INRIA INTERNSHIP POSITION

Data mining for ecological accounting and material flow analysis

- Inria research team: STEEP
- Website of the Inria research team: http://steep.inrialpes.fr/
- Internship supervisor: E. Prados in collaboration with S. Fenet, P.Y. Longaretti, P. Sturm
- Supervisor's email address: Emmanuel.Prados@inria.fr
- Internship location (Inria's research centre): Grenoble
- Level of education of the candidate: Master 2
- Duration (in months): 6 -- Start date: 04/2013 -- End date: 10/2013 (dates are quite flexible!)

Keywords:
- Data mining, statistics, data correlations
- Ecological accounting, material flow.
- Socio-economic models for sustainable development.

Context and objectives of the internship:

One of the major issues in the assessment of the long-term sustainability of urban areas is related to the concept of "imported sustainability". Indeed, any city brings from the outside most of its material and energy resources, and rejects to the outside the waste produced by its activity. The modern era has seen a dramatic increase in both volume and variety of these material flows and consumption as well as in distance of origin and destination of these flows, usually accompanied by a spectacular increase in the associated environmental impacts. A realistic assessment of the sustainability of urban areas requires to quantify both local and distant environmental impacts; greenhouse gas emissions are only one aspect of this question.

In order to produce such an assessment for a given territory or urban area, one must first establish different types of ecological accounting: one must identify and quantify the different types of material and energy uses on the one hand, and the different types of impact associated to these uses. The first task is the object of Material Flow Analysis (MFA), while the second is more directly related to the logic of Life Cycle Analysis (LCA). One of the major challenges here is to obtain reliable MFA data at the region and "département" scales, either directly, or through appropriate disaggregation techniques.

To process such a disaggregation, we must first identify the drivers (which have to be available for the two considered levels: the aggregated level as well as the finer level) with which the target data are correlated. Until now such correlations have found more or less by hand. The goal of this internship is to explore and implement several methods of data mining which would allow automating this task.

This internship will have theoretical aspects and practical ones (implementation and tests). The method developed will be tested on own database. An complete analysis will done on three scales: the city of Grenoble, the “department” of Isère and the “région” Rhône-Alpes.
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Internship location:

This position is offered at the “Rhône-Alpes” Research Unit of INRIA, located near Grenoble. It takes place in the STEEP team (Sustainability, Transition, Environment, Economy and local Policy). STEEP is an interdisciplinary research team that tries to model regional transition to sustainability and develops mathematical and computational tools for decision-making. This group gathers physicists, modelers, geographers/planners, mathematicians and computer scientists.

Skills required:

- Knowledge of programming.
- Knowledge of data mining.
- An interest in sustainable development would be a plus.

Application:

Important note: Emmanuel Prados will not be available in December 2012. Peter Sturm is in charge of the recruitment for this internship.

- For international students: Please APPLY ONLINE via:
  http://www.inria.fr/recherches/mobilite-internationale/programme-internships/candidatures
  AND SENT a complete CV, a cover letter and a list of two references (telephone numbers and email address) to Peter Sturm as soon as possible: Peter.Sturm@inria.fr

- For French students: To apply, please send a pdf file containing a complete CV (eventually your publication list), a cover letter and a list of two references (with telephone numbers and postal and e-mail addresses) to Peter Sturm (Peter.Sturm@inria.fr) before the 7th of December 2012.

Deadline: 7th of December, 2012