[uniqueCountry] = avgWC

#average ~2865 was found in cell above
def compareToAverage(aNum):
    return (aNum - 2865.4698281603837)

findAverageWC(dictOfUniqueCountryWC)
wordCountData = pd.DataFrame.from_dict(dictOfUniqueCountryWC, orient='index', columns=["AverageWordCount"])

#Average word count is 2865.4698281603837
wordCountData["CompareToAverage"] = wordCountData['AverageWordCount'].apply(lambda avgWC: compareToAverage(avgWC))
plotData = wordCountData["CompareToAverage"]

ax = plotData.plot.bar(x='Country', y='Distance From Average', rot=0)
plotData.head()
```

Out[38]:

```
MDV    -618.726238
FIN    -832.292050
NER     -23.447101
URY     416.160607
ZWE    -105.184114
Name: CompareToAverage, dtype: float64
```



In [39]:

```
plotData.head
```

Out[39]:

```
<bound method NDFrame.head of MDV    -618.726238
FIN     -832.292050
NER      -23.447101
URY      416.160607
ZWE     -105.184114
            ...
VAT     -601.315982
MCO    -1047.904611
CHE    -1321.826971
KAZ     -710.636495
SVN    -1240.969828
Name: CompareToAverage, Length: 199, dtype: float64>
```

In [40]:

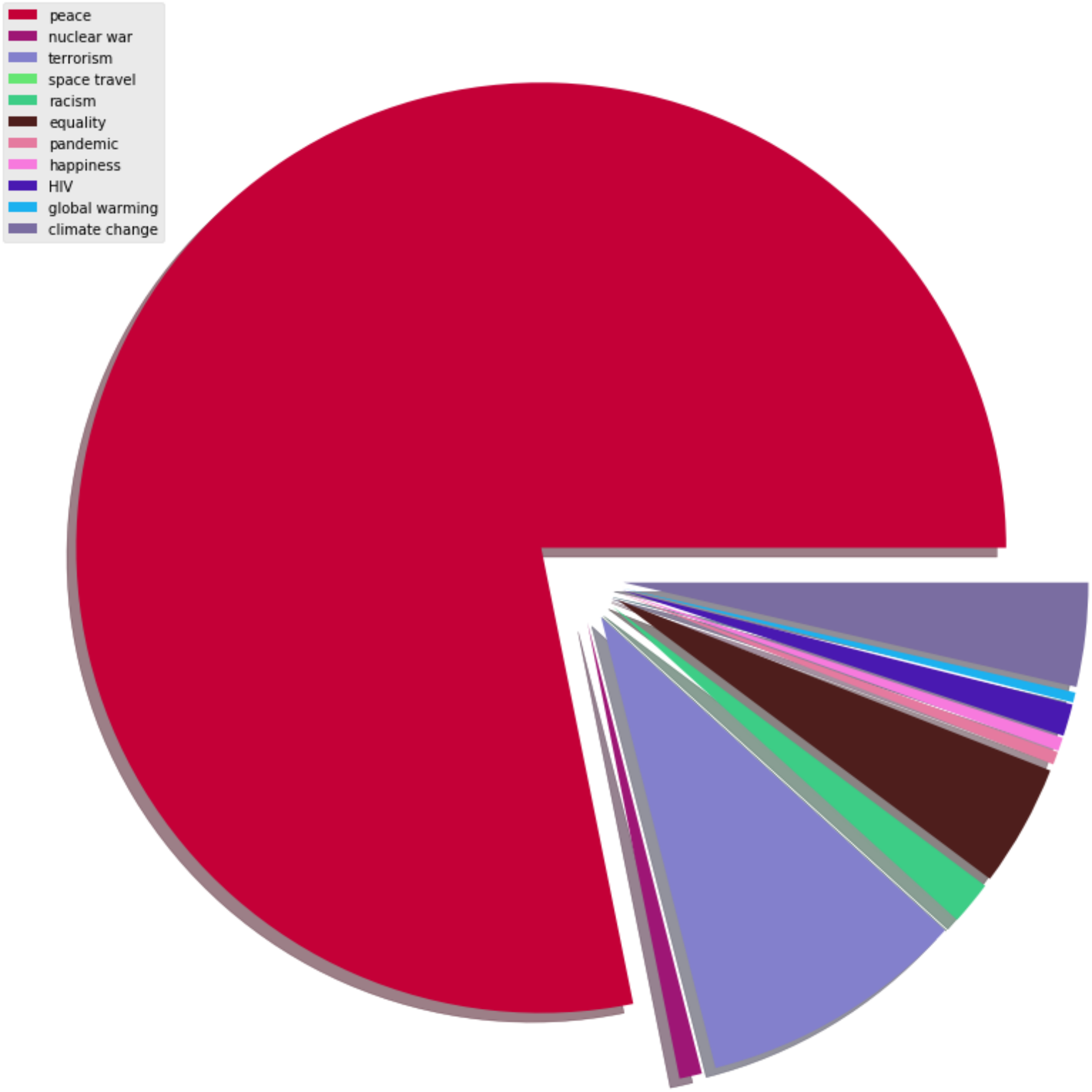
```
#A list of topics that the UN might discuss and debate.

