



## Post-doctoral position (2 years) on Artificial Intelligence and Bioacoustics

Keywords: Machine Learning, Bioacoustics, Deep Representation Learning, Soundscapes, Prediction, Visualization, AI-assisted Science.

Location: University of Saint-Étienne (France)

Duration: 2-year position, starting between now and September 2022

### TL;DR

You have a strong *background in machine learning*?

You want to develop new methods to help *tackling global change*?

You want to contribute to a *AI+bioacoustics platform*?

We are looking for a dynamic and motivated candidate to work in a stimulating environment at the intersection of two very active teams, one specialized in machine learning and the other in bioacoustics.

### PROJECT SUMMARY

In the context of global change, the use of aerial or aquatic soundscapes to characterize the complexity and dynamics of natural environments is rapidly developing. Processing the large volumes of data collected (sound recordings of very long duration) and optimizing interpretable models of soundscape classification using Artificial Intelligence techniques represent major scientific challenges. **The post-doc will develop novel machine learning approaches inspired and driven by bioacoustics applications. The successful candidate will contribute to the scientific core of a platform using Artificial Intelligence for Bioacoustics, based on new approaches for analysis, visualization and classification of natural soundscapes.** This project will be developed along 3 axes: 1) Learning and interpretation of soundscape representations, 2) Development of prediction models, 3) Development of an AI platform for bioacoustics.

## SOUGHT QUALIFICATIONS AND SKILLS

- ✓ A Ph.D. in statistical machine learning (or related)
- ✓ Strong programming and data analysis skills
- ✓ Curiosity and eagerness to work at the crossroads of two domains
- ✓ Prior experience with bioacoustics data (or audio or signal) is a plus
- ✓ Experience/interest for end-user application development can be leveraged

## GENERAL TASKS AND DIRECTIONS

- Creation of new representation/deep learning approaches for audio data
- Proposal of new similarity measures targeted to clustering and visualization
- Systematic evaluation of the methods on a variety of bioacoustics datasets
- Suggestion of novel use cases/applications of AI methods in bioacoustics
- Participation in the fieldwork to better understand bioacoustics processes
  
- Contributions will be integrated in an open platform (a prototype already exists and the project have dedicated engineering support to improve it).
- The successful candidate will have the opportunity to publish contributions in both computer science machine learning and bioacoustics.

## Contact both:

- Rémi Emonet [remi.emonet@univ-st-etienne.fr](mailto:remi.emonet@univ-st-etienne.fr)
- Nicolas Mathevon [mathevon@univ-st-etienne.fr](mailto:mathevon@univ-st-etienne.fr)

## LABORATORIES INVOLVED IN THE PROJECT

The post-doc will work in the stimulating environment offered by two laboratories from University of Saint-Étienne.

- [The ENES \(eneslab.com\)](http://eneslab.com) is a research team focused on bioacoustics (Centre de Recherche en Neurosciences de Lyon, CNRS, Inserm, University of St-Etienne), member of the Labex CeLyA (Centre Lyonnais d'Acoustique)(publications in Nature Communications in 2020, 2021, Current Biology 2022; numerous collaborations with foreign laboratories; 2 professors senior members of the Institut universitaire de France). The ENES constitutes a **unique ecosystem dedicated to bioacoustics**, with a team of about twenty researchers (PhD Students, Post-docs, Associate and Full Professors) and associated training courses (Bioacoustics Winter School, International Master of Bioacoustics).

- [The Hubert Curien laboratory](#) is a research unit (UJM-CNRS-IOGS) covering activities in optics, photonics, surface engineering, computer science, security and image processing. This lab coordinates the Labex MANUTECH-SISE, the EquipEx MANUTECH-USD and the EUR MANUTECH SLEIGHT. It also coordinates numerous ANR and European projects and is involved in the Labex PRIMES and MILYON. Its Artificial Intelligence (Data Intelligence) team has **strong expertise in Machine Learning** (NeurIPS, ICML, IJCAI, AISTATS, AAAI, etc.).

## SOME PUBLICATIONS FROM THE TWO TEAMS

- Grinfeder, E., Hauptert, S., Ducrettet, M. et al. *Soundscape dynamics of a cold protected forest: dominance of aircraft noise*. Landscape Ecology 37, 567-582 (2022).
- Marin-Cudraz, T., Muffat-Joly, B., Novoa, C., Aubry, P., Desmet, J-F, et al.. *Acoustic monitoring of rock ptarmigan: A multi-year comparison with point-count protocol*. Ecological Indicators, 101,710-719 (2019).
- Kerdoncuff T., Emonet R., Sebban M., *Sampled Gromov Wasserstein*. Machine Learning 110 (8), 2151-2186 (2021).
- Viola R., Emonet R., Habrard A., Metzler G., Sebban M., *Learning from few positives: a provably accurate metric learning algorithm to deal with imbalanced data*. IJCAI-PRICAI (2020).
- Emonet R., Varadarajan J., Odobez J-M. *Temporal analysis of motif mixtures using dirichlet processes*. IEEE TPAMI 36 (1), 140-156 (2013).