2018-00252 - PhD Position / Decentralized Machine Learning M/F

**Contract type**: Public service fixed-term contract  
**Level of qualifications required**: Graduate degree or equivalent  
**Function**: PhD Position  
**Level of experience**: Recently graduated

### About Inria

Inria, the French National Institute for computer science and applied mathematics, promotes “scientific excellence for technology transfer and society”. Graduates from the world's top universities, Inria's 2,700 employees rise to the challenges of digital sciences. With its open, agile model, Inria is able to explore original approaches with its partners in industry and academia and provide an efficient response to the multidisciplinary and application challenges of the digital transformation. Inria is the source of many innovations that add value and create jobs.

### About the research centre or Inria department

The Inria Lille - Nord Europe Research Centre was founded in 2008 and employs a staff of 360, including 300 scientists working in sixteen research teams. Recognised for its outstanding contribution the socio-economic development of the Nord - Pas-de-Calais Region, the Inria Lille - Nord Europe Research Centre undertakes research in the field of computer science in collaboration with a range of academic, institutional and industrial partners.

The strategy of the Centre is to develop an internationally renowned centre of excellence with a significant impact on the City of Lille and its surrounding area. It works to achieve this by pursuing a range of ambitious research projects in such fields of computer science as the intelligence of data and adaptive software systems. Building on the synergies between research and industry, Inria is a major contributor to skills and technology transfer in the field of computer science.

### Context

This project will be carried out in the MAGNET Team at INRIA Lille in the context of the PAMELA Project funded by the French Research Agency. This project will also stimulate existing and emerging collaborations with other research groups on themes at the intersection between machine learning, distributed systems and privacy. In particular, MAGNET has collaborations on this topic with the MLIA team at LIP6 and the ASAP team at INRIA Rennes.

Industrial contact include snips (a startup developing privacy-friendly personal assistants for smartphones) and Mediego (an INRIA spin-off working on decentralized recommenders systems).

### Assignment

In the first 2 months, the student will study the state of the art and the relevant literature to investigate the ideas outlined above. We aim at finishing all research in 31 months to leave 3 months for completing all dissemination efforts (including the dissertation). Concrete applications will be pursued continuously throughout the doctoral research to provide inspiration and ensure applicability of the results.

### Main activities

We will first focus on the problem of decentralized model propagation: we assume that some users (nodes) in the network have learned a model from their local data, and we would like to propagate these models to other similar nodes through the graph. In a preliminary work, we have started to adapt a label propagation algorithm to the decentralized setting and to evaluate its performance.
for the propagation of models that can be averaged in a straightforward way (such as linear classifiers). This work has opened many important questions. For other types of models (e.g., decision trees, nonparametric models), one should carefully define how the information is propagated, and the influence of propagation on structured prediction models should also be investigated. From a theoretical point of view, we are particularly interested in proving convergence rates and estimating the robustness of these approaches. Privacy concerns have been studied in a preliminary approach. Connections with on-line learning will also be explored.

**Skills**

Technical skills and level required: The candidate will be required to have a solid background in machine learning, statistics, and algorithms.

Languages: English

**Benefits package**

- Subsidised catering service
- Partially-reimbursed public transport

**Remuneration**

With a fixed term contract in the public administration, the salary will be between 23 000 € and 27 000 € bruto yearly.

**General Information**

- **Theme/Domain**: Data and Knowledge Representation and Processing
  - Statistics (Big data) (BAP E)
- **Town/city**: Villeneuve d'Ascq
- **Inria Center**: CRI Lille - Nord Europe
- **Starting date**: 4/1/18
- **Duration of contract**: 3 years
- **Deadline to apply**: 1/26/18

**Contacts**

- **Inria Team**: MAGNET
- **Recruiter**:
  - Tommasi Marc / marc.tommasi@inria.fr

**Conditions for application**

**Defence Security**:

This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

**Recruitment Policy**:

As part of its diversity policy, all Inria positions are accessible to people with disabilities.

**Warning**: you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.