In [5]:
```
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.cluster import KMeans
```

In [6]:
```
# dictionary of title_Id -> title_name
fp=open("title_Id.txt",'r')

titleId_titleName={}
for line in fp:
    line=line.strip().split('#')
    #print line[0], line[1]
    if len(line)!=2:
        if len(line)>2:
            key=line[-1]
            value=""
            for i in range(len(line)-1):
                value=value+line[i]
            titleId_titleName[key]=value
    else:
        titleId_titleName[line[1]]=line[0]

fp.close()
```

In [7]:
```
# dictionary of journal_Id -> journal_name
fp=open("journal_Id.txt",'r')

journalId_JournalName={}
for line in fp:
    line=line.strip().split("#")
    journalId_JournalName[line[1]]=line[0]

fp.close()
```

In [8]:
```
# dictionary of author_Id -> author_name
fp= open("author_Id.txt",'r')

authorId_authorName={}
for line in fp:
    line = line.strip().split("#")
    authorId_authorName[line[1]]=line[0]
fp.close()
```

In [9]:
```
fp= open("title_Journal_Author.txt",'r')

authorList=[]
titleJournalList=[]
for line in fp:
    line = line.strip().split("#")
    curr= titleId_titleName[line[0]] + " " + journalId_JournalName[line[
1]]
    titleJournalList.append(curr)
    tempList=line[2].strip().split('|') #author ids list
    tempNameList=[] #authors namelist
    for i in tempList:
        tempNameList.append(authorId_authorName[i])
    authorList.append(tempNameList)

fp.close()
```

In [10]:
```
# to find a no. of unique words
vocab={}
for line in titleJournalList:
    wordList=line.strip().split()
    for word in wordList:
        if word in vocab:
            vocab[word]=vocab[word]+1
        else:
            vocab[word]=1

print len(vocab)
```

```
125296
```

In [11]:
```
vectorizer = TfidfVectorizer(stop_words='english')
vec=vectorizer.fit(titleJournalList)
vectorized=vec.transform(titleJournalList)
```

In [12]:
```
km = KMeans(n_clusters=20, init='k-means++', max_iter=100, n_init=1)
km.fit(vectorized)
```

Out[12]:
```
KMeans(algorithm='auto', copy_x=True, init='k-means++', max_iter=100,
    n_clusters=20, n_init=1, n_jobs=1, precompute_distances='auto',
    random_state=None, tol=0.0001, verbose=0)
```

In [13]:
```
print("Top terms per cluster:")
order_centroids = km.cluster_centers_.argsort()[:, ::-1]
terms = vectorizer.get_feature_names()
for i in range(20):
    print "Cluster %d:" % i,
    for ind in order_centroids[i, :10]:
        print ' %s' % terms[ind],
    print
```

```
Top terms per cluster:
Cluster 0:  computers  circuits  systems  industry  interacting  journal
biomed  design  based  trans
Cluster 1:  neural  transactions  ieee  networks  information  learning
forensics  security  biomedicine  netw
Cluster 2:  computing  based  wireless  information  systems  networks  m
obile  jasist  using  synthese
Cluster 3:  comput  parallel  distrib  sci  technol  distributed  network
s  based  algorithms  algorithm
Cluster 4:  software  engineering  ieee  international  knowledge  journa
l  development  iee  proceedings  iet
Cluster 5:  siam  scientific  computing  equations  method  methods  prob
lems  finite  multigrid  numerical
Cluster 6:  physics  comput  communications  computer  method  equations
numerical  finite  flows  simulations
Cluster 7:  magazine  lib  digital  library  libraries  preservation  met
adata  repository  collections  research
Cluster 8:  data  trans  ieee  statistics  analysis  computational  vlsi
knowl  amp  eng
Cluster 9:  graph  theory  journal  graphs  number  cycles  chromatic  de
gree  edge  planar
Cluster 10:  cybernetics  knowing  systems  human  fuzzy  based  knowledg
e  cybernetic  model  machine
Cluster 11:  decision  support  systems  based  management  information
knowledge  making  model  approach
Cluster 12:  amp  safety  sys  rel  eng  security  privacy  ieee  reliabi
lity  risk
Cluster 13:  fuzzy  intelligent  journal  systems  based  making  decisio
n  using  control  intuitionistic
Cluster 14:  automatica  control  systems  linear  time  nonlinear  robus
t  stability  feedback  identification
Cluster 15:  future  generation  comp  syst  grid  parallel  based  distr
ibuted  data  computing
Cluster 16:  reliability  microelectronics  power  thermal  high  tempera
ture  gate  failure  analysis  stress
Cluster 17:  knowl  based  syst  knowledge  fuzzy  decision  approach  us
ing  systems  model
Cluster 18:  logic  dame  notre  formal  pure  ann  appl  journal  modal
theory
Cluster 19:  inf  int  acta  game  arab  syst  technol  theory  cooperati
ve  retr
```

In [14]:
```
authorClusters={} # Cluster Id to List of authorName
for i in range(len(titleJournalList)):
    currList=[]
    currList.append(titleJournalList[i])
    data_features=vec.transform(currList)
    labels=km.predict(data_features)

    clusterId=labels[0]
    curAuthorsList=authorList[i] #authors list for current article
    if clusterId in authorClusters.keys():
        #fetch the existing list of authors for the clusterId
        tempList=authorClusters[clusterId]
        for j in curAuthorsList:
            tempList.append(j)

        #update authorsClusters with updated authors list
        authorClusters[clusterId]=tempList

    else: #create a new key with the new cluster id and make value list
of authors for the current article
        authorClusters[clusterId]=curAuthorsList

# print clusters Id-> author ids
```

