ex4

January 10, 2023

[ ]:
```
# Spectral Clustering
```

[ ]:
```
%pip install pandas
```

```
Requirement already satisfied: pandas in
/home/pranav/miniconda3/envs/gal/lib/python3.9/site-packages (1.5.2)
Requirement already satisfied: pytz>=2020.1 in
/home/pranav/miniconda3/envs/gal/lib/python3.9/site-packages (from pandas)
(2022.7)
Requirement already satisfied: python-dateutil>=2.8.1 in
/home/pranav/miniconda3/envs/gal/lib/python3.9/site-packages (from pandas)
(2.8.2)
Requirement already satisfied: numpy>=1.20.3 in
/home/pranav/miniconda3/envs/gal/lib/python3.9/site-packages (from pandas)
(1.24.1)
Requirement already satisfied: six>=1.5 in
/home/pranav/miniconda3/envs/gal/lib/python3.9/site-packages (from python-
dateutil>=2.8.1->pandas) (1.16.0)
Note: you may need to restart the kernel to use updated packages.
```

[ ]:
```
# Import libraries (pandas, pyplot,SpectralClustering from
# sklearn.cluster, preprocessing libraries , )
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.cluster import SpectralClustering
import numpy as np
```

[ ]:
```
from sklearn.datasets import make_moons
random_state = 213
np.random.seed(random_state)
data_size = 150
X,y = make_moons(n_samples=data_size, noise=0.07, random_state=213)
```

[ ]:
```
X
```

[ ]:
```
array([[ 8.12762470e-01,  5.02988580e-01],
       [ 2.56110000e-01, -1.41695478e-04],
       [ 8.84738643e-01,  5.12936768e-01],
```

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```

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```

```
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```

[ ]:
```
y
```

[ ]:
```
array([0, 1, 0, 1, 0, 0, 1, 1, 1, 1, 0, 1, 1, 1, 1, 0, 0, 1, 0, 0, 0, 0,
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       1, 1, 1, 1, 0, 0, 1, 0, 1, 1, 0, 0, 0, 1, 1, 0, 1, 0])
```
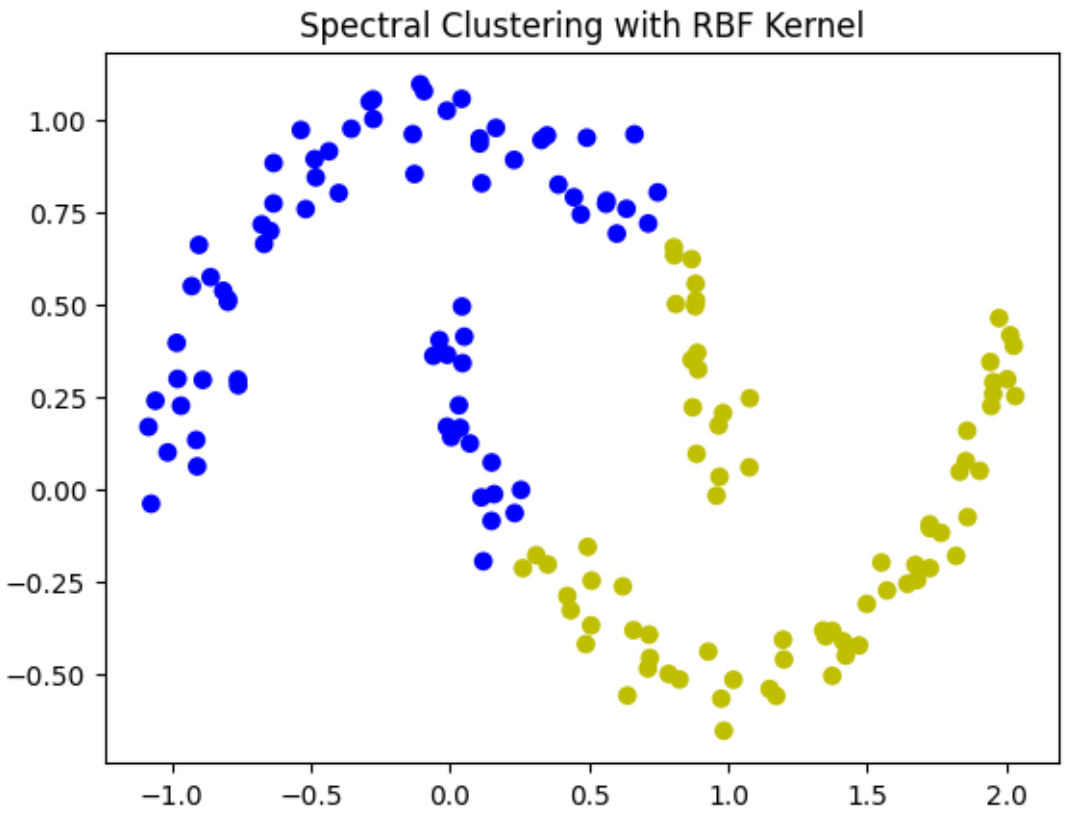

[ ]:
```
colours = {
    0: 'b',
    1: 'y'
}
```

[ ]:
```
spectral_model_rbf = SpectralClustering(n_clusters = 2, affinity ='rbf')
labels_rbf = spectral_model_rbf.fit_predict(X)
```

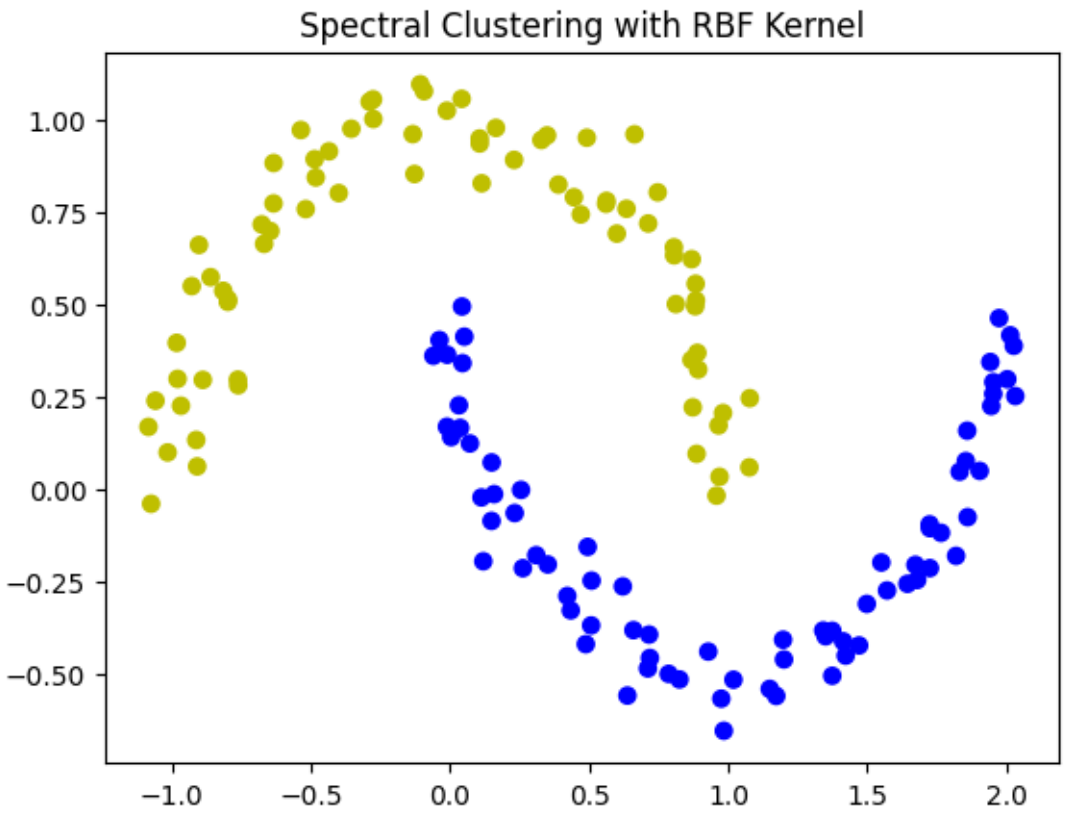
[ ]:
```
cvec = [colours[label] for label in labels_rbf]
```

[ ]:
```
# plot color vector
# Plotting the clustered scatter plot
plt.scatter(X[:, 0], X[:, 1], c=cvec)
plt.title('Spectral Clustering with RBF Kernel')
plt.show()
```



[ ]:
```
spectral_model_rbf = SpectralClustering(n_clusters = 2, affinity␣
↪='nearest_neighbors')
labels_rbf = spectral_model_rbf.fit_predict(X)
```

[ ]:
```
cvec = [colours[label] for label in labels_rbf]
plt.scatter(X[:, 0], X[:, 1], c=cvec)
plt.title('Spectral Clustering with RBF Kernel')
plt.show()
```


Spectral Clustering with RBF Kernel
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0

[ ]: