Exercise 8: Clustering stocks using KMeans

In this exercise, you'll cluster companies using their daily stock price movements (i.e. the dollar difference between the closing and opening prices for each trading day). You are given a NumPy array `movements` of daily price movements from 2010 to 2015, where each row corresponds to a company, and each column corresponds to a trading day.

Some stocks are more expensive than others. To account for this, include a `Normalizer` at the beginning of your pipeline. The Normalizer will separately transform each company's stock price to a relative scale before the clustering begins.

Normalizer vs StandardScaler

Note that `Normalizer()` is different to `StandardScaler()`, which you used in the previous exercise. While `StandardScaler()` standardizes **features** (such as the features of the fish data from the previous exercise) by removing the mean and scaling to unit variance, `Normalizer()` rescales **each sample** - here, each company's stock price - independently of the other.

This dataset was obtained from the Yahoo! Finance API.

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 data *(written for you)*

In [2]:
```
import pandas as pd

fn = 'datasets/company-stock-movements-2010-2015-incl.csv'
stocks_df = pd.read_csv(fn, index_col=0)
```

Step 2: Inspect the first few rows of the DataFrame `stocks_df` by calling its `head()` function.

In [6]:
```
stocks_df.head()
```

Out[6]:
```
                  2010-01-04  2010-01-05  2010-01-06  2010-01-07  2010-01-08  \
Apple               0.580000   -0.220005   -3.409998   -1.170000    1.680011
AIG                -0.640002   -0.650000   -0.210001   -0.420000    0.710001
Amazon             -2.350006    1.260009   -2.350006   -2.009995    2.960006
American express    0.109997    0.000000    0.260002    0.720002    0.190003
Boeing              0.459999    1.770000    1.549999    2.690003    0.059997

                  2010-01-11  2010-01-12  2010-01-13  2010-01-14  2010-01-15  \
Apple              -2.689994   -1.469994    2.779997   -0.680003   -4.999995
AIG                -0.200001   -1.130001    0.069999   -0.119999   -0.500000
Amazon             -2.309997   -1.640007    1.209999   -1.790001   -2.039994
American express   -0.270001    0.750000    0.300004    0.639999   -0.130001
```

```
Boeing              -1.080002   0.360000   0.549999   0.530002   -0.709999

                       ...      2013-10-16  2013-10-17  2013-10-18  2013-10-21  \
Apple                  ...        0.320008    4.519997    2.899987    9.590019
AIG                    ...        0.919998    0.709999    0.119999   -0.480000
Amazon                 ...        2.109985    3.699982    9.570008   -3.450013
American express       ...        0.680001    2.290001    0.409996   -0.069999
Boeing                 ...        1.559997    2.480003    0.019997   -1.220001

                    2013-10-22  2013-10-23  2013-10-24  2013-10-25  2013-10-28  \
Apple                -6.540016    5.959976    6.910011   -5.359962    0.840019
AIG                   0.010002   -0.279998   -0.190003   -0.040001   -0.400002
Amazon                4.820008   -4.079986    2.579986    4.790009   -1.760009
American express      0.100006    0.069999    0.130005    1.849999    0.040001
Boeing                0.480003    3.020004   -0.029999    1.940002    1.130005

                    2013-10-29
Apple               -19.589981
AIG                   0.660000
Amazon                3.740021
American express      0.540001
Boeing                0.309998

[5 rows x 963 columns]
```

Step 3: Extract the NumPy array `movements` from the DataFrame and the list of company names (*written for you*)

```
In [14]: companies = list(stocks_df.index)
         movements = stocks_df.values
```

Step 4: Make the necessary imports:

- `Normalizer` from `sklearn.preprocessing`.
- `KMeans` from `sklearn.cluster`.
- `make_pipeline` from `sklearn.pipeline`.

```
In [7]: from sklearn.preprocessing import Normalizer
        from sklearn.cluster import KMeans
        from sklearn.pipeline import make_pipeline
```

Step 3: Create an instance of `Normalizer` called `normalizer`.

```
In [8]: normalizer = Normalizer()
```


Step 4: Create an instance of `KMeans` called `kmeans` with `14` clusters.

```
In [15]: kmeans = KMeans(n_clusters=14)
```

Step 5: Using `make_pipeline()`, create a pipeline called `pipeline` that chains `normalizer` and `kmeans`.

```
In [16]: pipeline = make_pipeline(normalizer, kmeans)
```

Step 6: Fit the pipeline to the `movements` array.

```
In [17]: pipeline.fit(movements)

Out[17]: Pipeline(steps=[('normalizer', Normalizer(copy=True, norm='l2')), ('kmeans', KMear
             n_clusters=14, n_init=10, n_jobs=1, precompute_distances='auto',
             random_state=None, tol=0.0001, verbose=0))])
```

In the next exercise: Let's check out your clustering!

