Lab5_homework

2018 年 10 月 19 日

1 lab5 实验报告

姓名: 李广泓学号:16369031 学院: 资讯管理学院专业: 信息管理与信息系统

2 实验目的

- 学习使用 Python 访问 Baidu Web 的 API, 以及 sklearn 的 GMM 模型

2.1 实验步骤

2.1.1 获取百度地图数据

```
In [36]: def geoGrab():
             import json
             import urllib.request
             j=0
             f=open(r'Restaurant_Data_Beijing.txt','w')
             for j in range (0,5):
                 a = 'http://api.map.baidu.com/place/v2/search?q=%E9%A5%AD%E5%BA%97&page_size=
                 b = '&region=%E5%8C%97%E4%BA%AC&output=json&ak=SaG5y6eI888RC0tLrk5073XVfpcmdi
                 # 上面的汉字 （百分号部分）做了 urlencode 处理，原本是”饭店”和”北京”
                 # 密钥需要自己申请，然后替换掉上面的“秘钥”
                 c =str(j)
                 url=a+c+b
                 j=j+1
                 #url='http://api.map.baidu.com/place/v2/search?q=%E9%A5%AD%E5%BA%97&page_size
                 #'&page_num=19&region=%E5%8C%97%E4%BA%AC&output=json&ak=qUPyb0ZPGmT41cL9L5irQ
                 temp=urllib.request.urlopen(url)
```

```
                # 把字符串解析成为 Python 对象
                hjson = json.loads(temp.read().decode('utf-8'))
                i=0
                for i in range (0,1):
                    lat=hjson['results'][i]['location']['lat']
                    lng=hjson['results'][i]['location']['lng']
                    print ('%s\t%f\t' % (lat,lng))
                    f.write('%s\t%f\t\n' % (lat,lng))
                    i=i+1
            f.close()
        geoGrab()
```

```
39.999823       116.337129
39.930828       116.386323
39.907596       116.669027
39.913481       116.669950
40.070405       116.423010
```

2.1.2 使用 sklearn 中的 GMM 模型聚类

```
In [2]: import numpy as np
        def load_data(file_name):
            f = open(file_name,'r')
            data = f.readlines()
            f.close()
            feature_list = []
            for line in data:
                tmp = list(map(float, line.split('\t')[0:2]))
                feature_list.append([tmp[0],tmp[1]])
            features = np.array(feature_list)
            print("Shape: %s"%str(features.shape))
            return features
```

```
In [3]: sample=load_data('Restaurant_Data_Beijing.txt')
```

```
Shape: (400, 2)
```

```
In [4]: print(sample[:5])
```

```
[[ 39.915769 116.434797]
 [ 39.915302 116.416703]
 [ 39.977517 116.344784]
 [ 39.995559 116.39352 ]
 [ 39.959371 116.287243]]
```

```
In [5]: from sklearn.mixture import GaussianMixture
        gmm=GaussianMixture(n_components=4, covariance_type='tied')
```

```
In [6]: result=gmm.fit(sample)
```

```
In [7]: label=gmm.predict(sample)
```

```
In [8]: center=gmm.means_
        print("center:",center)
        print("result:",result)
        print("label:",label)
```

```
center: [[ 39.92794947 116.39166015]
 [ 40.659145   117.23369795]
 [ 40.49900223 116.84924278]
 [ 40.23643062 117.13075845]]
result: GaussianMixture(covariance_type='tied', init_params='kmeans', max_iter=100,
        means_init=None, n_components=4, n_init=1, precisions_init=None,
        random_state=None, reg_covar=1e-06, tol=0.001, verbose=0,
        verbose_interval=10, warm_start=False, weights_init=None)
label: [0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 2 0 0 0 0 0 0 0 0 2 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 3 0 0
 0 0 0 0 2 0 2 3 1 0 0 0 1 0 0 0 3 0 0 2 2 0 0 1 0 0 0 2 3 0 1 0 2 0 0 0 0
 2 1 3 0 2 2 0 2 2 1 1 1 2 0 3 2 3 2 0 3 1 2 0 0 2 3 0 2 2 2 0 2 2 3 2 2 3
 1 1 1 1 0 3 2 3 0 2 2 0 0 2 2 1 2 3 2 3 3 3 3 3 2 0 0 2 0 2 2 3 0 2 2 1 2
 0 0 0 2 1 2 3 2 2 2 1 1 2 2 2 1 1 3 2 2 3 2 2 2 2 2 1 2 1 2 2 3 2 3 2 2 1
 3 2 1 2 2 2 2 2 2 2 2 2 2 1 3 3 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2]
```

