2022-04405 - Internship: Mechanism Design via Flexibility Disaggregation

Type de contrat : Stage  
Niveau de diplôme exigé : Bac + 5 ou équivalent  
fonction : Stagiaire de la recherche

A propos du centre ou de la direction fonctionnelle

The Inria Lille - Nord Europe research center, created in 2008, employs 360 people including 305 scientists in 15 research teams. Recognized for its strong involvement in the socio-economic development of the Hauts-De-France region, the Inria Lille - Nord Europe research center 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 Lille - Nord Europe center has been located at the heart of the university and scientific ecosystem in Lille, as well as at the heart of Frenchtech, with a technology showroom based on avenue de Bretagne in Lille, on the site of economic excellence dedicated to information and communication technologies (ICT) that is EuraTechnologies.

Contexte et atouts du poste

The INOCS team aims to develop new models, algorithmic techniques and implementations for problems with complex structure according to three types of optimization paradigms: mathematical optimization, bilevel optimization and robust/stochastic optimization.

The intern will be hosted at Inria Lille-Nord Europe. Some collaborations are possible with EDF R&D lab at Paris Saclay and with the LIA, at the University of Avignon.

Mission confiée

Recently, [1] proposed a method to disaggregate an aggregate consumption profile over a set of flexibilities. The key point of this method is that it is privacy-preserving, meaning that individual consumers keep private the set of constraints characterizing their individual electricity usage. An iterative procedure is used between a utility company and the consumers, and the latter only provide binary information which allows the utility company progressing in the disaggregation task. The system operator controls the flexibilities to activate on the distribution grid, in order to minimize its activation cost while taking into account a number of network constraints capturing operational aspects as well as power-flows equations modeling the laws of physics of the power flows. In this framework, the flexibilities can come from individual consumers or from groups of consumers whose flexibilities are aggregated by a utility company (for example, flexibilities from electric vehicles can be reported by fleet/charging stations operator, flexibilities from water heaters by an aggregator, etc.). Utility companies may have a detailed access to the constraints of their consumers, but it is not necessarily possible nor adequate to take this level of detail in the system operator's flexibility activation problem, as the dimension of the resulting problem would be prohibitive, and for privacy reasons.

References


Principales activités

The problem is that consumers can often receive monetary gains by strategically misrepresenting their usage patterns (e.g., baseline inflation) and preferences to the utility company, and many of the incentive programs in deployment today are not robust to strategic data manipulation.

The goal of this internship is i) to model the interactions between the consumers– utility company as a principal–agent problem, ii) to develop a mechanism that the utility company can employ to design incentives while estimating the consumers’ utility functions/preferences, using the aggregated as well as the disaggregated flexibility data, iii) to quantify the impact of the sharing of information from the distribution system operator through the design of a network tariff reflecting the individual contribution of consumers on the congestion state of the network.

Compétences
We are looking for a highly motivated second year Master student, who would like to be involved in a 5 to 6 months internship. The candidate should have a very good background in mathematical optimization/game theory/operations research, interests for economics, and basic programming skills in python.

Avantages
- Subsidized meals
- Partial reimbursement of public transport costs
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities

Rémunération
Internship

Informations générales
- **Thème/Domaine**: Optimisation, apprentissage et méthodes statistiques
  - Système & réseaux (BAP E)
- **Ville**: Villeneuve d'Ascq
- **Centre Inria**: CRI Lille - Nord Europe
- **Date de prise de fonction souhaitée**: 2022-04-01
- **Durée de contrat**: 6 mois
- **Date limite pour postuler**: 2022-02-27

Contacts
- **Equipe Inria**: INOCS
- **Recruteur**: Le Cadre Helene / helene.le-cadre@inria.fr

A propos d'Inria
Inria est l'institut national de recherche dédié aux sciences et technologies du numérique. Il emploie 2600 personnes. Ses 200 équipes-projets agiles, en général communes avec des partenaires académiques, impliquent plus de 3500 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 180 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.

Consignes pour postuler

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.

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.