Institut de recherche de l'Ecole navale (IRENav), EA 3634
Lanvéoc-Poulmic, France
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Research and Development Position in Data/Information Science

Anomaly Detection in Vessel Location Data for Coastal Security

Context:

The ENDOUME project aims to design and develop a new solution to automatically secure a coastal maritime area. This innovative solution, based on machine learning algorithms but also rule-based analysis, meets various needs in terms of maritime security; sailing races, maritime events (e.g., G7 / G20, Cannes festival, nautical events, Olympic Games 2024…); port approaches, wind farms, marine protected area, etc.). The solution consists of (1) an autonomous coast station, comprising radar, optronic sensors and an AIS transponder, and (2) a set communicating beacons deployed on cooperative vessels connected through a resilient and secure radio network.

Under the umbrella of this funded project, we aim to detect and prevent marine events such as intrusions into a controlled access area or unusual behaviors that may pose a risk on a maritime event (a focus on sailing races is considered) and its ecosystem (including onshore areas) by a continuous monitoring and understanding of marine movements.

The research to be addressed concerns the development of innovative analytical and learning algorithms combined with rule-based analysis supporting maritime security. The research will be organized by the different works to conduct:

- Definition, modelling or learning of regular behaviours, patterns, and unwanted movements.
- Preparation, annotation, curation of dataset (learning and scenario design).
- Design and implementation of rule-based and learning algorithms.

The research will be based on historical data provided by the Automatic Identification System which provide location of ships on a regular basis as well as nominative information. A data stream with a fusion of optronic sensor data, radar data and AIS data will be provided by project partners.

Keywords: computer science, machine learning; anomaly detection; location-based data; dataset preparation; maritime security.

Location: Naval Academy Research Institute (IRENav), France - MOTIM research group

Period: 1st half of June 2021 – June 2022 (12 months)

Expected skills: good skills in machine learning and data analytics; knowledge in statistics and data fusion. Preferred programming language (Python, Java, C/C ++). Knowledge in databases and geographic information science is a plus. Speaking, reading, and writing in English.

Profile: Post-doctoral researcher or research engineer in computer science / data science

Salary: around 2400 Euros/month (medical insurance included).

Imperative: The candidate must be of European nationality.

Contact: Candidates should send their CV, motivation letter to Cyril RAY (cyril.ray@ecole-navale.fr) Abdel BOUDRAA (boudra@ecole-navale.fr) and Patrick Bot (Patrick.bot@ecole-navale.fr)