#creates a copy of original df
undf1 = undf.copy()


listOfTopics = ["peace", "nuclear war", "terrorism", "space travel","racism","equality","pandemic","happiness", "HIV", "global warming","climate change"]

undf1["peace"] = undf1.text.str.count("peace")
undf1["nuclear"] = undf1.text.str.count("nuclear war")
undf1["terrorism"] = undf1.text.str.count("terrorism")
undf1["space"] = undf1.text.str.count("space travel")
#undf1["space"] = undf1.text.str.count("space travel"|"moon landing")
undf1["racism"] = undf1.text.str.count("racism")
undf1["equality"] = undf1.text.str.count("equality")
undf1["pandemic"] = undf1.text.str.count("pandemic")
undf1["happiness"] = undf1.text.str.count("happiness")
undf1["HIV"] = undf1.text.str.count("hiv")
undf1["warming"] = undf1.text.str.count("global warming")
undf1["climate"] = undf1.text.str.count("climate change")

undf1.head()
```

Out[40]:

	session	year	country	text	Global	wordCount	peace	nuclear	terrorism	space
0	44	1989	MDV	it is indeed a pleasure for me and the members...	True	3011	15	0	3	(
1	44	1989	FIN	may i begin by congratulating you. sir, on you...	True	2726	15	0	0	(
2	44	1989	NER	mr. president, it is a particular pleasure for...	False	4859	27	0	3	(
3	44	1989	URY	during the debate at the fortieth session of t...	True	2710	16	0	2	(
4	44	1989	ZWE	i should like at the outset to express my dele...	True	4551	21	0	0	(

In [41]:

```
#Graph to show how often these topics were mentioned.

sumofpeace = undf1.peace.sum()
sumofnuclearwar = undf1.nuclear.sum()
sumofterrorism = undf1.terrorism.sum()
sumofspacetravel = undf1.space.sum()
sumofracism = undf1.racism.sum().sum()
sumofequality = undf1.equality.sum()
sumofpandemic = undf1.pandemic.sum()
sumofhappiness = undf1.happiness.sum()
sumofhiv = undf1.HIV.sum()
sumofwarming = undf1.warming.sum()
sumofcchange = undf1.climate.sum()

explode = (0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1)
listofFreqs = [sumofpeace,sumofnuclearwar,sumofterrorism,sumofspacetra
vel,sumofracism,sumofequality,sumofpandemic,sumofhappiness,sumofhiv,su
mofwarming,sumofcchange]

# using zip() to convert 2 lists to a dictionary
topicDataOverall = dict(zip(listOfTopics, listofFreqs))

colors=["#c40037","#9e1675","#8380cc","#65e673","#3dcd86","#4e1e1c","#
e57a9f","#f77add","#4919b1","#1cb1ef","#7a6da1"]

fig, ax = plt.subplots(figsize=(15, 15), subplot_kw=dict(aspect="equal
") )
plt.pie([val for val in topicDataOverall.values()],shadow=True,explode
=explode,labels=[keys for keys in topicDataOverall.keys()],labeldistan
ce=None,colors=colors)
plt.legend(labels=topicDataOverall, loc="upper left")
plt.show()

topicDataOverall
```



```
Out[41]: {'peace': 98830,
          'nuclear war': 992,
          'terrorism': 11749,
          'space travel': 3,
          'racism': 1914,
          'equality': 5378,
          'pandemic': 565,
          'happiness': 591,
          'HIV': 1406,
          'global warming': 440,
          'climate change': 4556}
```

In [42]:

```
listOfUniqueYears = undf1.year.unique()

listOfUniqueYears
```

Out[42]:

```
array([1989, 1970, 2013, 1985, 2008, 1991, 1986, 2002, 1975, 1996, 2
012,
       1997, 1978, 1988, 2010, 1984, 1995, 2009, 1971, 1976, 1983, 1
979,
       1999, 2005, 1987, 1982, 1998, 2003, 2004, 1980, 2014, 2011, 1
974,
       2015, 1993, 1977, 1981, 2000, 1992, 1990, 1973, 1994, 1972, 2
006,
       2007, 2001])
```

In [43]:

```
#8.4.1 6)

#a. Make a graph to show the frequency with which various topics are d
iscussed over the years.

#The following uses the same topics as above

def countTopicinYears(tempDict):
    for uniqueYear in listOfUniqueYears:
        tempDict = {}

        #focus on each unique year as a df
        tempDF = undf1[undf1.year == uniqueYear]

        tempDict["peace"] = tempDF.peace.sum()
        tempDict["nuclear"] = tempDF.nuclear.sum()
        tempDict["terrorism"] = tempDF.terrorism.sum()
        tempDict["space"] = tempDF.space.sum()
        tempDict["racism"] = tempDF.racism.sum()
        tempDict["equality"] = tempDF.equality.sum()
        tempDict["pandemic"] = tempDF.pandemic.sum()
        tempDict["happiness"] = tempDF.happiness.sum()
        tempDict["HIV"] = tempDF.HIV.sum()
        tempDict["warming"] = tempDF.warming.sum()
        tempDict["climate"] = tempDF.climate.sum()

        dict_of_year_data[uniqueYear] = tempDict
```

In [44]:

```
dict_of_year_data = {}
countTopicinYears(dict_of_year_data)
```

In [45]:

```
yearTopicData = pd.DataFrame.from_dict(dict_of_year_data, orient='index', columns=['peace','nuclear','terrorism','space','racism','equality','pandemic','happiness','HIV','warming','climate'])

#sort by year, where year is index
yearTopicData = yearTopicData.sort_index()
yearTopicData.head()
```

Out[45]:

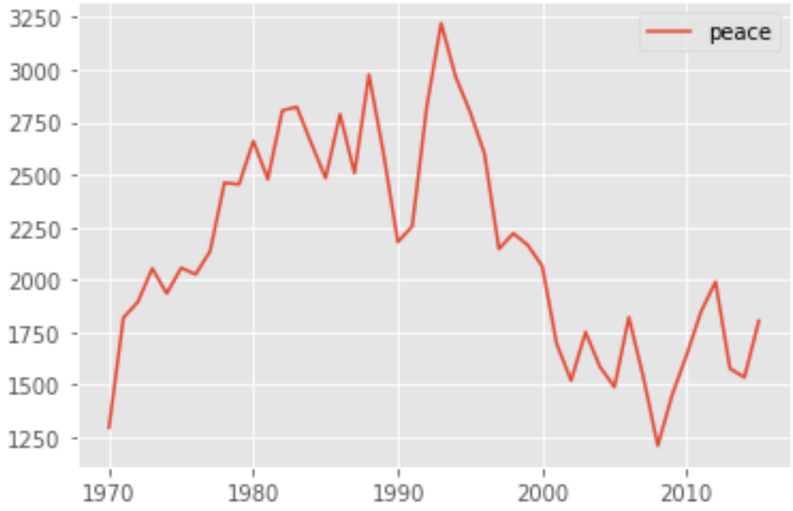
	peace	nuclear	terrorism	space	racism	equality	pandemic	happiness	HIV	warming
1970	1297	6	7	0	24	65	0	8	2	0
1971	1820	21	9	0	53	101	0	27	1	0
1972	1895	21	382	0	82	107	0	22	3	0
1973	2054	53	125	0	89	110	0	18	4	0
1974	1935	21	24	0	67	143	0	15	4	0

In [46]:

