In [1]:

```
%matplotlib inline

import sys
import os
import sklearn
import numpy as np
import scipy as sp
import scipy.sparse as spa
import matplotlib.pyplot as plt
from time import time
from sklearn.datasets import fetch_20newsgroups
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.metrics import confusion_matrix
from sklearn.metrics import classification_report
from sklearn.naive_bayes import MultinomialNB
from sklearn.cluster import KMeans
```

In [2]:

```
# Load the training set
print("Loading 20 newsgroups training set... ")
dataset = fetch_20newsgroups(subset='all',shuffle=True, random_state=4)
#Classifying dataset into training set
t0=time()
newsgroups_train = fetch_20newsgroups(subset='train')
#print(newsgroups_train.DESCR)
print("%d documents" % len(newsgroups_train.filenames))
#filenames = newsgroups_train.filenames
print("%d categories" % len(newsgroups_train.target_names))
print("done in %fs" % (time() - t0))
```

```
Loading 20 newsgroups training set...
11314 documents
20 categories
done in 0.285633s
```

In [3]:

```
print("Loading 20 newsgroups test set... ")
#Classifying daatset into test set
newsgroups_test = fetch_20newsgroups(subset='test')
t0 = time()
print("done in %fs" % (time() - t0))
print("Predicting the labels of the test set...")
print("%d documents" % len(newsgroups_test.filenames))
print("%d categories" % len(newsgroups_test.target_names))
```

```
Loading 20 newsgroups test set...
done in 0.000000s
Predicting the labels of the test set...
7532 documents
20 categories
```

In [4]:

```
# Feature Extraction
#We now vectorize the dataset using SKLearn vectorizers.
#This is the stage of feature extraction. We use the TF-IDF feature model.
t0=time()
vectorizer = TfidfVectorizer(encoding='latin1')
X_train = vectorizer.fit_transform(newsgroups_train.filenames)
print("done in %fs" % (time() - t0))
print("n_samples: %d, n_features: %d" % X_train.shape)
assert spa.issparse(X_train)
y_train = newsgroups_train.target

```

```
done in 0.221436s
n_samples: 11314, n_features: 9879
```

In [6]:

```
print("Extracting features from the dataset using the same vectorizer")
t0 = time()
X_test = vectorizer.transform( newsgroups_test.filenames)
y_test = newsgroups_test.target
print("done in %fs" % (time() - t0))
print("n_samples: %d, n_features: %d" % X_test.shape)
```

```
Extracting features from the dataset using the same vectorizer
done in 0.157541s
n_samples: 7532, n_features: 9879
```

In [5]:

```
#Benchmarking aims at evaluating something by comparison with a standard.
#Benchmarking the code means how fast the code is executing and where the bottleneck i
s.
#One major reason for benchmarking is that it optimizes the code.

#A confusion matrix is a tabular summary of the number of correct and incorrect predict
ions made by a classifier.
#It can be used to evaluate the performance of a classification model through the calcu
lation of performance metrics like accuracy, precision, recall, and F1-score.
```

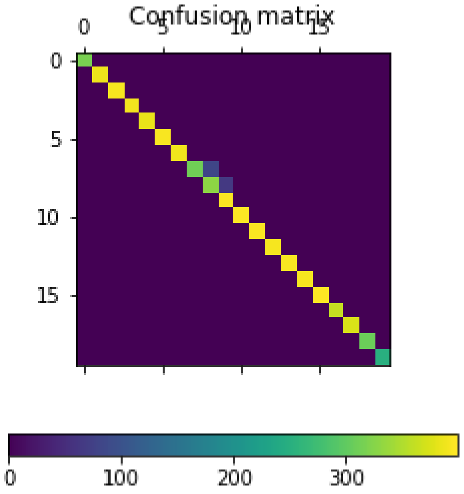
In [6]:

```
#benchmark  Multinomialclassifiers


def benchmark(clf_class, params, name):
    print("parameters:", params)
    t0 = time()
    clf = clf_class(**params).fit(X_train, y_train)
    print("done in %fs" % (time() - t0))

    if hasattr(clf, 'coef_'):
        print("Percentage of non zeros coef: %f" % (np.mean(clf.coef_ != 0) * 100))
    print("Predicting the outcomes of the testing set")
    t0 = time()
    pred = clf.predict(X_test)
    print("done in %fs" % (time() - t0))

    print("Classification report on test set for classifier:")
    print(clf)
    print()
    print(classification_report(y_test, pred, target_names=newsgroups_test.target_names
))

    cm = confusion_matrix(y_test, pred)
    print("Confusion matrix:")
    print(cm)

    # Show confusion matrix
    plt.matshow(cm)
    plt.colorbar(orientation = 'horizontal' )
    plt.title('Confusion matrix')
```