2.2 操作练习

2.2.1 对聚类结果可视化

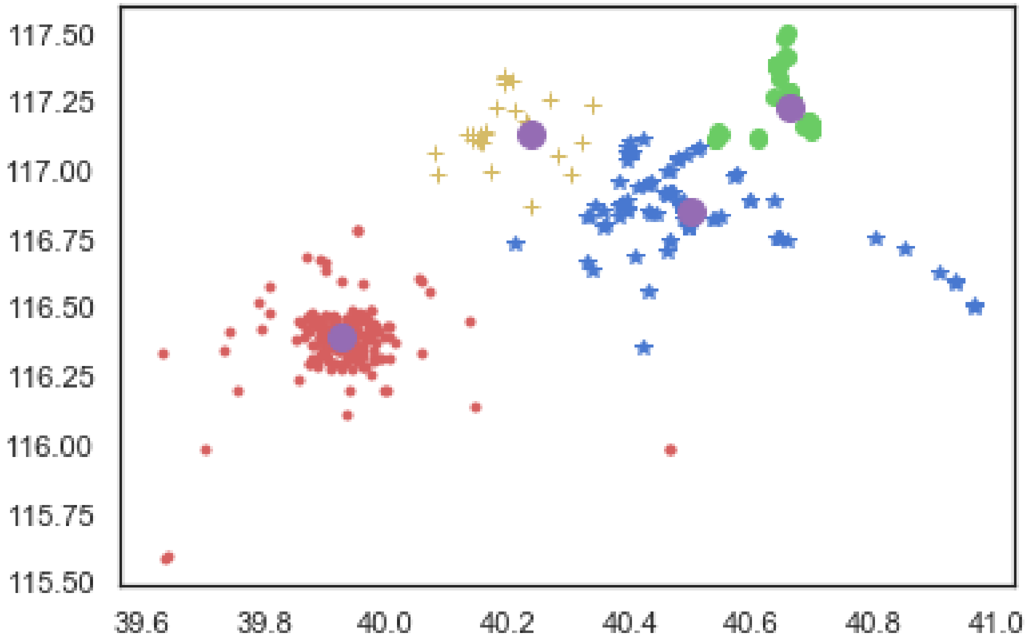
```
In [9]: sample[0]
```

```
Out[9]: array([ 39.915769, 116.434797])
```

```
In [13]: classes = []
         for i in np.unique(label):
             classes.append(sample[label == i])
         print(classes[0][:5])
```

```
[[ 39.915769 116.434797]
 [ 39.915302 116.416703]
 [ 39.977517 116.344784]
 [ 39.995559 116.39352 ]
 [ 39.959371 116.287243]]
```

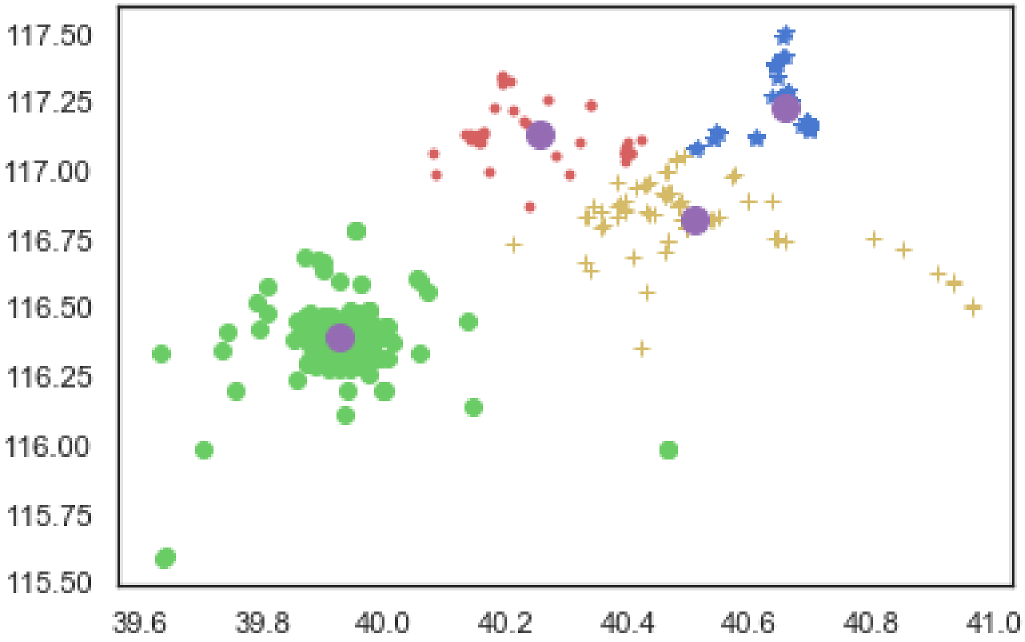
```
In [16]: import matplotlib.pyplot as plt
         import seaborn as sns
         sns.set(style="white", palette="muted", color_codes=True)
         plt.plot(classes[0][:, 0], classes[0][:, 1], 'r.')
         plt.plot(classes[1][:, 0], classes[1][:, 1], 'go')
         plt.plot(classes[2][:, 0], classes[2][:, 1], 'b*')
         plt.plot(classes[3][:, 0], classes[3][:, 1], 'y+')
         plt.plot(center[:, 0], center[:, 1], 'mo', markersize=10)
         plt.show()
```