In [15]:
```
fp=open("Kmeans_TfIdf_output","wr")

for i in authorClusters.keys():
    outstr=str(i) + " => " + str(authorClusters[i])
    fp.write(outstr+"\n")
    fp.write("**************************************************************
**************************************************************"+"\n")
fp.close()
```

In [16]:
```
from __future__ import print_function

from sklearn.datasets import make_blobs
from sklearn.cluster import KMeans
from sklearn.metrics import silhouette_samples, silhouette_score, pairwi
se

import matplotlib.pyplot as plt
import matplotlib.cm as cm
import numpy as np
```

In [17]:
```
range_n_clusters = [10,20,50,70,100,130,150,170,200]
```

In [22]:
```
valueList_5000=[]
for n_clusters in range_n_clusters:
    km = KMeans(n_clusters=n_clusters, init='k-means++', max_iter=100, n
_init=1,random_state=10)
    cluster_labels = km.fit_predict(vectorized)
    silhouette_avg = silhouette_score(vectorized, cluster_labels, metric
='euclidean',sample_size=5000)
    valueList_5000.append(silhouette_avg)
    print("For n_clusters =", n_clusters,"The average silhouette_score i
s :", silhouette_avg)
```

```
For n_clusters = 10 The average silhouette_score is : 0.010734032515
For n_clusters = 20 The average silhouette_score is : 0.0189018479368
For n_clusters = 50 The average silhouette_score is : 0.0370186729109
For n_clusters = 70 The average silhouette_score is : 0.0341606141535
For n_clusters = 100 The average silhouette_score is : 0.0362486230873
For n_clusters = 130 The average silhouette_score is : 0.0330725535286
For n_clusters = 150 The average silhouette_score is : 0.0312054547606
For n_clusters = 170 The average silhouette_score is : 0.0310797267519
For n_clusters = 200 The average silhouette_score is : 0.0283946336987
```

In [23]:
```
valueList_10000=[]
for n_clusters in range_n_clusters:
    km = KMeans(n_clusters=n_clusters, init='k-means++', max_iter=100, n
_init=1,random_state=10)
    cluster_labels = km.fit_predict(vectorized)
    silhouette_avg = silhouette_score(vectorized, cluster_labels, metric
='euclidean',sample_size=10000)
    valueList_10000.append(silhouette_avg)
    print("For n_clusters =", n_clusters,"The average silhouette_score i
s :", silhouette_avg)
```

```
For n_clusters = 10 The average silhouette_score is : 0.0105448793087
For n_clusters = 20 The average silhouette_score is : 0.0183119283923
For n_clusters = 50 The average silhouette_score is : 0.0370563180451
For n_clusters = 70 The average silhouette_score is : 0.0343865015456
For n_clusters = 100 The average silhouette_score is : 0.0363259087534
For n_clusters = 130 The average silhouette_score is : 0.0321412732477
For n_clusters = 150 The average silhouette_score is : 0.0317292099644
For n_clusters = 170 The average silhouette_score is : 0.0319264441636
For n_clusters = 200 The average silhouette_score is : 0.0301362632732
```

In [19]:
```
valueList_15000=[]
for n_clusters in range_n_clusters:
    km = KMeans(n_clusters=n_clusters, init='k-means++', max_iter=100, n
_init=1,random_state=10)
    cluster_labels = km.fit_predict(vectorized)
    silhouette_avg = silhouette_score(vectorized, cluster_labels, metric
='euclidean',sample_size=15000)
    valueList_15000.append(silhouette_avg)
    print("For n_clusters =", n_clusters,"The average silhouette_score i
s :", silhouette_avg)
```

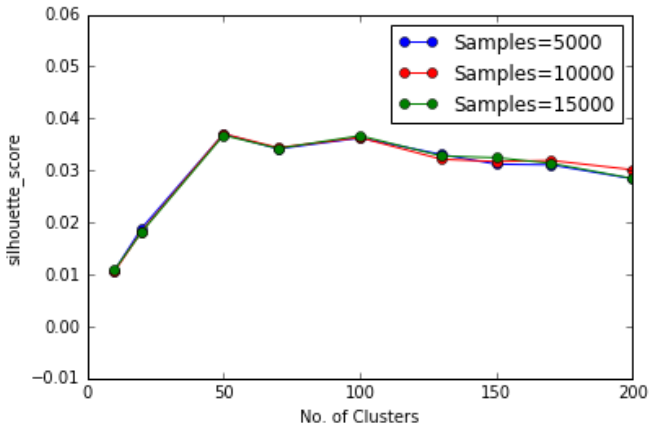
```
For n_clusters = 10 The average silhouette_score is : 0.0108246198577
For n_clusters = 20 The average silhouette_score is : 0.018177873247
For n_clusters = 50 The average silhouette_score is : 0.0367729002117
For n_clusters = 70 The average silhouette_score is : 0.0342381974225
For n_clusters = 100 The average silhouette_score is : 0.0366813813101
For n_clusters = 130 The average silhouette_score is : 0.0327856670438
For n_clusters = 150 The average silhouette_score is : 0.0324619651998
For n_clusters = 170 The average silhouette_score is : 0.0313815821048
For n_clusters = 200 The average silhouette_score is : 0.0284556317012
```

In [46]:
```
import matplotlib.pyplot as plt

plt.axis([0,200,-0.01,0.06])
plt.xlabel('No. of Clusters')
plt.ylabel('silhouette_score')

plt.plot(range_n_clusters,valueList_5000,color='b',marker='o',label='Sam
ples=5000')
plt.plot(range_n_clusters,valueList_10000,color='r',marker='o',label='Sa
mples=10000')
plt.plot(range_n_clusters,valueList_15000,color='g',marker='o',label='Sa
mples=15000')

plt.legend()
plt.show()
```



In [ ]: