

## **1. K-MEANS**

- a) Program from scratch the clustering algorithm k-means with random initialization.
- b) Download the data set S3 from <http://cs.uef.fi/sipu/datasets/>
- c) Apply the algorithm with  $k=15$  100 times, obtain the best value of the objective function and the average one. Plot the assignation for the best case.
- d) Implement K-means ++ initialization in your algorithm and redo point c)
- e) Perform the scree plot (with  $k$  from 2 to 20) for this data set using the best value of the objective function.
- f) (Optional) modify your k-means code for obtaining k-medoids.

## **2. FUZZY C-MEANS**

- a) Modify k-means for obtaining c-means.
- b) Perform the scree plot for the same data set.
- c) Plot the assignation for the best case.