2018-01045 - Postdoctoral Researcher - Theoretical aspects of private machine learning for speech processing M/F

Renewable contract : Oui
Level of qualifications required : PhD or equivalent
Fonction : Post-Doctoral Research Visit

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 to 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

Inria Lille is seeking a postdoctoral researcher for a new European (H2020 ICT) collaborative project called COMPRISE. The successful candidate will be part of the Magnet team, which gathers 15 researchers (faculty, postdocs, PhD students) in the field of machine learning, with focus on learning from graph-structured data as well as decentralized and privacy-friendly algorithms. The team is very international and English is the working language.

COMPRISE is a 3-year Research and Innovation Action (RIA) aiming at new cost-effective, multilingual, privacy-driven voice interaction technology. This will be achieved through research advances in privacy-driven machine learning, personalized training, automatic data labeling, and tighter integration of speech and dialog processing with machine translation. The technology will be based on existing software toolkits (Kaldi speech-to-text, Maton dialog processing, Tilde text-to-speech), as well as new software resulting from these research efforts.

The consortium includes academic and industrial partners in France (Inria, Netfective Technology), Germany (Ascena, Saarland University), Latvia (Tilde), and Spain (Rooter).

Assignment

The postdoctoral researcher will work on the design and the validation of privacy-friendly speech-to-text based on machine learning techniques. He/she will address the following research questions:

- how to design private speech-to-text training algorithms with formal guarantees,
- how to define privacy and data protection for speech signals and speech-to-text tasks,
- how to formally characterize the amount of noise and the utility-privacy trade-off.

This research has an important machine learning component, mainly focusing on the underlying statistical theory, which will strengthen the existing research lines.

The research and experimentation will be conducted in the Magnet at Inria Lille, in tight collaboration with the Multispeech team at Inria Nancy and in connection with Saarland University and Rooter. Depending on his/her desires and aspirations, the successful candidate will have the opportunity to join Multispeech for extended periods of time, in order to benefit from the complementary scientific environments offered by the two teams.

This contract is for 2 years and may be renewed up to 2 more years.

Main activities

- Study privacy models (such as differential privacy, pufferfish privacy) and their applicability in the context of the project's architecture and requirements
- Design privacy-friendly training algorithms
- Implement algorithms in a library compliant with the other developments of the consortium
- Assess privacy/confidentiality of information
- Validate the proposed solutions
- Coordinate with the two other postdoctoral researchers to be recruited by Inria as part of this project, who will be working on personalized training and automatic data labeling

Additional activities

- Publish, report, and disseminate results
- Coordinate with related efforts in the team / community

Skills

Two alternative profiles are welcome, either:

- Strong background in mathematics, machine learning, statistics and algorithms
- Strong experience with implementation and experimentation, distributed systems, speech
Excellent English writing and speaking skills are required in any case.

Benefits package

- Subsidised catering service
- Sports facilities