



Offre n°2024-07608

PhD Position F/M Integration of forecasting methods into the optimization models: an application to city logistics

Type de contrat : Fixed-term contract

Niveau de diplôme exigé : Graduate degree or equivalent

Fonction : PhD Position

A propos du centre ou de la direction fonctionnelle

The Inria University of Lille centre, created in 2008, employs 360 people including 305 scientists in 15 research teams. Recognised for its strong involvement in the socio-economic development of the Hauts-De-France region, the Inria University of Lille centre pursues a close relationship with large companies and SMEs. By promoting synergies between researchers and industrialists, Inria participates in the transfer of skills and expertise in digital technologies and provides access to the best European and international research for the benefit of innovation and companies, particularly in the region. For more than 10 years, the Inria University of Lille centre has been located at the heart of Lille's university and scientific ecosystem, as well as at the heart of Frenchtech, with a technology showroom based on Avenue de Bretagne in Lille, on the EuraTechnologies site of economic excellence dedicated to information and communication technologies (ICT).

Contexte et atouts du poste

A central issue in city logistics is to design systems that move goods to, from, and within urban areas while meeting sustainability goals. Such city logistics systems are generally based on new business models, cooperation among stakeholders, resource sharing, consolidation, synchronization of operations, multi and intermodality. Here, we consider an orchestrator that manages a system involving freight transporters which can be carriers or logistics service providers. One of the critical activities of the orchestrator in coordinating and managing the resources offered by the freight transporters is to distribute the transportation demand among them. However, this task is complicated by the fact that transportation demand is uncertain.

To help the orchestrator in his decision process, we address the associated planning problem: the Allocation Resource Problem in city logistics with Demand Uncertainty (ARPDU). The ARPDU is an operational problem that typically has to be solved the day before the resources are deployed. Given the solution of the ARPDU, the orchestrator can inform the freight providers. They can then plan their activities for the next day by including the requests of the orchestrator in the set of the other logistics tasks they have to perform.

The ARPDU aims to determine what logistics facilities should be used and when and where the vehicles of the carriers should be assigned to cover the demand over the planning period in the most efficient way. More precisely, the ARPDU aims to select the facilities (crossdock platform, storage area, parking spaces...) to be used, the types and the numbers of vehicles (vans, cargo-bicycles,...), to determine what are their starting points and during which periods they are used. Additional operational constraints can be considered according

to the products delivered and to the logistics means.

A key feature of the ARPDU is that demand and its characteristics (quantity, origin, destination, time slots when the freight becomes available or may be delivered) is uncertain, i.e., unknown or partially known. In practice, the orchestrator must estimate the demand on the urban area for the considered time horizon using historical data. This demand forecast is based on a model of the urban territory that must be built first.

This thesis is performed in the context of the ANR project Adele.

Principales activités

This thesis is part of the general field of decisions-focused predictions. It will address the scientific challenge related to the integration of forecasting methods into the optimization models and solution methods. This implies determining useful information in available data, developing some ad-hoc forecasting methods, managing their integration into decision models, and developing innovative optimization algorithms in which the selection of the best demand estimators is part of the decision process.

The main steps of the thesis will be:

- . Demand modeling and design of forecasting methods;
- . Mathematical modeling;
- . Development (design and implementation) of innovative ad-hoc optimization algorithms based on mathematical modeling;

Compétences

Technical skills and level required :

Good knowledge in combinatorial optimization, Stochastic optimization, machine learning

Coding: C++, Java

Avantages

- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of teleworking and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Social security coverage

Informations générales

- **Thème/Domaine** : Optimization, machine learning and statistical methods
Scientific computing (BAP E)
- **Ville** : Villeneuve d'Ascq
- **Centre Inria** : [Centre Inria de l'Université de Lille](#)
- **Date de prise de fonction souhaitée** : 2024-09-01
- **Durée de contrat** : 3 years
- **Date limite pour postuler** : 2024-05-23

Contacts

- **Équipe Inria** : [INOCS](#)

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A propos d'Inria

Inria est l'institut national de recherche dédié aux sciences et technologies du numérique. Il emploie 2600 personnes. Ses 215 équipes-projets agiles, en général communes avec des partenaires académiques, impliquent plus de 3900 scientifiques pour relever les défis du numérique, souvent à l'interface d'autres disciplines. L'institut fait appel à de nombreux talents dans plus d'une quarantaine de métiers différents. 900 personnels d'appui à la recherche et à l'innovation contribuent à faire émerger et grandir des projets scientifiques ou entrepreneuriaux qui impactent le monde. Inria travaille avec de nombreuses entreprises et a accompagné la création de plus de 200 start-up. L'institut s'efforce ainsi de répondre aux enjeux de la transformation numérique de la science, de la société et de l'économie.

Attention: Les candidatures doivent être déposées en ligne sur le site Inria. Le traitement des candidatures adressées par d'autres canaux n'est pas garanti.

Consignes pour postuler

Please send your CV and cover letter.

Sécurité défense :

Ce poste est susceptible d'être affecté dans une zone à régime restrictif (ZRR), telle que définie dans le décret n°2011-1425 relatif à la protection du potentiel scientifique et technique de la nation (PPST). L'autorisation d'accès à une zone est délivrée par le chef d'établissement, après avis ministériel favorable, tel que défini dans l'arrêté du 03 juillet 2012, relatif à la PPST. Un avis ministériel défavorable pour un poste affecté dans une ZRR aurait pour conséquence l'annulation du recrutement.

Politique de recrutement :

Dans le cadre de sa politique diversité, tous les postes Inria sont accessibles aux personnes en situation de handicap.