2.2.2 尝试使用 kMeans 聚类

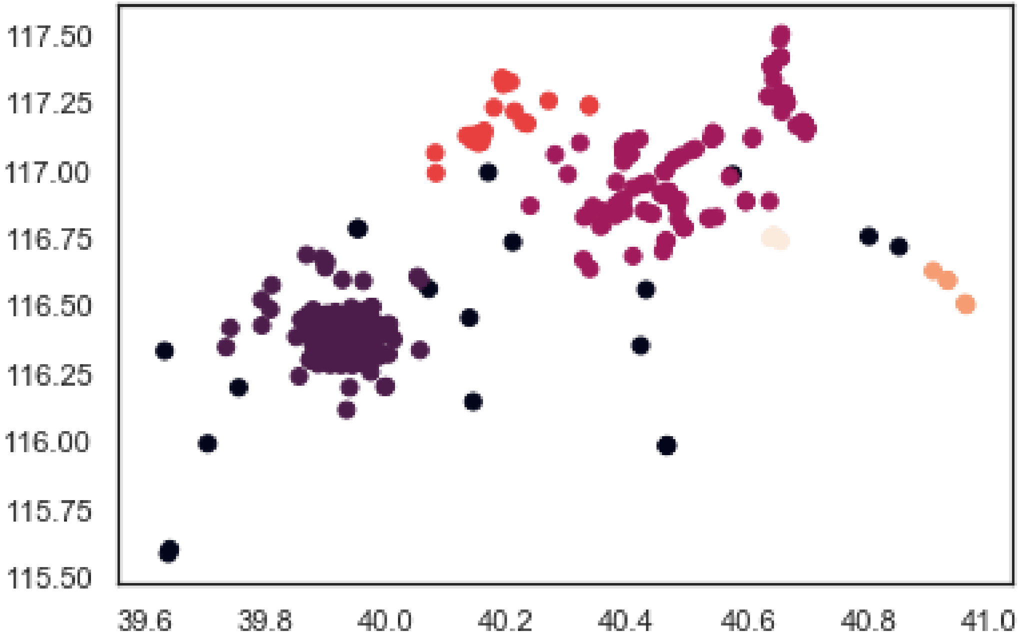
```
In [27]: from sklearn.cluster import KMeans
         kmeans = KMeans(n_clusters=4)
         kmeans.fit(sample)
         result = kmeans.predict(sample)
         center = kmeans.cluster_centers_
```

```
In [28]: class1 = []
         for i in np.unique(result):
             class1.append(sample[result == i])
         plt.plot(class1[0][:, 0], class1[0][:, 1], 'r.')
         plt.plot(class1[1][:, 0], class1[1][:, 1], 'go')
         plt.plot(class1[2][:, 0], class1[2][:, 1], 'b*')
         plt.plot(class1[3][:, 0], class1[3][:, 1], 'y+')
         plt.plot(center[:, 0], center[:, 1], 'mo', markersize=10)
         plt.show()
```



2.2.3 尝试使用 DBSCAN 聚类

In [33]:
```
from sklearn.cluster import DBSCAN
y_pred = DBSCAN(eps = 0.1, min_samples=5, algorithm='auto').fit_predict(sample)
plt.scatter(sample[:, 0], sample[:, 1], c=y_pred)
plt.show()
```


117.50
117.25
117.00
116.75
116.50
116.25
116.00
115.75
115.50
39.6
39.8
40.0
40.2
40.4
40.6
40.8
41.0