```
#line graphs showing changes in total word frequencies within all speeches accross the years

yearTopicData['peace'].plot(x="Year", y=["Count"], kind="line",legend=True)
```

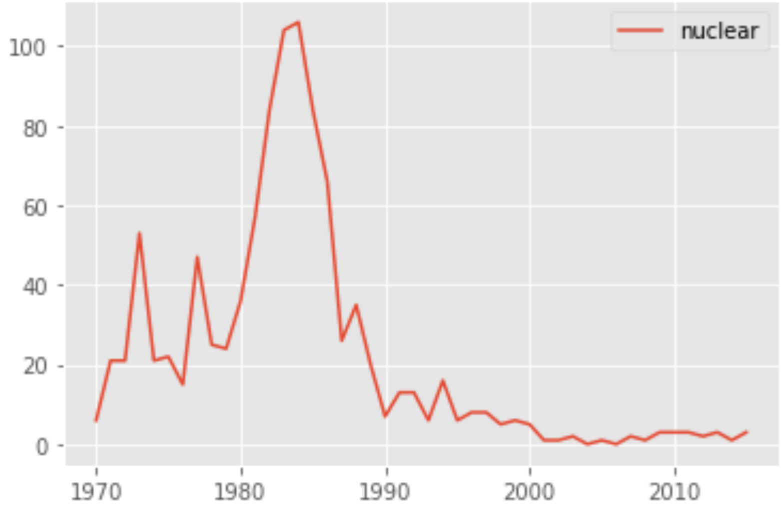
Out[46]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x176f35a30>
```



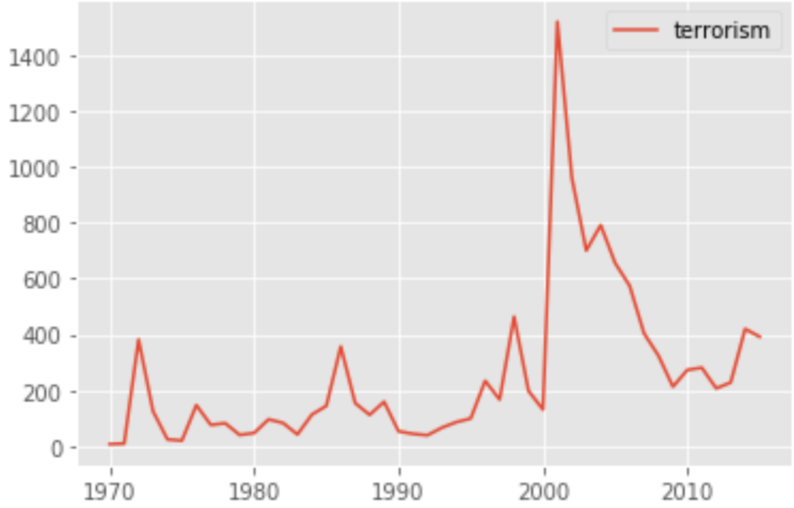
In [47]:
```
yearTopicData['nuclear'].plot(x="Year", y=["Count"], kind="line",legend=True)
```

Out[47]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x12cb7f340>
```



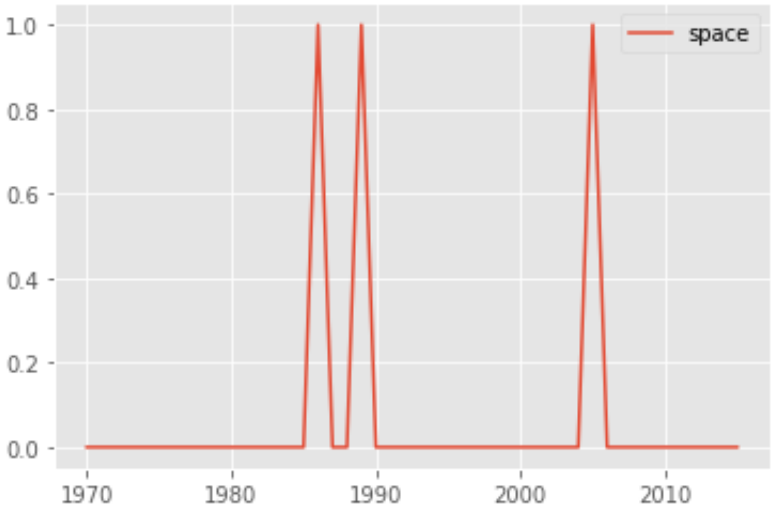
In [48]:
```
yearTopicData['terrorism'].plot(x="Year", y=["Count"], kind="line",legend=True)
```

Out[48]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x17707cb80>
```



