PhD Position: Machine Learning for Artificial Olfaction

SECTOR: Higher Education Institution

LOCATION: France, Grenoble

RESEARCHER PROFILE:
- First stage researcher,

INSTITUTION: Univ. Grenoble Alpes, University of Innovation

One of the major research-intensive French universities, Univ. Grenoble Alpes**1 enjoys an international reputation in many scientific fields, as confirmed by international rankings. It benefits from the implementation of major European instruments (ESRF, ILL, EMBL, IRAM, EMFL**2, CEA Minatex campus). The dynamic ecosystem, grounded on a close interaction between research, education and companies, has earned Grenoble to be ranked as the 5th most innovative city in the world. Surrounded by mountains, the campus benefits from a natural environment and a high quality of life and work environment. With 7000 foreign students and the annual visit of more than 8000 researchers from all over the world, Univ. Grenoble Alps is an internationally engaged university.

A personalized Welcome Center for international students, PhDs and researchers facilitates your arrival and installation.

In 2016, Univ. Grenoble Alpes was labeled «Initiative of Excellence », This label aims at the emergence of around ten French world class research universities. By joining Univ. Grenoble Alpes, you have the opportunity to conduct world-class research, and to contribute to the social and economic challenges of the 21st century ("sustainable planet and society", "health, well-being and technology", "understanding and supporting innovation: culture, technology, organizations" "Digital technology").

Key figures:

- + 50,000 students including 7,000 international students
- 3,700 PhD students, 45% international
- 5,500 faculty members
- 180 different nationalities
- 1st city in France where it feels good to study and 5th city where it feels good to work
- ISSO: International Students & Scholars Office affiliated to EURAXESS

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1 Univ. Grenoble Alpes
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MANDATORY REFERENCES:

IDEX PROJECT TITLE: AI for the Environment: "Detection, classification and localisation of pollutants in air and liquids"

SUBJECT TITLE: Machine Learning for Artificial Olfaction

RESEARCH FIELD: Computer science, Signal processing, Chemometrics, Engineering.

SCIENTIFIC DEPARTMENT (LABORATORY’S NAME): GIPSA-lab

DOCTORAL SCHOOL’S: EEATS

SUPERVISOR’S NAME: Simon Barthelmé (co-supervisor Pierre Comon).

SUBJECT DESCRIPTION:

Motivation. Chemical sensors are used in a wide array of tasks, for instance for the detection of pollutants or toxic chemicals. While most chemical sensors target a specific molecule, “artificial noses” are designed to be non-specific, and can detect a wide range of different molecules. Machine learning is directly involved: the instrument is exposed to the target molecules, the signatures of different molecules is learned, after which they can be recognised in the wild.

PhD description. Aryballe Technologies is a start-up company that has been developing a new technology for gas sensing based on Plasmon Resonance Imaging or silicon photonics. Aryballe’s instrument, the NeOse, shows a capacity for identifying molecules that is much beyond the state-of-the-art. While artificial noses are typically used in a highly-controlled laboratory setting, we have been trying to push the technology forward in more challenging environments (for instance, by equipping a mobile robot with a NeOse). In such environments, interesting problems for Machine Learning arise: (i) Signatures vary over time, and ML methods need to be made robust to changes induced by variation in environmental conditions; (ii) Gases mix, so that appropriate demixing algorithms should be devised. The PhD candidate will work on both of these problems. They will design and carry out experiments as well as develop appropriate signal processing and ML methods.

For more information on the project, see here.

Organization. The position is held within GIPSA-lab at University Grenoble-Alpes, as part of the MIAI chair on “AI for Environmental Applications: Detection, classification and localisation of pollutants in air and liquids”. GIPSA-lab is a highly dynamic work environment for signal processing and ML, with a strong focus on methods with sound theoretical footing. All work will be conducted in close collaboration with Aryballe Technologies, also located in Grenoble.

The candidate will be advised by Simon Barthelmé, CNRS research fellow, and co-advised by Pierre Comon (CNRS research director).

Expected Outcomes. Results will be published in international journals and presented at international conferences. Potential IP will also be considered.

Profile. The work will involve both experimental and theoretical aspects, so we will consider applicants from a relatively wide array of backgrounds: candidates from chemistry or experimental physics should be conversant with linear algebra and programming, and highly motivated to learn some ML and signal processing. Candidates with a computer science, statistics or signal processing background should be interested in experimental work, and should be open to discuss with chemists or biologists.

ELIGIBILITY CRITERIA

Applicants must hold a Master’s degree (or be about to earn one) or have a university degree equivalent to a European Master’s (5-year duration),
Applicants will have to send an application letter in French or English and attach:
- Their last diploma
- Their CV
- A short presentation of their scientific project (2 to 3 pages max)
- Letters of recommendation are welcome.

Address to send their application:
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