JOB OFFER (fixed-term contract, Assistant Engineer)

Image acquisition, banking and analysis of diatoms using optical microscopy

Type of employment

- Localisation: Laboratoire Interdisciplinaire des Environnements Continentaux (LIEC), Université de Lorraine, site de Metz (Campus Bridoux), 57070, France
- Contract: 10 months, starting as soon as possible, no later than September 2024
- Remuneration: 2150 euros (monthly gross salary)
- Required regulatory diploma: minimum bac +2 (DUT, BTS)

Hosting structure

The LIEC is a joint research unit (UMR) University of Lorraine / CNRS whose research work focuses on the understanding of the functioning of continental ecosystems strongly disturbed by human activity, with the aim of their rehabilitation. To this end, we implement interdisciplinary research combining the concepts and methods of environmental mineralogy, soil sciences, microbial ecology, colloidal physico-chemistry, ecotoxicology, functional ecology. The unit has around 130 people, divided into 5 research teams, and 4 competence centers which bring together the laboratory's different technical and experimental resources. The laboratory has 3 geographical sites, two in Nancy and one in Metz.

Under the authority of the co-head of the “Environmental Biology” competence center, the recruited person will work within the framework of the European project “iMagine” (Imaging data and services for aquatic science) which began on September 1, 2022. This project brings together around twenty participants whose common objective is to develop a set of image analysis tools based on artificial intelligence, serving the health of aquatic environments. Collaborations are also undergoing with INRAE (Cestas), LIST (Luxembourg) and Georgia Tech Europe (Metz).

Scientific context

Diatoms are microalgae present in all aquatic environments. They are notably used routinely as bioindicators for the ecological assessment of freshwaters. Water quality indices are calculated from taxonomic inventories of diatoms, which are known to present a very high diversity (more than 10,000 known morphological species). The traditional taxonomic identification of diatoms is based on optical microscopic observation of the morphology and ornamentation of their silica exoskeleton. This work requires a high level of expertise and is subject to multiple biases (operator experience, microscope quality), which justifies the development of a more robust tool, based on automatic image classification.

In this context, our team aims to develop a diatom identification tool based on an automatic shape recognition approach. Deep learning-based algorithms have been developed to detect diatoms present in an image taken under a microscope, which are then classified by identifying their morphological characteristics. These algorithms were developed using a limited dataset (number of images available, number of species represented). They must now be improved by completing this image dataset.

Details of missions and activities

The recruited person will aim to actively contribute to the acquisition of images of diatoms and their annotation in order to constitute an image dataset which will be later used to optimize the training of automatic recognition algorithms for these organisms:

- Development of a data management plan of all acquired data (images, annotations, associated environmental data) following the FAIR principles (Findable, Accessible, Interoperable, Reusable)
- Collection of images of diatoms: collection of images already available, acquisition of new images using an optical microscope (phase contrast, interference contrast)
- Contribution to image annotation tasks using dedicated software (ImageJ, Biigle, etc.): detection of objects of interest (diatoms VS debris), segmentation, taxonomic identification (according to expertise)

Key desired skills

Scientific skills

- Database creation and management
- Acquisition of diatom images (light microscopy)
- Use of image analysis tools (e.g. ImageJ, Biigle, etc.)
- Basic knowledge of diatom ecology

Transversal skills

- Dynamism, autonomy and teamworking
- Open-mindedness and ability to evolve in an interdisciplinary context (ecology and computer sciences)
- Very good oral and written communication skills in French
- Sufficient communication skills in English to ensure the link with international partners

How to apply

The application deadline is June 3rd, 2024. Your application must include:

- a CV including a list of skills relevant for the position
- a copy of the last obtained diploma
- a personalized cover letter explicitly referring to your experiences related to the position (internships/fixed-term contracts, etc.)
- contact details (name, link with the candidate, email and telephone number) of scientific reference(s)

The best applications will be selected for an interview. Please send your application in the form of a single pdf document to martin.laviale@univ-lorraine.fr