Masters Internship Position

" Boats detection and counting in Mediterranean harbors using marked point processes "

Where: INRIA, Sophia Antipolis (near Antibes on the French Riviera), France.

Research group: Ariana/Ayin   http://www-sop.inria.fr/ariana

Internship advisor

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Context:

The Ariana-Ayin project aims to provide image processing tools to aid in the solution of problems arising in a wide range of concrete applications in Earth observation and cartography. The Master student will be working in collaboration with the French Space Agency in Toulouse and ACRI-ST in Sophia Antipolis.
The problem of feature detection from remote sensing images has been addressed in several applications (eg. environment, civilian and military). As the resolution of the provided aerial and satellite images is very high, a smart technique of analysis of such data needs to be developed. In order to achieve unsupervised objects extraction from remote sensing images a model of marked point process was previously introduced. It is basically a stochastic model that involves some information about the geometry of the objects present in the image.

Goal of the internship:

The current Master topic focuses on the detection and counting of boats in a harbor from aerial or high resolution satellite images. A particular challenge is that these objects are very close and aligned, which makes their discrimination difficult. For that purpose, a probabilistic model using marked point processes has to be constructed with an appropriate geometric prior model. Furthermore, an efficient data likelihood needs to be defined allowing an automatic parameter estimation. In particular, the direction of boats involved in the prior term has to be estimated automatically. While classical iterative parameter estimation algorithms, such as SEM, can be applied, they are rather time consuming. Therefore accelerating the proposed algorithm by well designed optimization strategies is an important part of the work.

Profile
The ideal candidate should have knowledge of image processing and applied mathematics, and be able to program in C++ and Matlab.

Salary and conditions:
The duration of the internship will be five to six months. Salary is €1100 per month net, including health care, if no funding from another body. For further details of life at INRIA and on the French Riviera, see the Ariana web site http://www-sop.inria.fr/ariana.

PhD continuation: possible if good results are obtained.