In [9]:

```
#Benchmark Multinomial Classifier
print("Testbenching a MultinomialNB classifier...")
parameters = {'alpha': 0.01}

benchmark(MultinomialNB, parameters, 'MultinomialNB')
```

```
Testbenching a MultinomialNB classifier...
parameters: {'alpha': 0.01}
done in 0.021942s
Percentage of non zeros coef: 100.000000
Predicting the outcomes of the testing set
done in 0.003990s
Classification report on test set for classifier:
MultinomialNB(alpha=0.01, class_prior=None, fit_prior=True)

                          precision    recall  f1-score   support

             alt.atheism       1.00      1.00      1.00       319
           comp.graphics       1.00      1.00      1.00       389
 comp.os.ms-windows.misc       1.00      1.00      1.00       394
comp.sys.ibm.pc.hardware       1.00      1.00      1.00       392
   comp.sys.mac.hardware       1.00      1.00      1.00       385
          comp.windows.x       1.00      1.00      1.00       395
            misc.forsale       1.00      1.00      1.00       390
               rec.autos       1.00      0.79      0.88       396
         rec.motorcycles       0.80      0.83      0.81       398
      rec.sport.baseball       0.86      1.00      0.92       397
        rec.sport.hockey       1.00      1.00      1.00       399
               sci.crypt       1.00      1.00      1.00       396
         sci.electronics       1.00      1.00      1.00       393
                 sci.med       1.00      1.00      1.00       396
               sci.space       1.00      1.00      1.00       394
  soc.religion.christian       1.00      1.00      1.00       398
      talk.politics.guns       1.00      1.00      1.00       364
   talk.politics.mideast       1.00      1.00      1.00       376
      talk.politics.misc       1.00      1.00      1.00       310
      talk.religion.misc       1.00      1.00      1.00       251

                accuracy                           0.98      7532
               macro avg       0.98      0.98      0.98      7532
            weighted avg       0.98      0.98      0.98      7532

Confusion matrix:
[[319   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
    0   0]
 [  0 389   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
    0   0]
 [  0   0 394   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
    0   0]
 [  0   0   0 392   0   0   0   0   0   0   0   0   0   0   0   0   0   0
    0   0]
 [  0   0   0   0 385   0   0   0   0   0   0   0   0   0   0   0   0   0
    0   0]
 [  0   0   0   0   0 395   0   0   0   0   0   0   0   0   0   0   0   0
    0   0]
 [  0   0   0   0   0   0 390   0   0   0   0   0   0   0   0   0   0   0
    0   0]
 [  0   0   0   0   0   0   0 312  84   0   0   0   0   0   0   0   0   0
    0   0]
 [  0   0   0   0   0   0   0   0 331  67   0   0   0   0   0   0   0   0
    0   0]
 [  0   0   0   0   0   0   0   0   0 397   0   0   0   0   0   0   0   0
    0   0]
 [  0   0   0   0   0   0   0   0   0   0 399   0   0   0   0   0   0   0
    0   0]
 [  0   0   0   0   0   0   0   0   0   0   0 396   0   0   0   0   0   0
    0   0]
 [  0   0   0   0   0   0   0   0   0   0   0   0 393   0   0   0   0   0
    0   0]
 [  0   0   0   0   0   0   0   0   0   0   0   0   0 395   1   0   0   0
    0   0]
 [  0   0   0   0   0   0   0   0   0   0   0   0   0   0 394   0   0   0
    0   0]
 [  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 398   0   0
    0   0]
 [  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 364   0
    0   0]
 [  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 376
    0   0]
 [  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  310   0]
 [  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
    0 251]]
```