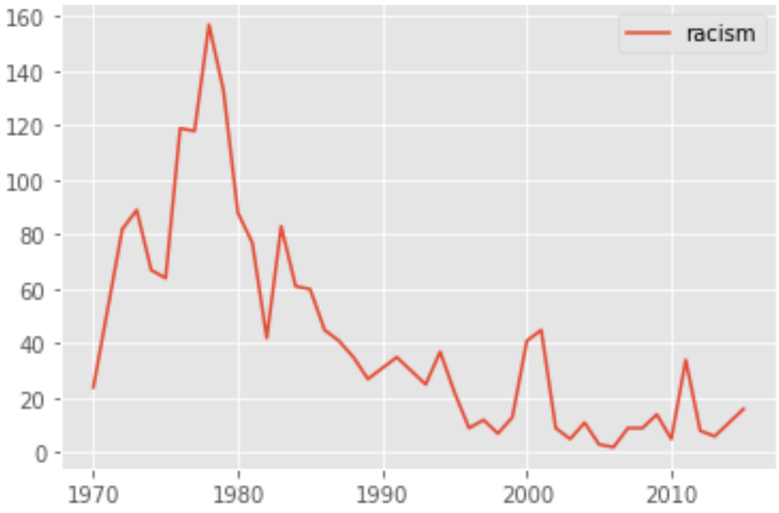
```
In [49]: yearTopicData['space'].plot(x="Year", y=["Count"], kind="line",legend=True)
```

```
Out[49]: <matplotlib.axes._subplots.AxesSubplot at 0x1770863a0>
```

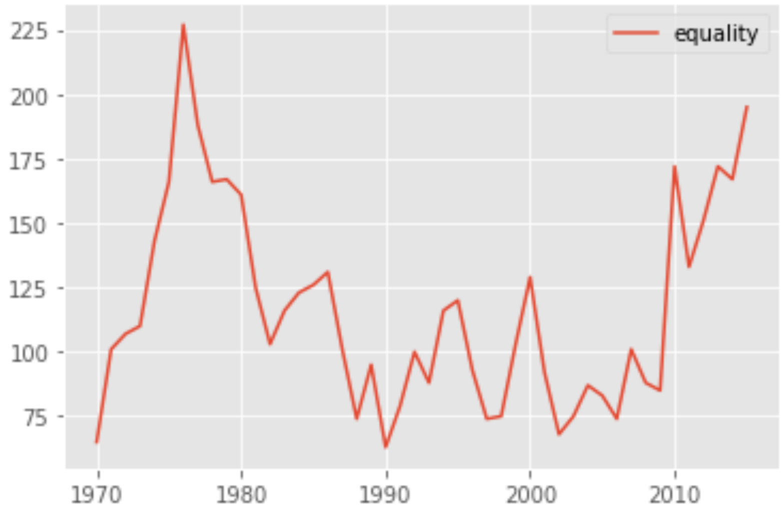


```
In [50]: yearTopicData['racism'].plot(x="Year", y=["Count"], kind="line",legend=True)
```

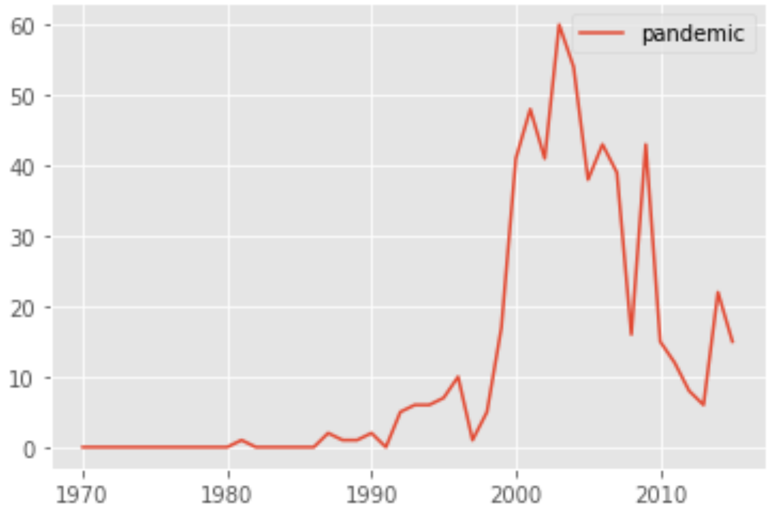
```
Out[50]: <matplotlib.axes._subplots.AxesSubplot at 0x177421550>
```



```
In [51]: yearTopicData['equality'].plot(x="Year", y=["Count"], kind="line",lege
         nd=True)

Out[51]: <matplotlib.axes._subplots.AxesSubplot at 0x1775364c0>
```

