In [1]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.cluster import MiniBatchKMeans
from sklearn.feature_extraction.text import TfidfVectorizer
```

In [2]:

```
data = pd.read_json('C:/Users/Hp/Downloads/combined.json/combined.json', lines=True)
data.head()
```

Out[2]:

	components	contents	date	id	title	topics
0	[National Security Division (NSD)]	PORTLAND, Oregon. – Mohamed Osman Mohamud, 23,...	2014-10-01T00:00:00-04:00	None	Convicted Bomb Plotter Sentenced to 30 Years	[]
1	[Environment and Natural Resources Division]	WASHINGTON – North Carolina’s Waccamaw River...	2012-07-25T00:00:00-04:00	12-919	$1 Million in Restitution Payments Announced t...	[]
2	[Environment and Natural Resources Division]	BOSTON– A $1-million settlement has been...	2011-08-03T00:00:00-04:00	11-1002	$1 Million Settlement Reached for Natural Reso...	[]
3	[Environment and Natural Resources Division]	WASHINGTON—A federal grand jury in Las Vegas...	2010-01-08T00:00:00-05:00	10-015	10 Las Vegas Men Indicted \r\nfor Falsifying V...	[]
4	[Environment and Natural Resources Division]	The U.S. Department of Justice, the U.S. Envir...	2018-07-09T00:00:00-04:00	18-898	$100 Million Settlement Will Speed Cleanup Wor...	[Environment]

In [4]:

```
tfidf = TfidfVectorizer(
    min_df = 5,
    max_df = 0.95,
    max_features = 8000,
    stop_words = 'english'
)
tfidf.fit(data.contents)
text = tfidf.transform(data.contents)
```

In [5]:

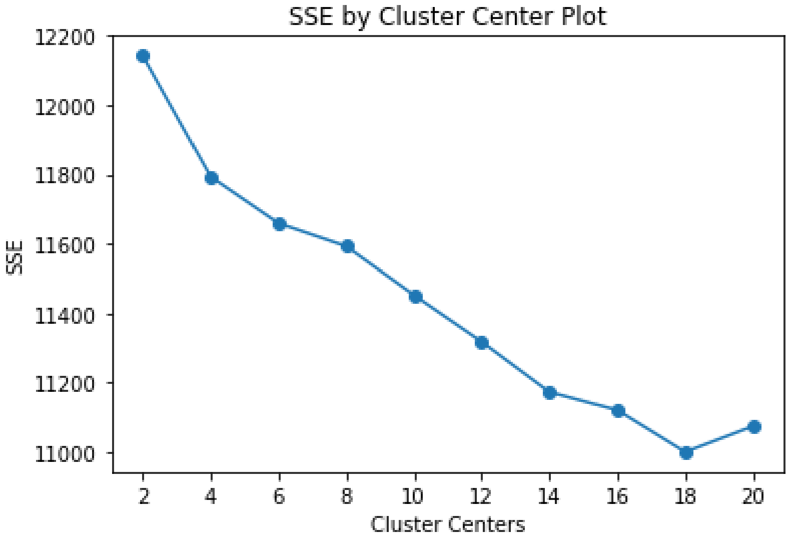
```
def find_optimal_clusters(data, max_k):
    iters = range(2, max_k+1, 2)

    sse = []
    for k in iters:
        sse.append(MiniBatchKMeans(n_clusters=k, init_size=1024, batch_size=2048, rando
m_state=20).fit(data).inertia_)
        print('Fit {} clusters'.format(k))

    f, ax = plt.subplots(1, 1)
    ax.plot(iters, sse, marker='o')
    ax.set_xlabel('Cluster Centers')
    ax.set_xticks(iters)
    ax.set_xticklabels(iters)
    ax.set_ylabel('SSE')
    ax.set_title('SSE by Cluster Center Plot')

find_optimal_clusters(text, 20)
```

```
Fit 2 clusters
Fit 4 clusters
Fit 6 clusters
Fit 8 clusters
Fit 10 clusters
Fit 12 clusters
Fit 14 clusters
Fit 16 clusters
Fit 18 clusters
Fit 20 clusters
```



In [6]:

```
clusters = MiniBatchKMeans(n_clusters=14, init_size=1024, batch_size=2048, random_state
=20).fit_predict(text)
```

In [7]:

```
def get_top_keywords(data, clusters, labels, n_terms):
    df = pd.DataFrame(data.todense()).groupby(clusters).mean()

    for i,r in df.iterrows():
        print('\nCluster {}'.format(i))
        print(','.join([labels[t] for t in np.argsort(r)[-n_terms:]]))

get_top_keywords(text, clusters, tfidf.get_feature_names(), 10)
```

```
Cluster 0
sexually,ceos,safe,children,project,exploitation,minor,sexual,childhood,ch
ild

Cluster 1
division,justice,united,office,indictment,fraud,department,district,crimin
al,attorney

Cluster 2
division,accounts,bank,taxes,attorney,false,returns,income,irs,tax

Cluster 3
hotline,provision,status,800,citizenship,immigration,ina,employment,discri
mination,osc

Cluster 4
allegations,act,services,government,medicare,false,settlement,care,claims,
health

Cluster 5
department,civil,lawsuit,rights,act,disabilities,hud,discrimination,fair,h
ousing

Cluster 6
beneficiaries,home,strike,oig,services,care,hhs,fraud,health,medicare

Cluster 7
prices,division,rigging,department,bid,competition,auctions,fraud,financia
l,antitrust

Cluster 8
county,police,ms,texas,abt,aka,racketeering,murder,members,gang

Cluster 9
act,epa,agreement,civil,settlement,department,voting,disabilities,rights,a
da

Cluster 10
sexual,children,safe,ceos,images,project,childhood,exploitation,pornograph
y,child

Cluster 11
terrorism,al,attorney,law,national,tribal,isil,support,violence,terrorist

Cluster 12
division,department,fbi,indictment,police,officers,attorney,victim,civil,r
ights

Cluster 13
preparing,prepared,return,irs,income,injunction,complaint,customers,return
s,tax
```

In [9]:

```
tfidf.get_feature_names()
```

Out[9]:

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