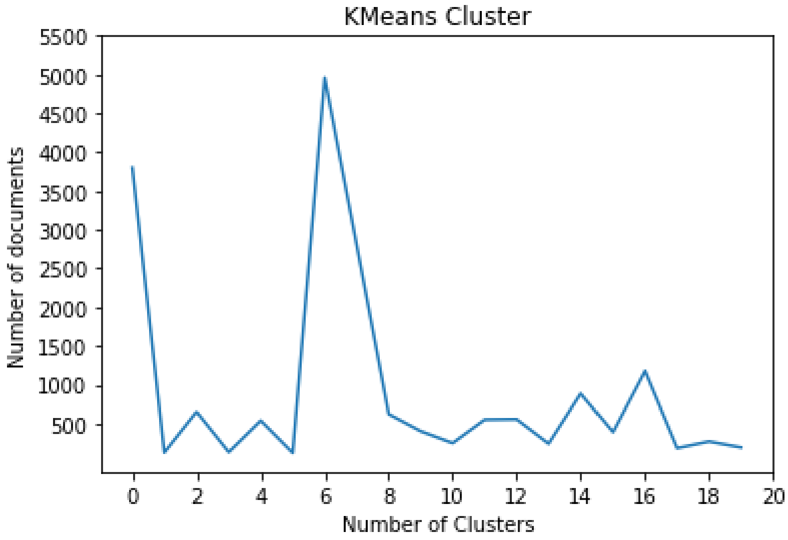
In [7]:

```
#removing the noisy data

vectorizer = TfidfVectorizer(min_df=10, max_df=0.5,stop_words='english')
vectorized = vectorizer.fit_transform(dataset.data)
num_samples, num_features = vectorized.shape
num_clusters = 20


#creating clusters

km = KMeans(n_clusters=num_clusters, init='random',max_iter=30, n_init=1, verbose=0 )
km.fit(vectorized)
labels = np.array(km.labels_)

#printing clusters
for i in range(0,num_clusters):
    num_docs_in_cluster = sum((labels == i))
    print ("cluster ",i,": ", "number of documents ",num_docs_in_cluster)
```

```
cluster  0 :  number of documents  3801
cluster  1 :  number of documents  128
cluster  2 :  number of documents  648
cluster  3 :  number of documents  133
cluster  4 :  number of documents  538
cluster  5 :  number of documents  123
cluster  6 :  number of documents  4958
cluster  7 :  number of documents  2800
cluster  8 :  number of documents  621
cluster  9 :  number of documents  402
cluster  10 :  number of documents  249
cluster  11 :  number of documents  550
cluster  12 :  number of documents  555
cluster  13 :  number of documents  241
cluster  14 :  number of documents  885
cluster  15 :  number of documents  390
cluster  16 :  number of documents  1176
cluster  17 :  number of documents  184
cluster  18 :  number of documents  270
cluster  19 :  number of documents  194
```

In [8]:

```
arr_1 = [0 for x in range(20)]
for x in range (0, 20):
     arr_1[x]=x

arr_2=[0 for y in range(20)]
for y in range(0,num_clusters):
    num_docs_in_cluster = sum((labels == y))
    arr_2[y]=num_docs_in_cluster

#Line Plot
plt.plot(arr_1,arr_2)
plt.xlabel('Number of Clusters')
plt.ylabel ('Number of documents')
plt.title('KMeans Cluster')
plt.xticks((0,2,4,6,8,10,12,14,16,18,20))
plt.yticks((500,1000,1500,2000,2500,3000,3500,4000,4500,5000,5500))
plt.show()
```



In [9]:

```
# Input post
new_post=input("Enter new_post: ")
t0 = time()
```

```
Enter new_post: Disk drive problems. Hi, I have a problem with my hard dis
k.  After 1 year it is working only sporadically now. I tried to format i
t, but now it doesn't boot any more. Any ideas? Thanks.
```

In [29]:

```
#finding similar posts
if new_post.isdigit():
    print("Invalid post")
else:
    # vectorizing input post
    new_post_vec = vectorizer.transform([new_post])
    new_post_label = km.predict(new_post_vec)[0]
    #Fetching indices in the original dataset
    similar_indices = (labels==new_post_label).nonzero()[0]
    #Finding similar posts
    similar = []
    for i in similar_indices:
        dist = sp.linalg.norm((new_post_vec-vectorized[i,:]).toarray())
        similar.append((dist, dataset.data[i]))
    similar = sorted(similar)

#print(similar)

print("Number of similar posts: ", len(similar))
print("done in %fs" % (time() - t0))
```

```
Number of similar posts:  1176
done in 3391.058196s
```

In [28]:

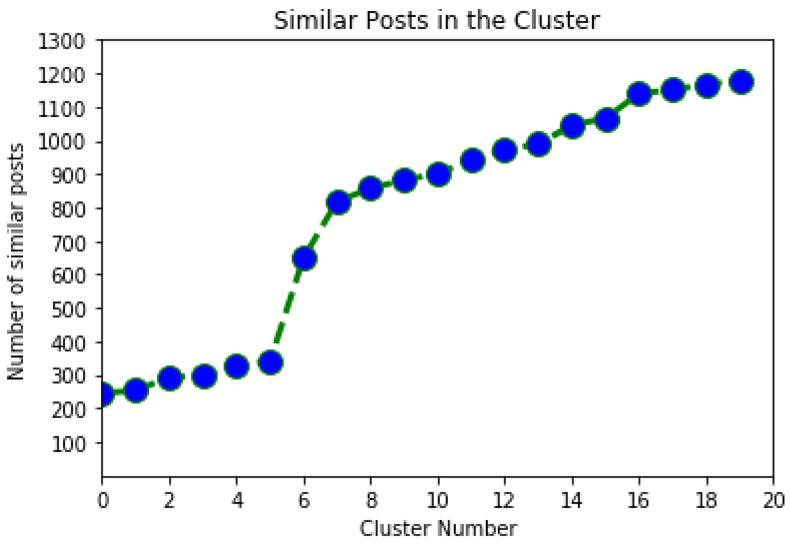
```
# Number of documents in a cluster
docs = [0 for i in range(20)]
for i in range(0,num_clusters):
    num_docs_in_cluster = sum((labels == i))
    docs[i]= num_docs_in_cluster

temp = np.append(np.cumsum(docs[:-1]),docs[-1])
temp[19]= temp[18]+temp[19]

#finding similar posts in each cluster
x = 0
similar_posts_in_each_cluster = [0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0]
for i in range(0,20):
    for j in range(0, len(similar_indices)):
            if(similar_indices[j] < temp[i]):
                   x = x+1

            similar_posts_in_each_cluster[i] = x

    x = 0
similar_posts_in_each_cluster
```

Out[28]:

```
[245,
 253,
 292,
 296,
 329,
 340,
 649,
 818,
 857,
 882,
 901,
 942,
 973,
 989,
 1044,
 1065,
 1139,
 1150,
 1167,
 1176]
```

In [27]:

```
#Line plot
plt.plot(arr_1, similar_posts_in_each_cluster,color='green', linestyle='dashed', linewi
dth = 3,
         marker='o', markerfacecolor='blue', markersize=12)
plt.xlim(0,20)
plt.ylim(0,1300)
plt.xlabel('Cluster Number')
plt.ylabel ('Number of similar posts')
plt.title('Similar Posts in the Cluster')
plt.xticks((0,2,4,6,8,10,12,14,16,18,20))
plt.yticks((100,200,300,400,500,600,700,800,900,1000,1100,1200,1300))
plt.show()
```