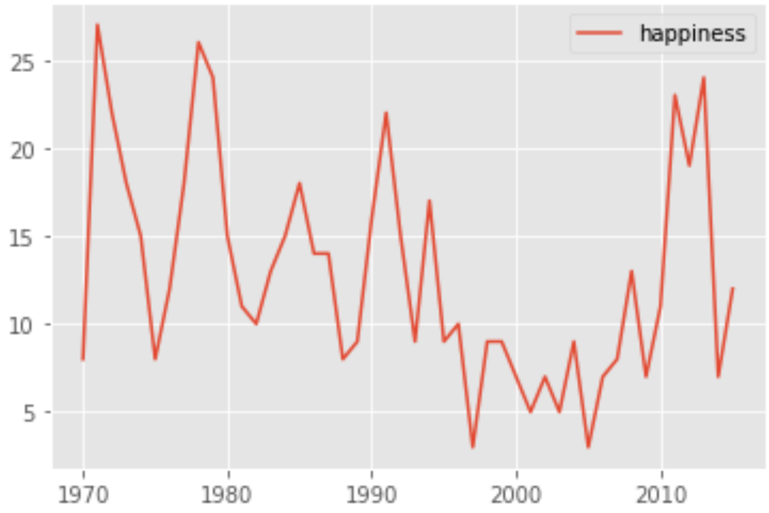


```
In [52]: yearTopicData['pandemic'].plot(x="Year", y=["Count"], kind="line",lege
         nd=True)

Out[52]: <matplotlib.axes._subplots.AxesSubplot at 0x1776c5b50>
```



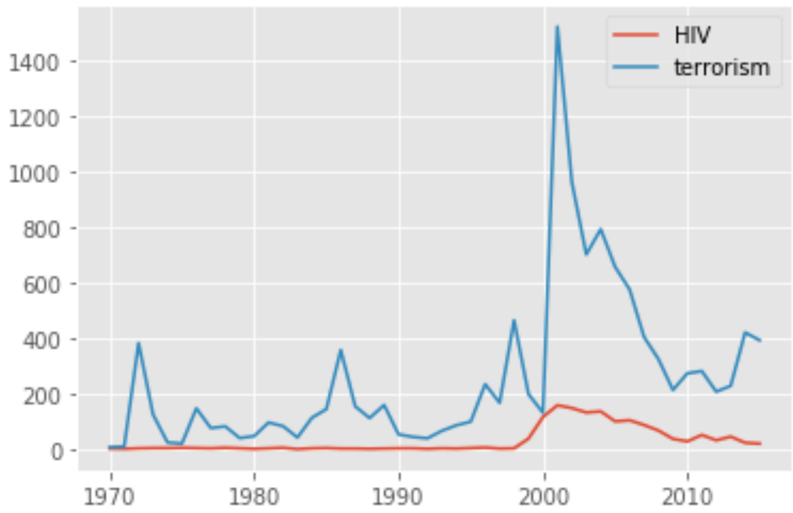
```
In [53]: yearTopicData['happiness'].plot(x="Year", y=["Count"], kind="line",legend=True)
```

```
Out[53]: <matplotlib.axes._subplots.AxesSubplot at 0x1776bf640>
```



```
In [54]: #What about ‘HIV’ or ‘terrorism’ or ‘global warming’.
         yearTopicData['HIV'].plot(x="Year", y=["Count"], kind="line",legend=True)
         yearTopicData['terrorism'].plot(x="Year", y=["Count"], kind="line",legend=True)
```

```
Out[54]: <matplotlib.axes._subplots.AxesSubplot at 0x17782cc40>
```

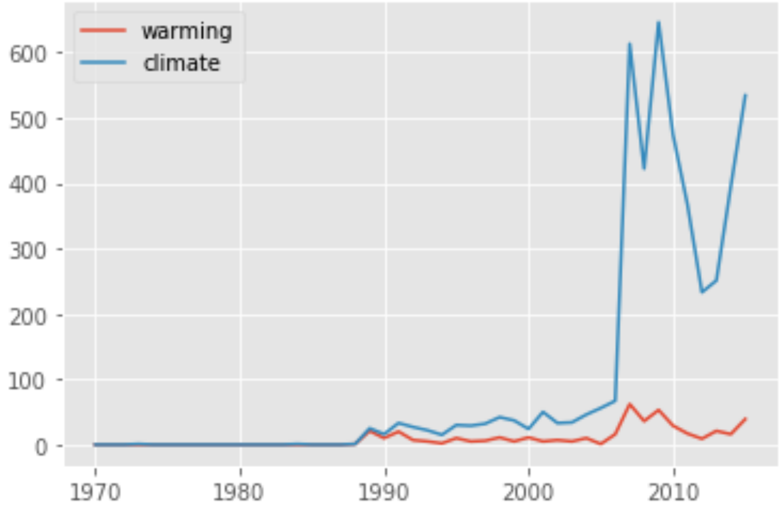


In [55]:

```
#Comparing two phrases like ‘global warming’ and ‘climate change’.
yearTopicData['warming'].plot(x="Year", y=["Count"], kind="line",legend=True)
yearTopicData['climate'].plot(x="Year", y=["Count"], kind="line",legend=True)
```

Out[55]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x1778f15e0>
```



In [56]:

```
from nltk import tokenize
from nltk.sentiment.vader import SentimentIntensityAnalyzer
analyzer = SentimentIntensityAnalyzer()

def score_text(text):
    sentence_list = tokenize.sent_tokenize(text)
    cscore = 0.0
    for sent in sentence_list:
        ss = analyzer.polarity_scores(sent)['compound']
        cscore += ss
    return cscore / len(sentence_list)
```

In [57]:

```
score_text("This movie is horrible")
```

Out[57]:

```
-0.5423
```

In [58]:

```
score_text("I love cute puppies")
```

Out[58]:

```
0.802
```

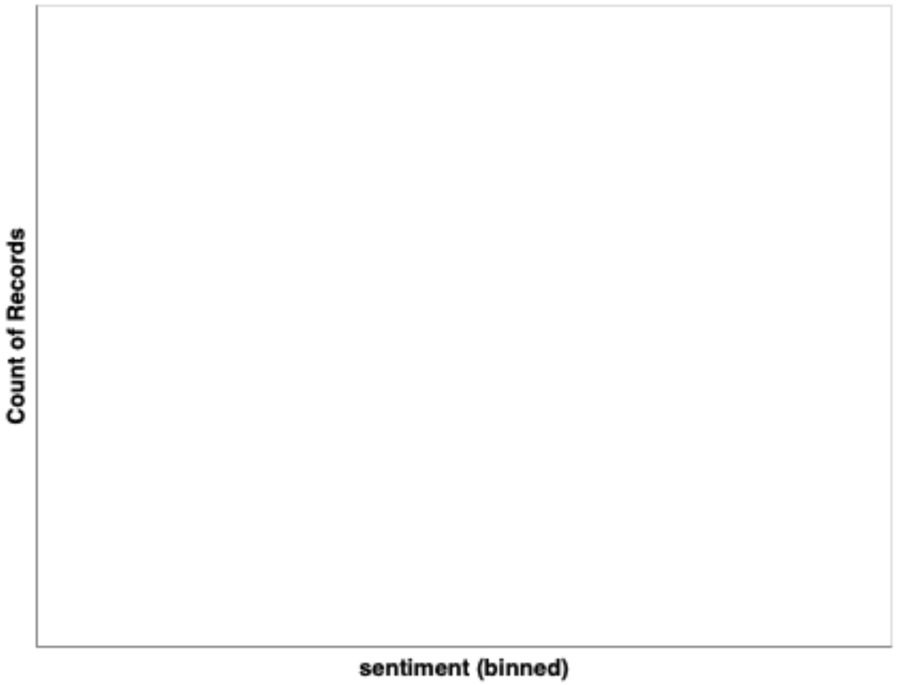
In [59]:

```
undf['sentiment'] = undf.text.map(lambda t : score_text(t))
```

In [60]:

```
alt.data_transformers.enable('json')
alt.Chart(undf).mark_bar().encode(x=X('sentiment', bin=True), y='count()')
```

Out[60]:



In [61]:

```
#Which countries are the most positive or negative in their speeches throughout the years?

