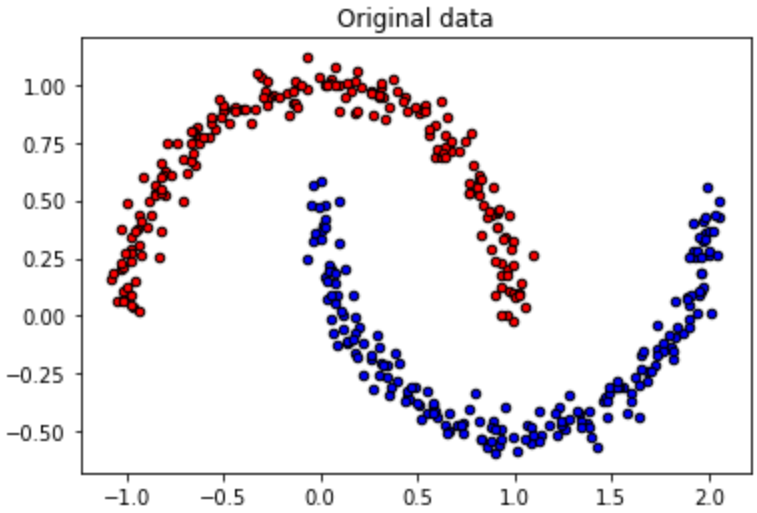
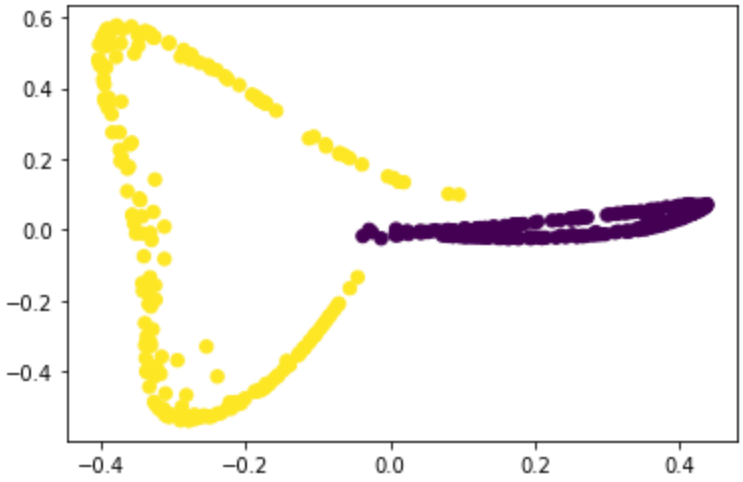
dataset:Two-moons

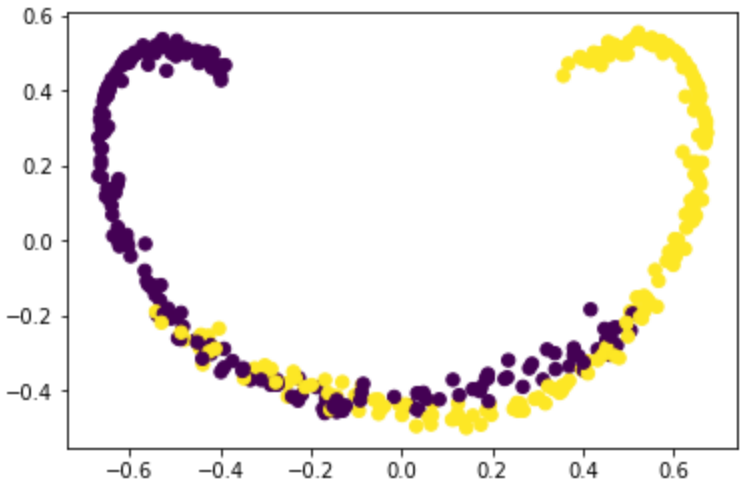
```
X, y = make_moons(n_samples=400, noise=.05, random_state=0)
```




```
n_samples=400,n_feature=2
Using Kernel PCA with rbf kernel, we got X_kpca.
When gamma=10,the shape of X_kpca is (400,298).
Clustering accuracy(GMM) on X_kpca is 1
```




```
When gamma=1,the shape of X_kpca is (400,89).
Clustering accuracy(GMM) on X_kpca is 0.7975
```




```
When gamma=3,the shape of X_kpca is (400,159).
Clustering accuracy(GMM) on X_kpca is 0.9025
```

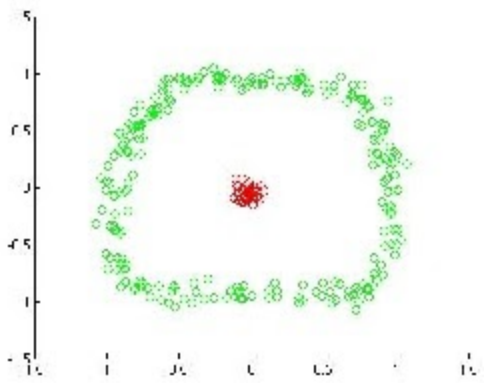
```
Kernel gmm
gamma=3 rbf kernel d_phi=24
0.9025
error 3.2283283605536166e-21

gamma=5  d_phi=40
0.985
error 8.03450975847036e-22

gamma=10 d_phi=69
1.0
error 3.2010122689731882e-21
```

很难选择初始值，需要一个好的初始值。

Dataset: two circles

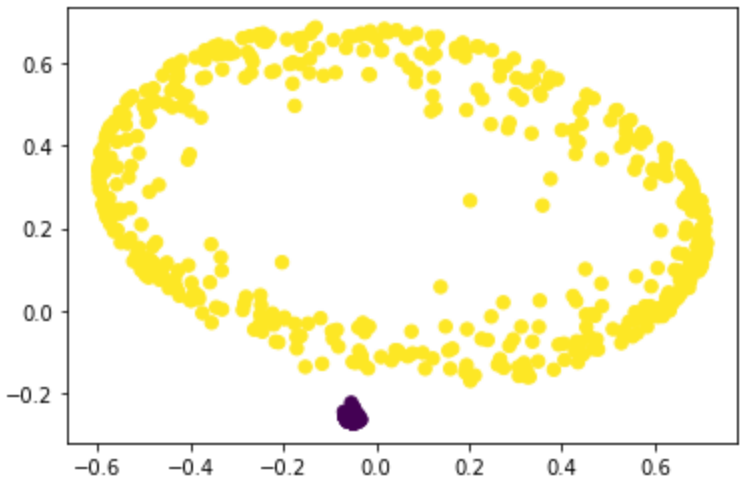
kernel k-means clustering algorithm

https://www.cs.utexas.edu/users/inderjit/public_papers/kdd_spectral_kernelkmeans.pdf
https://sites.google.com/site/dataclusteringalgorithms/kernel-k-means-clustering-algorithm



能完美区分

Kernel PCA +GMM也可以



Kernel gmm
也可以
但是依赖于初始值

```
Accuracy 0.853
p_t-p_(t+1) 897.8204557263256
Accuracy 1.0
p_t-p_(t+1) 293.99999984790566
Accuracy 1.0
p_t-p_(t+1) 6.278221811759174e-18
```

USPS 385 dayaset

Methods Accuracy

DEC 0.7408 https://arxiv.org/pdf/1511.06335.pdf

DBC 0.743 https://arxiv.org/pdf/1703.07980.pdf

(DEPICT) 0.964 https://arxiv.org/pdf/1704.06327.pdf

Kernel PCA+GMM

```
gamma=0.00015      rbf kernel
The shape of X_kpca=(7291, 5906)
gmm = GMM(n_components=10,n_init=10).fit(X_kpca[:,:100])
ACC=0.7317
```