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). 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").

* ESRF (European Synchrotron Radiation Facility), ILL (Institut Laue-Langevin), IRAM (International Institute for Radio Astronomy), EMBL (European Molecular Biology Laboratory), EMFL (European Magnetic Field Laboratory)

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

** Univ. Grenoble Alpes
The growth of artificial intelligence systems has led to tremendous changes in the optimization methods used in machine learning. An important novelty in modern algorithms for learning is the use of dimension reduction. It consists in identifying pertinent directions in the variable search space and concentrating most computational efforts onto these directions. A successful and typical example of dimension reduction is the screening of variables for the lasso problem. The success of these methods is partly due to the fact that the optimization problem at hand is strongly structured and this structure is harnessed to produce computationally efficient methods. Indeed, structure is often present in Machine Learning as it is brought by regularization: for instance, L1-norm regularization, elastic net, etc. enforce sparsity of the models. In addition, it is well-known that the iterates of most popular optimization methods actually become sparse in finite time for these examples; at this point, the convergence of the algorithm gets faster.

However, many popular optimization algorithms are still structure-blind (e.g. Nesterov's fast algorithm) or structure-ignoring (e.g. Quasi-Newton methods) and can actually slow down identification by making the iterates leave an otherwise stable subspace. The goal of this thesis is thus to develop and analyze structure-adapted optimization methods both theoretically and practically on usual machine learning objectives.

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 English and attach:
- Their last diploma
- Their CV
- A short motivation letter
- Letters of recommendation are welcome.

Address to send their application: miai.optimization@gmail.com