#group by country
uniqueCountries = undf.groupby(['country'])

#find average sentiment of text for each country
avgSentiment = uniqueCountries['sentiment'].mean()

#max and min of the series defined above
avgSentiment.describe()
```

Out[61]:

```
count    199.000000
mean       0.242241
std        0.058146
min        0.066121
25%        0.211212
50%        0.237993
75%        0.279126
max        0.491167
Name: sentiment, dtype: float64
```

In [62]:

```
#find country code for max and min
countryWithMaxSentiment = avgSentiment.idxmax()
countryWithMinSentiment = avgSentiment.idxmin()
```

In [63]:

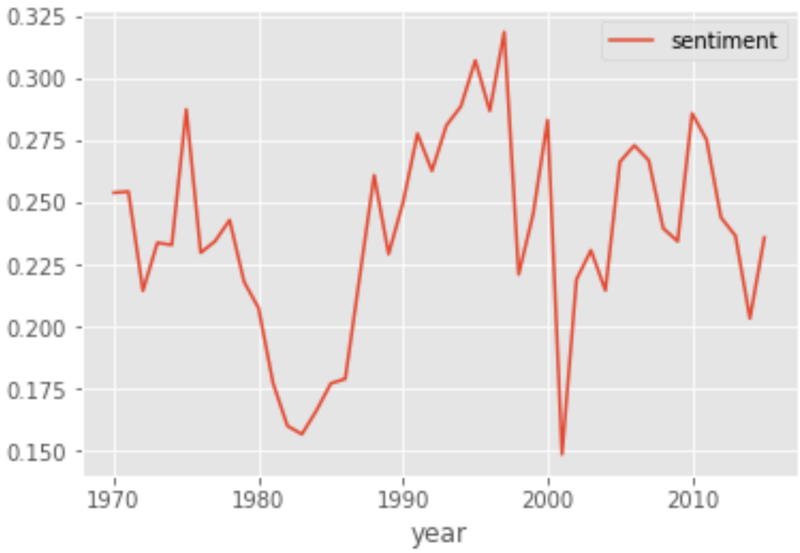
```
#check values match describe function above
print("Country with the max avg sentiment throughout the years is %s
with an avg ss of %f"%(countryWithMaxSentiment,avgSentiment[countryWit
hMaxSentiment]))
print("Country with the min avg sentiment throughout the years is %s
with an avg ss of %f"%(countryWithMinSentiment,avgSentiment[countryWit
hMinSentiment]))
```

```
Country with the max avg sentiment throughout the years is MNE with
an avg ss of 0.491167
Country with the min avg sentiment throughout the years is CUB with
an avg ss of 0.066121
```

In [64]:

```
#Are there trends in positivity or negativity of speeches throughout t
he years?

#similar procedure as the previous question, except focusing on year r
ather than country

#group by year
uniqueYear = undf.groupby(['year'])

#find average sentiment of text for each year
avgSentimentbyYear = uniqueYear['sentiment'].mean()

#max and min of the series defined above

avgSentimentbyYear.plot(x="Year", y=["Average Sentiment"], kind="line"
,legend=True)
```

```
Out[64]: <matplotlib.axes._subplots.AxesSubplot at 0x1780fb820>
```



```
In [65]: avgSentimentbyYear.describe()
```

```
Out[65]: count    46.000000
         mean      0.237759
         std       0.040571
         min       0.148770
         25%       0.218406
         50%       0.236318
         75%       0.266871
         max       0.318664
         Name: sentiment, dtype: float64
```

The average sentiment scores accross every decade is positive. However, from the graph above it is evident that the speeches started to have a slightly less positive sentiment from the 70's through 80's. Also, from the early 80's through late 90's, the sentiment of speeches show an increase in overall sentiment score. From 2000 onwards, there speeches have, overall, a less positive sentiment score than the previous decade.

end.