



PhD position offering

Title: Interactive Maritime Anomaly Discovery under Uncertainty

Maritime anomaly detection is a challenging problem as the notion of “anomaly” itself is a relative and contextual one, depending for instance on meteorological conditions or the geopolitical context, but also on the user context such as the operator surveillance mission. As a consequence, an "anomaly" does not necessarily imply a suspicious behavior and thus the same event may trigger different types of responses under different contexts. As an example, the coast guard is mainly focused on safety issue than on security ones and a behavior of interest would be one hiding a possible distress

The purpose of this research will be to design a generic solution to reasoning support for maritime anomaly detection fitting the user needs and adapting to the context of use. In particular, will be explored the theoretical frameworks and methods to interactive learning as a means to bridge the gap between human and automated reasoning.

Yet, the traditional machine learning (ML) approaches do not put much emphasis on the human interactions, excepted in the labeling of training datasets. The early ML research mostly neglects the question of how humans can label ambiguous data (such as anomaly) and how they deal with inaccurate models. Interactive Machine Learning (iML) is a relative new approach that considers the human involvement and interactions in the learning process and thus aims at putting the human into the loop of classification process.

This research will target on how human can work hand in hand with algorithms, which we consider as the most promising concept of iML, while still considering the training-evaluation loop. A specific focus will be put on human uncertainty handling as natural language and subjective assessment concepts will be involved. For that reason, rich mathematical formalisms for uncertainty expression such as evidence theory, possibility theory or imprecise probability will be favored. The solution proposed should be able to handle information from heterogeneous sources, from sensors to humans.

Candidate profile:

Prospective candidates should have good skills in mathematics or statistics, Matlab/C/C++ and programming languages. Good skills in several of the following fields are appreciated: Computer vision, pattern recognition, machine learning. Applicants should demonstrate good oral and written communication skills in English, and be motivated to work as part of a multidisciplinary team. Besides, the candidate should show the motivation of working in the framework of a collaborative project with the opportunity of working alternatively at two different geographical sites located in Caen (France) and La Spezia (Italy).

Application:

Applications should include the following:



- Letter of interest
- Official transcripts (with grades and ranking) for Master 1 and Master 2 (or equivalent)
- Scientific CV
- List of publications (if any)
- Name & contact information of at least two 2 referees

Application deadline: October, 15th (application will be processed on the fly).

PhD start: November/December 2018

This position is subject to **security clearance** because of the ZRR qualification of the two laboratories.

Benefits:

Salary : ~1800 euros monthly gross salary.

Contact:

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