15Z332 Ex8 - Clustering (k-means and agglomerative)

October 17, 2018

1 Exercise 8

1.1 Clustering

Using k-means, k-medoids and agglomerative methods.

1.1.1 1) Using k-means

```
In [22]: from sklearn.cluster import KMeans
         from sklearn.datasets import load_iris
         from sklearn.metrics import accuracy_score
         from sklearn.model_selection import train_test_split

         iris = load_iris()
         X = iris.data

         kmeans = KMeans(n_clusters=3, random_state=0).fit(X)
         kmeans.labels_
```

```
Out[22]: array([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, 1, 1, 1,
                1, 1, 1, 1, 1, 1, 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, 2, 0, 0, 0, 0, 0, 0, 0, 0,
                0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 2, 0, 2, 2, 2, 2, 0, 2,
                2, 2, 2, 0, 0, 2, 2, 2, 2, 0, 2, 0, 2, 0, 2, 2, 0, 0, 2, 2,
                2, 2, 2, 0, 2, 2, 2, 2, 0, 2, 2, 2, 0, 2, 2, 2, 0, 2, 2, 0],
               dtype=int32)
```

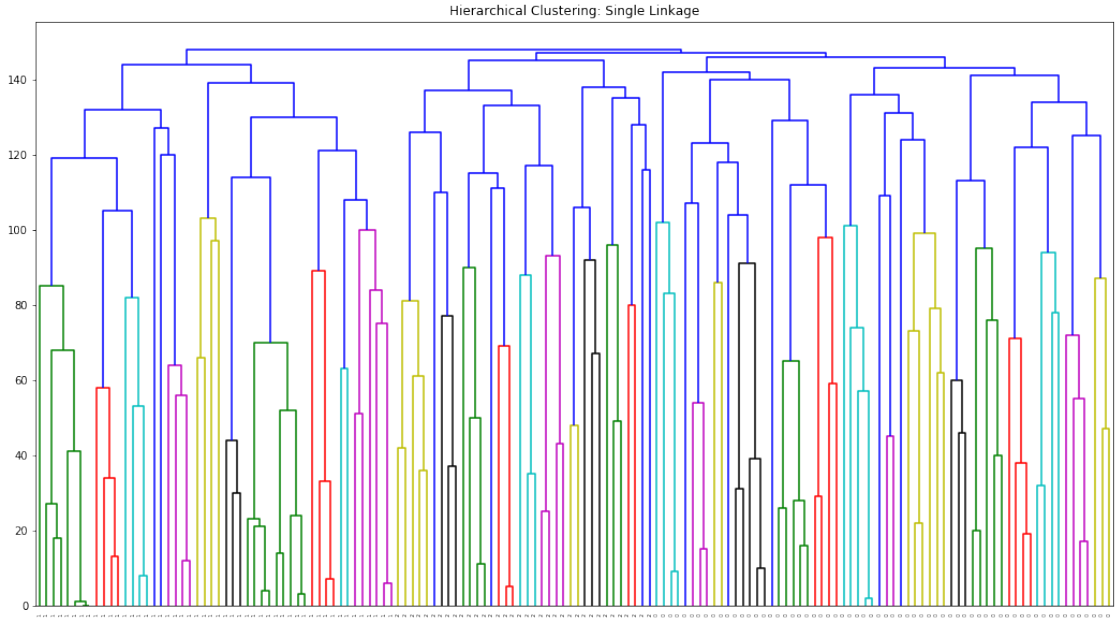
1.1.2 2) Using Agglomerative Clustering

```
In [23]: from matplotlib import pyplot as plt
         from scipy.cluster.hierarchy import dendrogram
         import numpy as np

         def plot_dendrogram(model, **kwargs):
             children = model.children_
             distance = np.arange(children.shape[0])
             no_of_observations = np.arange(2, children.shape[0]+2)
```

```
    linkage_matrix = np.column_stack([children, distance, no_of_observations]).astype
    dendrogram(linkage_matrix, **kwargs)
```

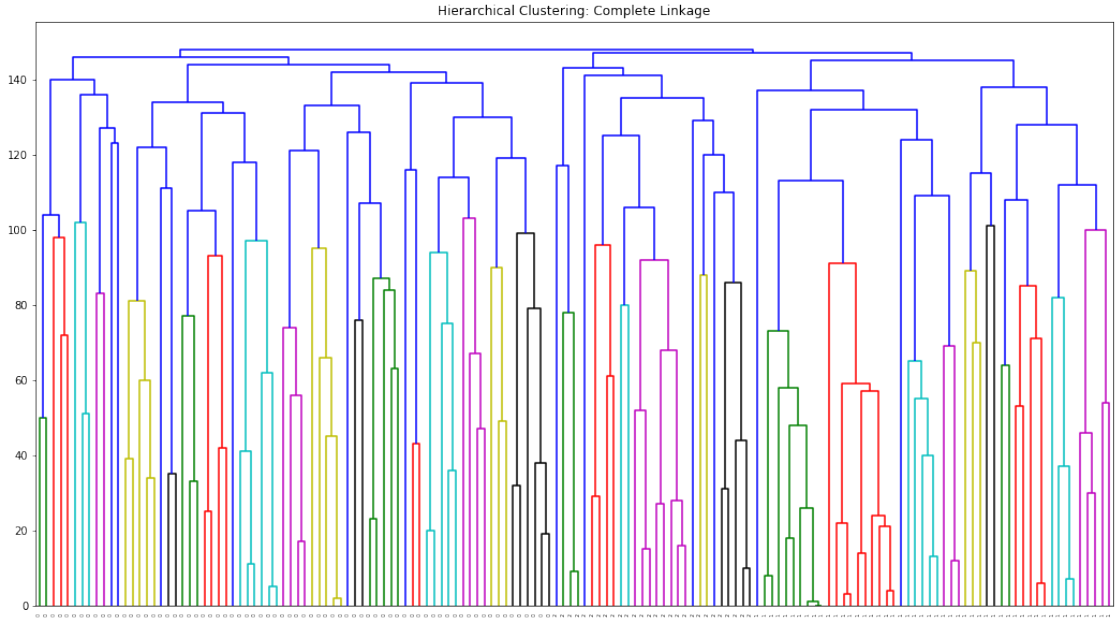
2a) Single Linkage

```
In [42]: from sklearn.cluster import AgglomerativeClustering
         model = AgglomerativeClustering(linkage="ward",n_clusters=3)
         singleLinkage = model.fit(X)

         plt.figure(figsize=(18,10))
         plt.title('Hierarchical Clustering: Single Linkage')
         plot_dendrogram(model, labels=singleLinkage.labels_)
         plt.show()
```



2b) Complete linkage

```
In [41]: model = AgglomerativeClustering(linkage="complete",n_clusters=3)
         completeLinkage = model.fit(X)

         plt.figure(figsize=(18,10))
         plt.title('Hierarchical Clustering: Complete Linkage')
         plot_dendrogram(model, labels=completeLinkage.labels_)
         plt.show()
```



2c) Average linkage

```
In [40]: model = AgglomerativeClustering(linkage="average",n_clusters=3)
         averageLinkage = model.fit(X)

         plt.figure(figsize=(18,10))
         plt.title('Hierarchical Clustering: Average Linkage')
         plot_dendrogram(model, labels=averageLinkage.labels_)
         plt.show()
```