## Machine learning Lab 6

## Graph Based Clustering

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```
import talib as ta
from pandas_datareader import data as pdr
import yfinance as yf

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.cluster import SpectralClustering
from sklearn.preprocessing import StandardScaler, normalize
from sklearn.decomposition import PCA
from sklearn.metrics import silhouette_score

import warnings
warnings.filterwarnings('ignore')

yf.pdr_override()
threshold = 0.75

df = pdr.get_data_yahoo('GOOG', '2000-01-01', '2018-01-01')
df = df[df.columns[df.isnull().mean() < threshold]]
df = df.loc[df.isnull().mean(axis=1) < threshold]
df = df.dropna()
df = df.iloc[:,:4]
df.head()
```

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 [**********************100%**********************]  1 of 1 completed
```

| Date | Open | High | Low | Close |
|---|---|---|---|---|
| 2004-08-19 | 2.490664 | 2.591785 | 2.390042 | 2.499133 |
| 2004-08-20 | 2.515820 | 2.716817 | 2.503118 | 2.697639 |
| 2004-08-23 | 2.758411 | 2.826406 | 2.716070 | 2.724787 |
| 2004-08-24 | 2.770615 | 2.779581 | 2.579581 | 2.611960 |
| 2004-08-25 | 2.614201 | 2.689918 | 2.587302 | 2.640104 |

```
upper_lim = df['Close'].quantile(.95)
lower_lim = df['Close'].quantile(.05)
df = df[(df['Close'] < upper_lim) & (df['Close'] > lower_lim)]

upper_lim = df['Open'].quantile(.95)
lower_lim = df['Open'].quantile(.05)
df = df[(df [ 'Open'] < upper_lim) & (df['Open'] > lower_lim)]
```

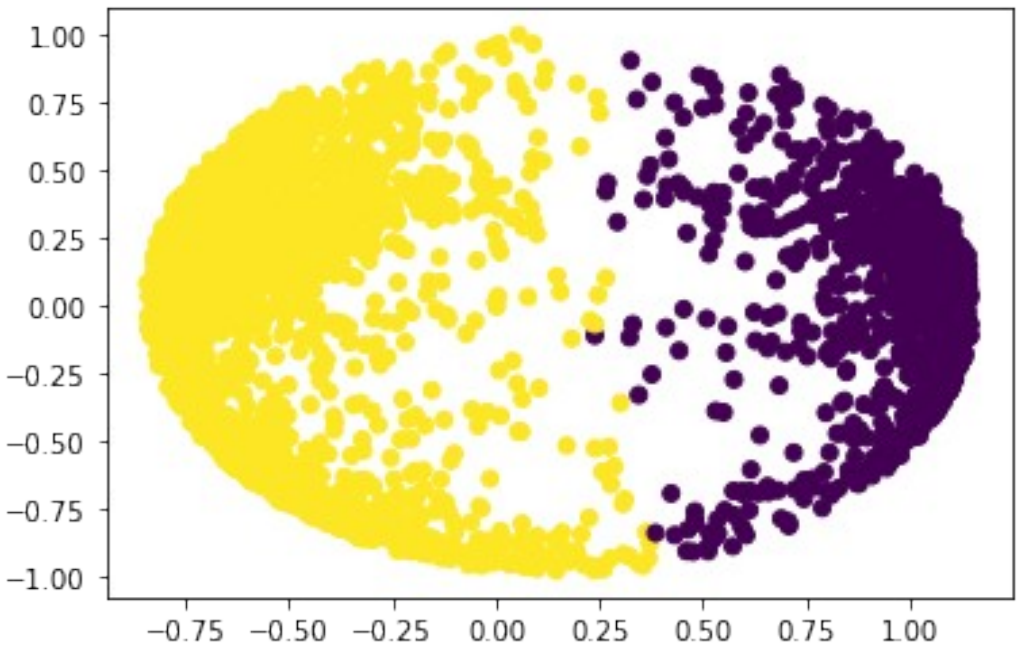
```
df['S_10'] = df['Close'].rolling(window=10).mean()
df['Corr'] = df['Close'].rolling(window=10).corr(df['S_10'])
df['RSI'] = ta.RSI(np.array(df['Close']), timeperiod =10)
df['Open-Close'] = df['Open'] - df['Close'].shift(1)
df[ 'Open-Open'] = df [ 'Open'] - df [ 'Open'].shift(1)
df = df.dropna()

scaler = StandardScaler()
X_scaled = scaler.fit_transform(df)
X_normalized = normalize(X_scaled)
X_normalized = pd.DataFrame (X_normalized)
pca = PCA(n_components = 2)
X_principal = pca.fit_transform(X_normalized)
X_principal = pd. DataFrame(X_principal)
X_principal.columns = ['Open-Close', 'Open-Open']
X_principal.head(2)
```

| | Open-Close | Open-Open |
|---|---|---|
| 0 | -0.660956 | -0.534079 |
| 1 | -0.662805 | -0.545855 |

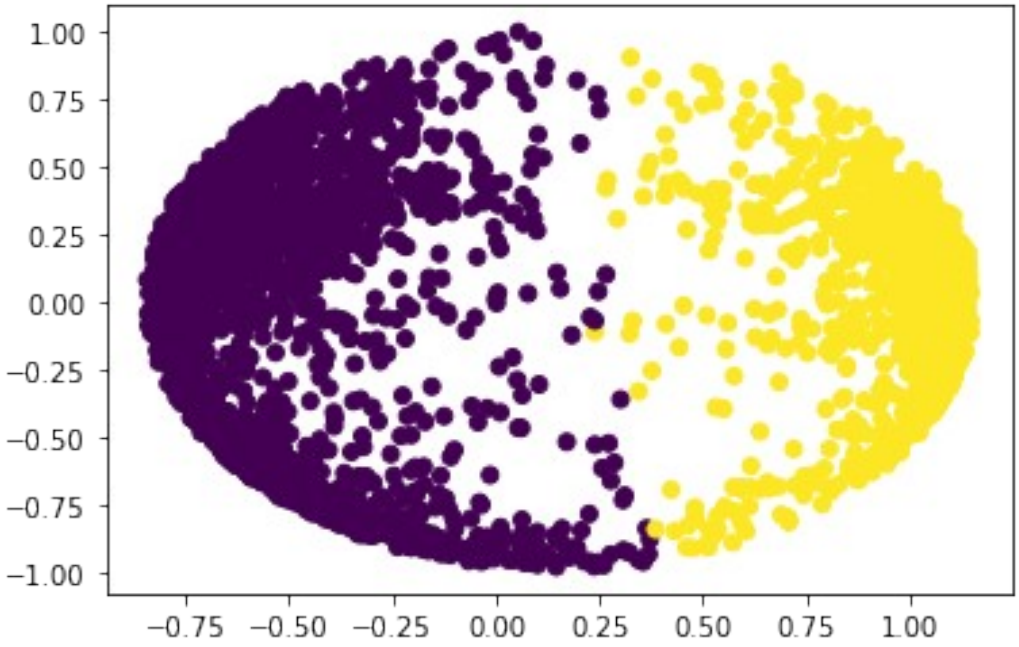
```
spectral_model_rbf = SpectralClustering(n_clusters = 2, affinity
='rbf')
labels_rbf = spectral_model_rbf.fit_predict(X_principal)
plt.scatter(X_principal['Open-Close'], X_principal['Open-Open'],c =
SpectralClustering(n_clusters = 2, affinity
='nearest_neighbors').fit_predict(X_principal))
```

```
<matplotlib.collections.PathCollection at 0x7f27ae14e610>
```

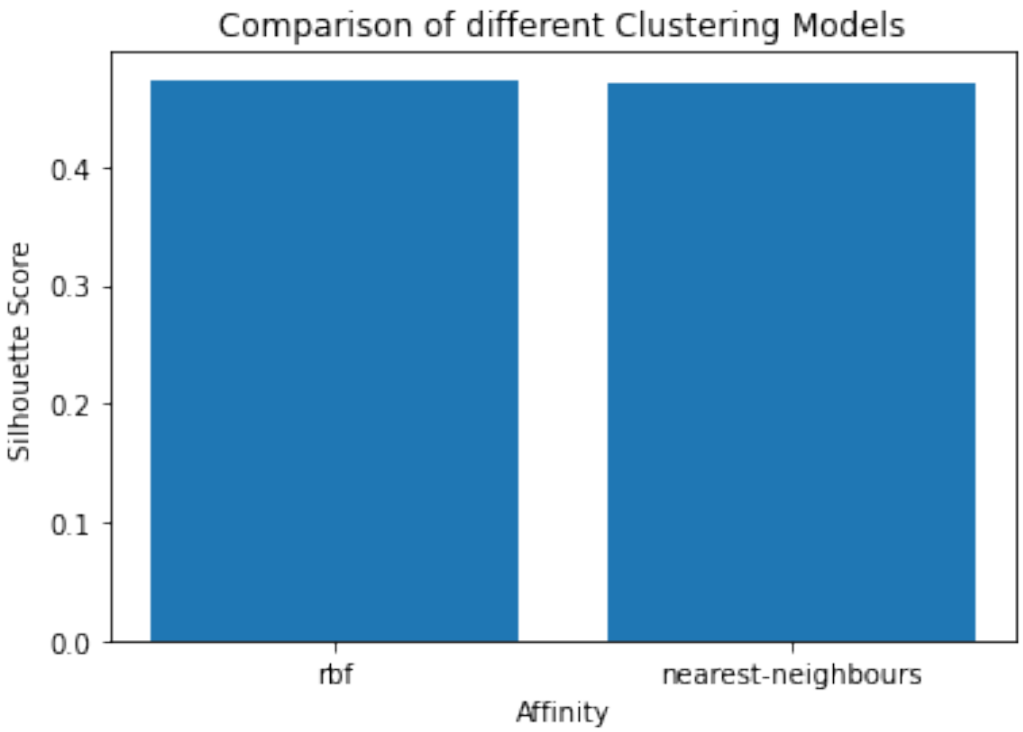


```
spectral_model_nn = SpectralClustering(n_clusters = 2, affinity
='nearest_neighbors')
labels_nn = spectral_model_nn.fit_predict(X_principal)

plt.scatter(X_principal['Open-Close'], X_principal['Open-Open'],
c = SpectralClustering(n_clusters = 2, affinity
='nearest_neighbors').fit_predict(X_principal))
plt.show()
```




```
affinity = ['rbf', 'nearest-neighbours']
S_scores = []
S_scores.append(silhouette_score(df, labels_rbf))
S_scores.append(silhouette_score(df, labels_nn))
plt.bar(affinity, S_scores)
plt.xlabel('Affinity')
plt.ylabel('Silhouette Score')
plt.title('Comparison of different Clustering Models')
plt.show()
print(S_scores)
```




```
[0.47319397822466186, 0.47107425929598745]
```