Exercise 15: Extracting the cluster labels

In the previous exercise, you saw that the intermediate clustering of the grain samples at height 6 has 3 clusters. Now, use the `fcluster()` function to extract the cluster labels for this intermediate clustering, and compare the labels with the grain varieties using a cross-tabulation.

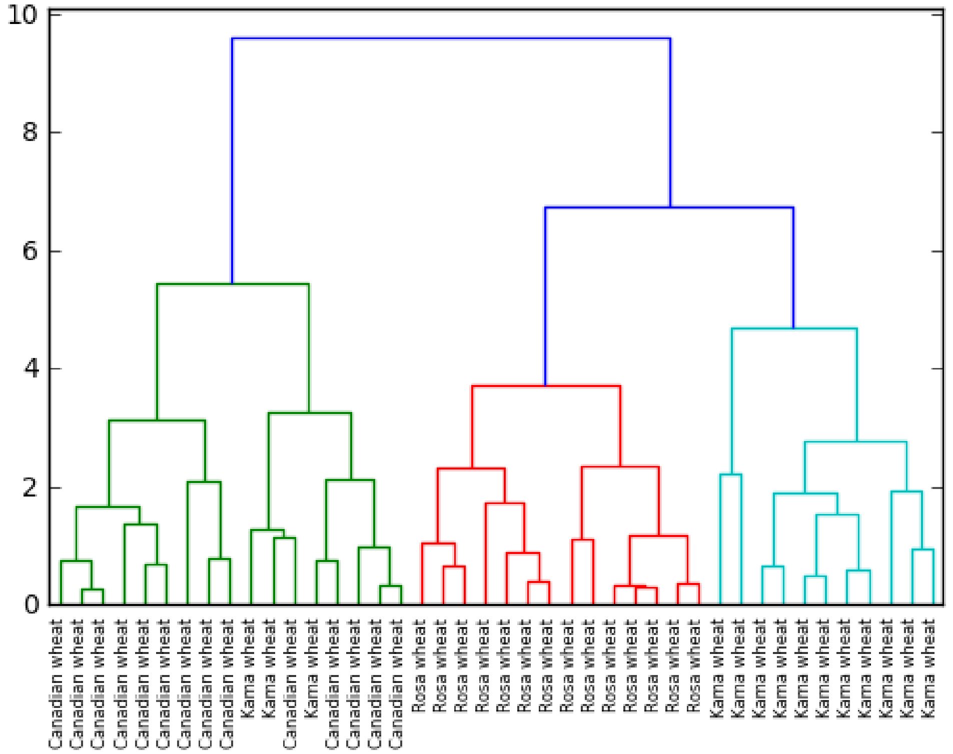
From the course *Transition to Data Science*. Buy the entire course for just $10 for many more exercises and helpful video lectures.

Step 1: Load the dataset: *(written for you)*

```
In [3]: import pandas as pd

        seeds_df = pd.read_csv('../datasets/seeds-less-rows.csv')

        # remove the grain species from the DataFrame, save for later
        varieties = list(seeds_df.pop('grain_variety'))

        # extract the measurements as a NumPy array
        samples = seeds_df.values
```

Step 2: Run the hierarchical clustering of the grain samples that you worked out earlier *(filled in here for you).*

```
In [2]: from scipy.cluster.hierarchy import linkage, dendrogram
        import matplotlib.pyplot as plt

        mergings = linkage(samples, method='complete')

        dendrogram(mergings,
                   labels=varieties,
                   leaf_rotation=90,
                   leaf_font_size=6,
        )
        plt.show()
```



Step 3: Import `fcluster` from `scipy.cluster.hierarchy`.

```
In [4]: from scipy.cluster.hierarchy import fcluster
```

Step 4: Obtain a flat clustering by using the `fcluster()` function on `mergings`. Specify a maximum height of `6` and the keyword argument `criterion='distance'`. Assign the result to `labels`.

```
In [5]: labels = fcluster(mergings, 6, criterion='distance')
```

Step 5: Create a DataFrame `df` with two columns named `'labels'` and `'varieties'`, using `labels` and `varieties`, respectively, for the column values.

```
In [6]: df = pd.DataFrame({'labels': labels, 'varieties': varieties})
```

Step 6: Create a cross-tabulation `ct` between `df['labels']` and `df['varieties']` to count the number of times each grain variety coincides with each cluster label.

```
In [9]: ct = pd.crosstab(df['labels'], df['varieties'])
```

Step 7: Display `ct` to see how your cluster labels correspond to the wheat varieties.

```
In [10]: ct
```

```
Out[10]: varieties  Canadian wheat  Kama wheat  Rosa wheat
         labels
         1                      14           3           0
         2                       0           0          14
         3                       0          11           0
```

```
In [ ]:
```