PhD offer at INRIA

Localization: INRIA Bordeaux Sud-Ouest (INRIA BSO) www.inria.fr

Team: Geostat (Geometry & Statistics in Acquisition Data), https://geostat.bordeaux.inria.fr/


Contact: H. Yahia, Geostat team manager, hussein.yahia@inria.fr

Starting date: September 2018

Subject: Advanced super-resolution techniques for high quality scanned images

Context: Geostat is an INRIA research team specialized in advanced signal and image processing. Geostat is associated with a world leader company in imaging devices, i2S (Innovative Imaging Solutions) in a InnovationLab starting in 2017. This PhD offer takes the form of a CIFRE funding where the applicant will work in close collaboration both with Geostat researchers and i2S engineers.

Project: In the framework of the acquisition chain and devices built by i2S, the objective of this PhD is to provide efficient algorithms able to merge different acquired images corresponding to slight spatial translational displacements in order to get a wider super-resolved image. Consequently, this PhD takes place within the general subject of super-resolution. At i2S, super-resolution is presently performed on monochrome images, and computed with the help of interpolation techniques performed on different acquisitions. Super-resolution is presently based on a priori knowledge of the sensor's displacement at subpixel level. The drawbacks of such an approach are clearly identified:

- limitation to monochrome images,
- the technique necessitates a very high mechanical precision in the sensor's displacements (problems in calibration/displacement's measure)
- the final gain in super-resolution is still limited

As a consequence, to overcome the a priori knowledge of the sensor's displacement would result in a great achievement in super-resolving images.

Subject: In this thesis, the applicant will explore and develop different approaches for proposing efficient solutions to this problem of super-resolution, for instance and among others: optimization approaches (convex and non-convex), machine learning and deep learning approaches, etc.

Skills: Applied mathematics/Physics or Computer science student with a good applied maths background (image processing, Fourier transforms, optimization techniques). A good knowledge of a computer language is necessary.

INRIA provides an unique context for research, equal opportunity environment.

Salary: equal opportunity, french PhD net income salary: 1593,50 EUR (first year).