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.

Contexte et atouts du poste

Job environnements

This Post-doc project takes place within the ANR project Colis. Its goal is to certify properties of Linux installation scripts. Our partner of University Paris Diderot models the actions of theses scripts as transformations of file systems viewed as data trees. Then the automatic verification of installation scripts can be obtained using algorithms that manipulate such transformations. Many of the properties that need to be verified can be reduced to the problem of equivalence of those tree transformations.

For instance, does the composition of an install script and its uninstall counterpart leave the file system unchanged ? We view these tree transformations as tree transducers of various sorts and thus the overall objective is to develop algorithms to solve the equivalence problem of tree transducers efficiently.

Mission confiée

Assignements

The objective of this project is to define normalisation techniques for models of tree transducers equivalent to Monadic Second Order (MSO) logic. Similar techniques have been developed by members of the Links projects (https://www.inria.fr/equipes/links) on models such as deterministic top-down tree transducers (LMN10), or Tree to String Transducers [LLN+11, BPI16]. Both those models have a sequential behavior. Sequentiality enables normal forms based on the notion of ‘earliest’ production which is already present in the work of [Cho03] on word transducers. However, these classes are not expressive enough to capture the whole class of MSO tree transformations. The class of Macro Tree Transducers (MTT) captures MSO transformations [EM99], but this models seems to lack the sequentiality properties necessary to apply the same techniques.

We propose to investigate other alternate models equivalent to MTT for which the notion of earliestness could be defined. These models would then serve as a means to obtain normal forms. In turn this would lead to efficient equivalence algorithms for the whole class of MSO tree transformations. It is expected that, beside its immediate impact on the Colis project, this normal form could also give rise to learning technics that are able to infer transducers from the observation of their behaviors.

Principales activités

Main activities

Research and collaboration with the team working on transducers.
**Compétences**
The candidate is expected to have a good competence in formal models, with a focus on models for tree transformations.

**Avantages sociaux**

**Benefits**
- Subsidised catering service
- Partially-reimbursed public transport
- Social security
- Paid leave
- Sports facilities
- Flexible working hours

More information about Lille:

http://www.liile3000.eu/portail/
http://www.lillemetropole.fr/mel.html

**Rémunération**

**Remunerating**
The gross monthly salary is 2653€