

## MIF23 : Analyse d'image : TP

**Object: Implement method for image segmentation or foreground object extraction or body parts segmentation**

### Task option list for TP:

In this TP students can chose and perform *any one* of these three tasks:

1. Image segmentation (partitioning an image in different coherent regions) i.e. region growing, relaxation labeling etc.
2. Foreground object extraction (simplest method is image thresholding, but remember there is no one method that gives good result for different types of images).
3. Body parts (head, arms, legs and torso) segmentation. To do this task foreground object extraction could be useful.

### Preliminary:

Perform basic image operations: read and generate an image (different formats: color) and visualize it.  
2 . To perform this TP, following preprocessing steps (already covered during the lectures) can be useful:

- a. noise removal / filtering
- b. image averaging / smoothing / low pass filtering

It is suggested to implement one (or more) preprocessing step(s) of your choice i.e. filtering, convolution with a smoothing mask etc.

### Pointers to main tasks:

1. Task of segmentation using region growing can be carried out by selecting appropriate seeds and treating them in parallel. Recall that (from the course material) it's a two steps algorithm:
  - a. growing regions around nuclei
  - b. merging similar adjacent regions
2. To understand the task of foreground object extraction and know state of the art, it is could be beneficial to read these two papers:
  - a. Human object tracking algorithm with human color structure descriptor for video surveillance system, S. Chien, W. Chan, D. Cherng, J. Chang *in* ICME 2006.
  - b. Statistical Modeling of Complex Backgrounds for Foreground Object Detection, L. Li, W. Huang, I. Gu, Q. Tian *in* IEEE transaction on image processing Nov 2004.
3. Methods for identifying body parts fall into two broad categories: model based and learning methods. Student can chose method of their choice.

Following papers could be useful and interesting:

- a. Body part segmentation of noisy human silhouette images, M. Barnard, M. Matilainen, J. Heikkila *in* ICME 2008.
- b. Recovering Human Body Configurations: Combining Segmentation and Recognition, G. Mori, X. Ren, Alexei A. Efros, J. Malik *in* CVPR 2004.

### Points to remember:

Successful completing of task requires analytical thinking, critical analysis of different approaches and development of the following aspects:

1. Appropriate choice of data structures for different critical steps of an algorithm. Warning!! it is important to handle computations complexity appropriately.
2. Termination criteria for iterative methodologies.
3. Selection of initial conditions.

## TP deliverables:

Following deliverables are expected:

1. Students are expected to submit source code for the implemented algorithm. The source code should be complete and commented well. Submission should include makefile or equivalent and all other dependent files necessary for compilation (compilation guidelines should also be provided).
2. Report for the TP, which should address the following aspects:
  - a. Pros and cons of implemented algorithm with respect to other existing algorithm (analysis).
  - b. Specific achievements i.e. novelty of proposition (if any).
  - c. Results on different images, result at different steps (if possible)
  - d. Report should be well structured and complete.
3. A demonstration of the software/algorithm will be made in the presence of both supervisors. The presence of all team members is mandatory (15 minutes to 20 minutes for the demo). The absence from the demo session will be considered as an absence from an exam.

## Note:

1. TP will be done in teams (2/3 students in each team).
2. Algorithm can be implemented in any useful language, and can use (preferably ) the software given by Jean-Claude Iehl , even some material from OpenCV for basic functionality (image manipulation: reading, creating, viewing images, ...).
3. You are strongly encouraged to write the report in English (ask for latex template file if you prefer to write report using latex).
4. French version of this proposal is available, please feel free to

Feel free to ask questions or discuss your ideas during TP sessions. Supervisors can also be reached through email (address given below) after TP sessions:

Jean-Claude Iehl : [jean-claude.iehl@univ-lyon1.fr](mailto:jean-claude.iehl@univ-lyon1.fr)

Saida Bouakaz : [saida.bouakaz@univ-lyon1.fr](mailto:saida.bouakaz@univ-lyon1.fr)