In [20]:

```
show_at_1 = similar[0]
show_at_2 = similar[int(len(similar)/2)]
show_at_3 = similar[-1]

from tabulate import tabulate
table = [show_at_1, show_at_2, show_at_3]
print(tabulate(table,headers=["Index","Position","Excerpt Posts"], showindex=True, tablefmt="grid"))
```

```
+---------+------------+--------------------------------------------------
------------------------------+
|   Index |   Position | Excerpt Posts
|
+=========+============+==================================================
==============================+
|       0 |    1.08548 | From: rogntorb@idt.unit.no (Torbj|rn Rognes)
|
|         |            | Subject: Adding int. hard disk drive to IIcx
|
|         |            | Keywords: Mac IIcx, internal, hard disk drive, SC
SI                             |
|         |            | Reply-To: rogntorb@idt.unit.no (Torbj|rn Rognes)
|
|         |            | Organization: Div. of CS & Telematics, Norwegian
Institute of Technology        |
|         |            | Lines: 32
|
|         |            |
|
|         |            | I haven't seen much info about how to add an extr
a internal disk to a           |
|         |            | mac. We would like to try it, and I wonder if som
eone had some good             |
|         |            | advice.
|
|         |            |
|
|         |            | We have a Mac IIcx with the original internal Qua
ntum 40MB hard disk,           |
|         |            | and an unusable floppy drive. We also have a new
spare Connor 40MB              |
|         |            | disk which we would like to use. The idea is to r
eplace the broken              |
|         |            | floppy drive with the new hard disk, but there se
ems to be some                 |
|         |            | problems:
|
|         |            |
|
|         |            | The internal SCSI cable and power cable inside th
e cx has only                  |
|         |            | connectors for one single hard disk drive.
|
|         |            |
|
|         |            | If I made a ribbon cable and a power cable with t
hree connectors each           |
|         |            | (1 for motherboard, 1 for each of the 2 disks), w
ould it work?                  |
|         |            |
|
|         |            | Is the IIcx able to supply the extra power to the
extra disk?                   |
|         |            |
|
|         |            | What about terminators? I suppose that i should r
emove the resistor             |
|         |            | packs from the disk that is closest to the mother
board, but leave them          |
|         |            | installed in the other disk.
```

```
|
|         |           |
|
|         |           | The SCSI ID jumpers should also be changed so tha
t the new disk gets             |
|         |           | ID #1. The old one should have ID #0.
|
|         |           |
|
|         |           | It is no problem for us to remove the floppy driv
e, as we have an                |
|         |           | external floppy that we can use if it won't boot
of the hard disk.               |
|         |           |
|
|         |           | Thank you!
|
|         |           |
|
|         |           | --------------------------------------------------
---------------------           |
|         |           | Torbj|rn Rognes                            Email:
rogntorb@idt.unit.no           |
+---------+-----------+--------------------------------------------------
------------------------------+
|       1 |   1.39408 | From: ak333@cleveland.Freenet.Edu (Martin Linsenb
igler)                          |
|         |           | Subject: Standard and Enhanced question
|
|         |           | Organization: Case Western Reserve University, Cl
eveland, OH (USA)               |
|         |           | Lines: 31
|
|         |           | Reply-To: ak333@cleveland.Freenet.Edu (Martin Lin
senbigler)                      |
|         |           | NNTP-Posting-Host: hela.ins.cwru.edu
|
|         |           |
|
|         |           |
|
|         |           | Why is Win 3.1 sometimes so finicky?
|
|         |           | I have a new DELL 486DX2/66mhz  8 megs RAM.
|
|         |           | Windows was working just great.  I had a Bus mous
e and mother board problem.     |
|         |           | DELL replaced the mouse, gave me a newer mouse dr
iver for windows                |
|         |           | and replaced the motherboard.  Just prior to this
problem windows would          |
|         |           | ]only load up every other time.  I would get the
LOGO and either it would        |
|         |           | go on into windows or LOCK UP.  This was very con
sistent EVERY OTHER TIME.       |
|         |           |
|
|         |           | Now with the new motherboard and all, it still do
es the same thing.              |
|         |           | The computer is less than one month old.  At firs
t it worked FINE!               |
|         |           | I can get into windows each time now with the   w
in/s command.                  |
|         |           | This forces Standard mode.  Things seem to run sl
ower.  I mainly                |
|         |           | use windows apps, but in standard mode there is n
o virtual mem.....             |
|         |           | plus it is slower.
|
|         |           |
|
|         |           | I re-loaded windows, it still does the same thin
g.  Should I first delete       |
|         |           | everything in all windows dir's?  I did not becau
se I have so much              |
|         |           | added in sub dir's etc.
|
|         |           |
|
|         |           | Really puzzling why ENHANCED MODE would not load
each time but consistently     |
|         |           | every other time.  Standard mode each time......
|
|         |           |
|
|         |           | ANY THOUGHTS OR COMMENTS ???
|
|         |           |
|
|         |           | C-ya..... /\/\artin
|
|         |           | --
|
|         |           |   This communication is sent by    /\/\artin   Un
iversity of Arizona Tucson     |
|         |           |   ===============================================
=========================      |
|         |           |   ak333@cleveland.freenet.edu   mlinsenb@ccit.ari
zona.edu  mlinsenb@arizvms     |
|         |           |   DEATH HAS BEEN DEAD FOR ABOUT 2,000 YEARS *****
* FOLLOW THE KING OF KINGS     |
+---------+-----------+--------------------------------------------------
-------------------------------+
|       2 |    1.41421 | From: dplatt@ntg.com (Dave Platt)
|
|         |           | Subject: Jumper settings for Ungermann-Bass PCNIC
Ethernet card                |
|         |           | Organization: New Technologies Group
|
|         |           | Distribution: usa
|
|         |           | Lines: 16
|
|         |           |
|
|         |           | Does anybody have a data-sheet handly for the abo
ve-mentioned card?  I          |
|         |           | bought one, sans manual at a local surplus shop,
and want to try it out         |
|         |           | with the Crywyr packet driver suite.
|
|         |           |
|
|         |            | The IRQ and interface-select jumpers are pretty s
traightforward, but I          |
|         |            | don't grok the settings of W10-W18 (also labelled
A15 through A18).             |
|         |            | Could somebody tell me which settings of these fo
ur jumpers correspond          |
|         |            | to what I/O addresses?
|
|         |            |
|
|         |            | Is there anything else about this card I should k
now, before I                  |
|         |            | plug&play?
|
|         |            |
|
|         |            | --
|
|         |            | Dave Platt
VOICE: (415) 813-8917 |
|         |            |               Domain: dplatt@ntg.com      UUCP:
...netcomsv!ntg!dplatt          |
|         |            |  USNAIL: New Technologies Group Inc. 2470 Embarca
rdero Way, Palo Alto CA 94303  |
+---------+------------+--------------------------------------------------
-------------------------------+
```

In [ ]: