Praca domowa 5

May 16, 2021

1 Wczytanie danych

[1]:
```
import pandas as pd
import numpy as np
import seaborn as sns
sns.set_theme(style="whitegrid")
sns.set_palette('Accent_r')

from matplotlib import pyplot as plt
```

[2]:
```
data = pd.read_csv("../../clustering.csv", header=None, names = ['X', 'Y'])
print(len(data))
data.head()
```

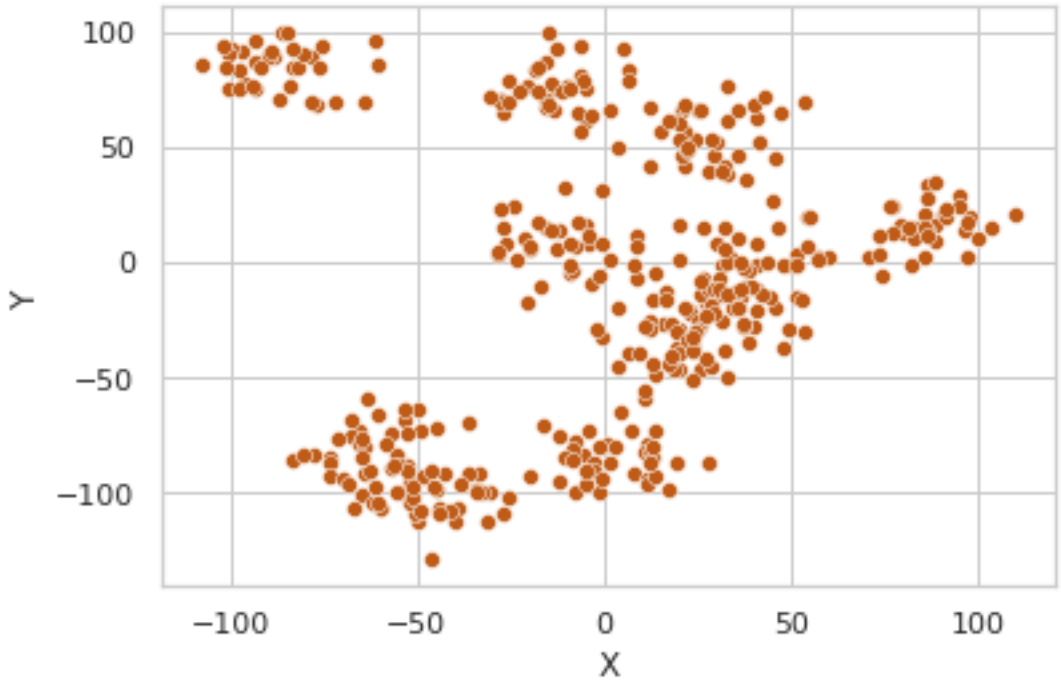
```
400
```

[2]:

	X	Y
0	41.788907	52.220182
1	-96.586516	90.957033
2	-54.143591	-99.153377
3	19.929231	-45.859779
4	-82.941076	84.099186

[3]:
```
sns.scatterplot(data=data, x='X', y='Y')
```

[3]:
```
<AxesSubplot:xlabel='X', ylabel='Y'>
```

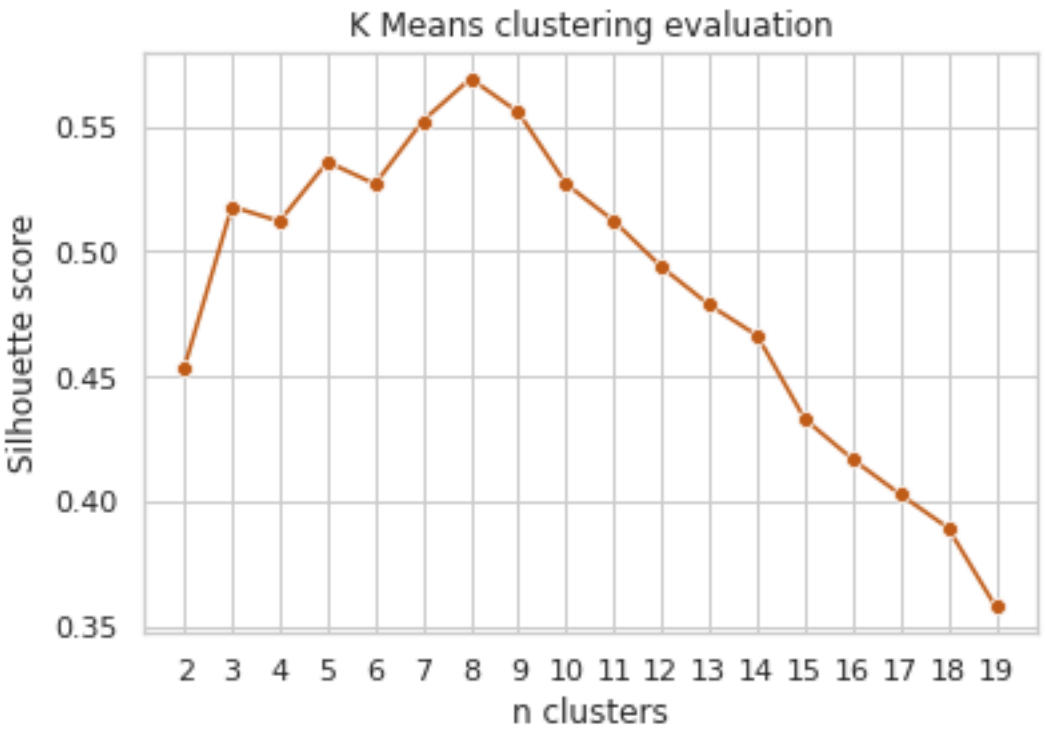


2 Klastrowanie metodą k-means oceniane współczynnikiem Silhouette

[4]:
```
from sklearn.cluster import KMeans
from sklearn.metrics import silhouette_score
```

[5]:
```
n_clusters = [i for i in range(2,20)]
silhouette_scores = []
labels_list = []
for n in n_clusters:
    kmeans = KMeans(n_clusters=n, random_state=123).fit(data)
    labels = kmeans.labels_
    score = silhouette_score(data, labels)
    labels_list.append(labels)
    silhouette_scores.append(score)
```

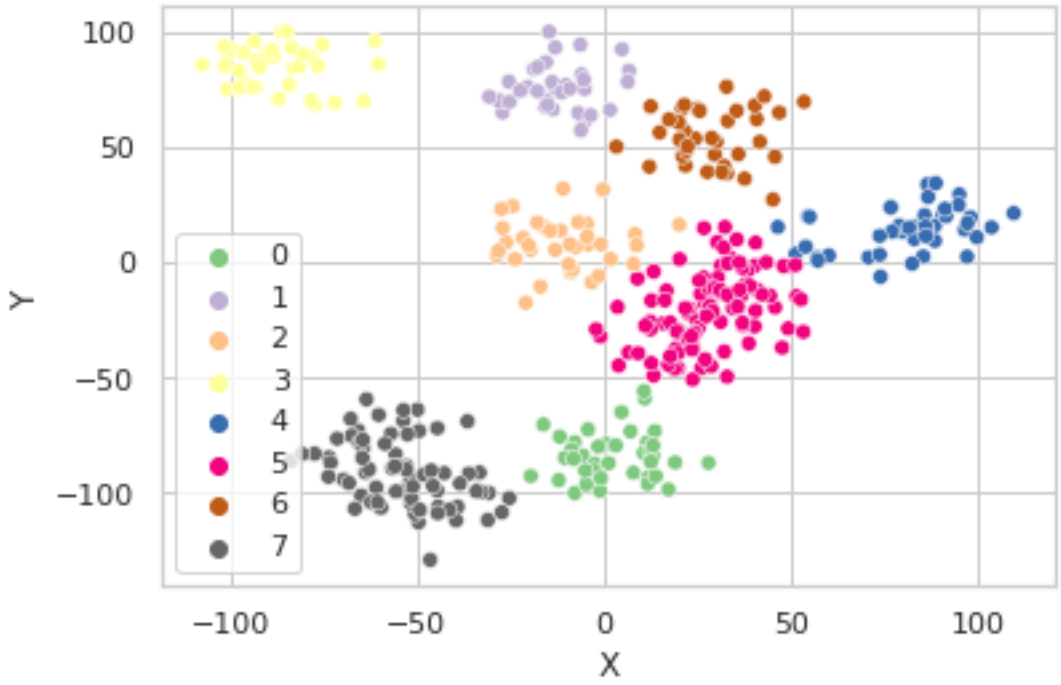
[6]:
```
ax = sns.lineplot(x=n_clusters, y=silhouette_scores, marker='o', dashes=False)
ax.set(xlabel='n clusters',
       ylabel='Silhouette score',
       title='K Means clustering evaluation',
       xticks=n_clusters)
plt.show()
```



