# Medical Imaging

## Laboratory

‘Coding freaks’ instruction

# Kidney segmentation in DCE-MRI images using data clustering techniques.

## Input:

1. DCE-MRI data set for one health volunteer (74 time frames in 3D). The images are already registered in the time-domain.
2. Regions of interest (ROI) for the left and right kidney.

## Requested output:

1. ROIs for three renal segments: *cortex*, *medulla* and *pelvis*.
2. A program (Python/Matlab script or Java/C/C++ code) for calculation of the above-mentioned ROIs.

## Methods:

1. Use one of the state-of-the-art data clustering algorithms (pick one):
   1. K-means
   2. Particle Swarm Optimization (PSO)
   3. Expectation-Maximization (EM)
   4. …
2. For each voxel in the input ROI find its signal intensity **time course vector** (TCV).
3. **Group** TCV vectors using any of the methods listed above into **three** clusters.
4. Create the output ROIs (i.e. three separate 3D images) based on the obtained clustering results and save it in the Nifti file format. The non-ROI voxels should be set to 0.

Note, that If you decide to complete the ‘Coding freaks’ instruction, let me know which clustering algorithm you have chosen.