

### Presentation of the project

Segmentation of objects into an image is still a challenging problem in general and particularly in biomedical imaging. Biomedical images are usually complex and noisy, so classical segmentation methods based on thresholding or edge detection are not adapted. A possible approach is to use super-pixels (see figure 1), where pixels of similar content (color or intensity) are clustered together. This approach hence helps to reduce the complexity of the image to thousands of super-pixels region instead of millions of individual pixels.



Figure 1: Achanta et al., SLIC Superpixels Compared to State-of-the-Art Superpixel Methods, IEEE PAMI 2012.



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### Expected deliverables

The project of this internship is not to implement super-pixels methods but to study how to use super-pixels for segmentation of 2D and 3D data in biomedical images. The super-pixels image can be apprehended as a graph connecting the different super-pixels regions. The project will then consist in applying graph functionalities and properties to super-pixels. Various other ideas may also be implemented like merging of two regions, regions dilation, erosion, ...

### Keywords

Segmentation, graphs, super-pixels, 2D, 3D, biomedical imaging

### Applicant profile

- Master Degree or Engineer Student (last year of studies).
- Skills in programming, preferably Java.
- Basic notions of image processing and graph analysis.
- Interest in biomedical research.
- Available second semester 2017.

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