Post-Doctoral position on
Radar images analysis for landmines detection

1 Context

This post-doctoral position takes place in the frame of the TANDEM project, which involves several large and medium size french companies, as well as a number of research labs.

This project originates from relations between Ecole Polytechnique and several universities in Chili. Chili has signed the Ottawa treatise, and is committed to eliminate mines that were installed in the northern and southern parts of the country (around 600000 mines).

Within TANDEM, a new airborne solution will be developed, that will allow one to detect mines. The technique will consist in building in real time a 3D image of the land using a synthetic antenna borne on a ship flying at very low altitude. This will enable imaging mines buried in the ground at depths not larger than 40 cm. Images will have 7 x 7 x 7 cm resolution. Four square kilometres will be analysed per day, which is roughly one hundred times faster than known existing techniques.

To realize this program, three types of problems must be solved: antenna conception, Radar data sensing, and signal processing.

2 Post-Doctoral position topic

The post-doctoral position will be concerned with the last topic mentioned above, *i.e.* signal processing. To solve this signal processing problem, we will use model correction as well as land images correlation.

Radar images are notoriously irregular, and the difficulty will be to detect a signature of mines in such an irregular background. In that view, we will rely on multifractal and wavelet techniques. Since a model based approach will be used, the first step will be to study the multifractal features as well as the wavelet characterizations of the models. These will in turn be used as benchmarks against actual data analysis. To further enhance the process, comparison with available land images will be performed. Then, using statistical techniques, the presence of mines will be assessed along with confidence intervals.

3 Skills and Profile

A strong background in image analysis as well as in statistics is required. Programming skills are also mandatory. Some knowledge in wavelet and/or multifractal analysis would be a plus.

4 Contact

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5 Place of work

Inria Regularity team at Ecole Centrale Paris, Chatenay Malabry