Na powyższym wykresie widzimy, że wybrana metryka przyjmuje najwiekszą wartość, gdy liczba klastrów jest równa 8. To oznacza, że wtedy klastry są najlepiej zdefiniowane.

[7]:
```
sns.scatterplot(data=data, x='X', y='Y', hue=labels_list[6], palette='Accent')
```

[7]:
```
<AxesSubplot:xlabel='X', ylabel='Y'>
```

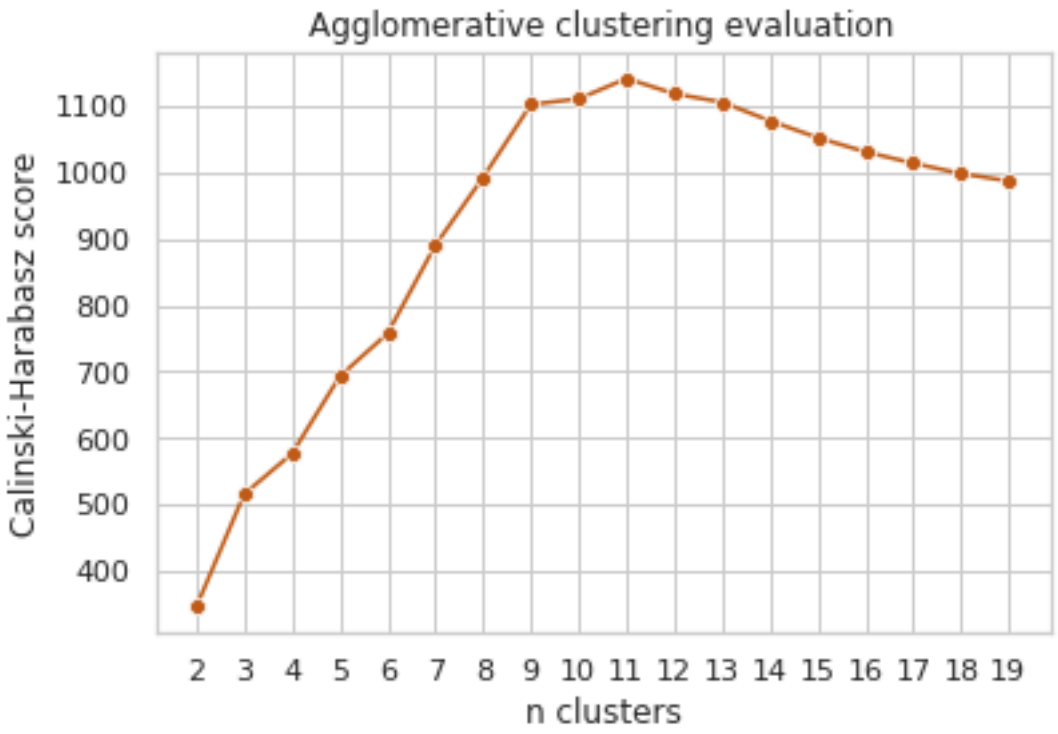


3 Klastrowanie metodą aglomeracyjną z użyciem metryki Calinski-Harabasz Index

[8]:
```
from sklearn.cluster import AgglomerativeClustering
from sklearn.metrics import calinski_harabasz_score
```

[9]:
```
n_clusters = [i for i in range(2,20)]
c_h_scores = []
labels_list = []
for n in n_clusters:
    agglomerative_clusters = AgglomerativeClustering(n_clusters=n).fit(data)
    labels = agglomerative_clusters.labels_
    score = calinski_harabasz_score(data, labels)
    labels_list.append(labels)
    c_h_scores.append(score)
```

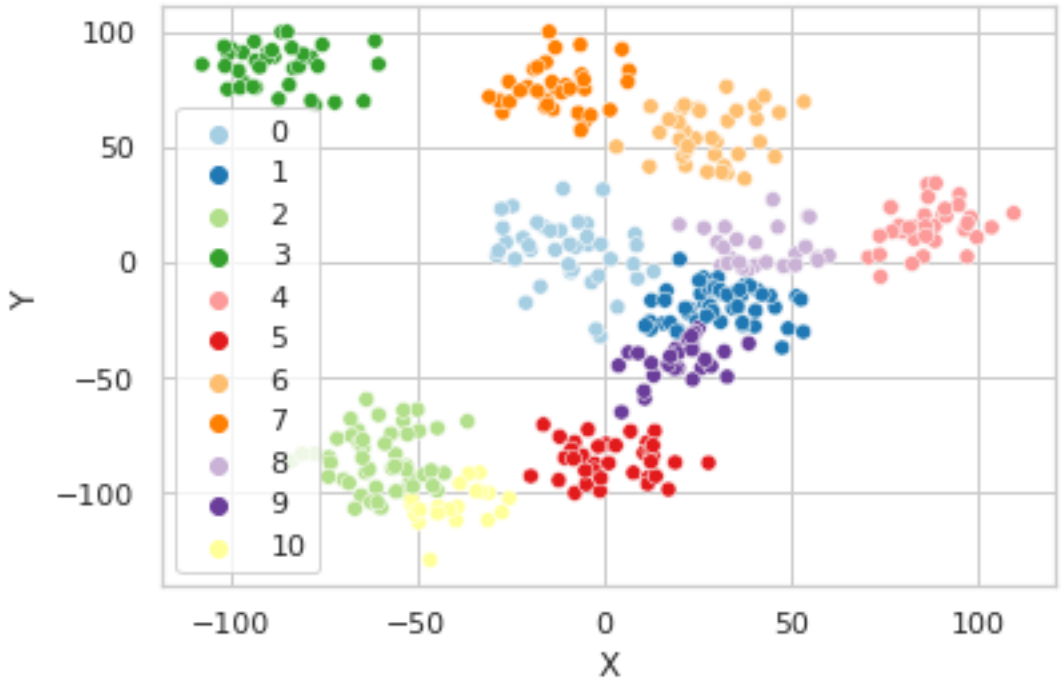
[10]:
```
ax = sns.lineplot(x=n_clusters, y=c_h_scores, marker='o', dashes=False)
ax.set(xlabel='n clusters',
       ylabel='Calinski-Harabasz score',
       title='Agglomerative clustering evaluation',
       xticks=n_clusters)
plt.show()
```



Największy wynik indeksu Calinski-Harabasz jest osiągany dla 11 klastrów. To najlepszy podział według tej metryki.

[11]:
```
sns.scatterplot(data=data, x='X', y='Y', hue=labels_list[9], palette='Paired')
```

[11]:
```
<AxesSubplot:xlabel='X', ylabel='Y'>
```


100
50
0
−50
−100
Y
−100
−50
0
50
100
X
0
1
2
3
4
5
6
7
8
9
10