2020-02358 - PhD Position F/M [PhD] Non-stationary bandits for patient follow-up

Type de contrat : CDD
Niveau de diplôme exigé : Bac + 5 ou équivalent
Fonction : Doctorant
Niveau d’expérience souhaité : Jeune diplômé

A propos du centre ou de la direction fonctionnelle

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 Hauts-de-France région, 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

This PhD proposal is part of our new iBandits for Health project (B4H), funded by i-site Lille. This is a PhD in Machine Learning. B4H is grounded on a collaboration between SequeL Inria research group, and CHU Lille, INSERM research unit 1190. The goal of B4H is to explore how bandit algorithms may be used to improve post-surgery patient follow-up. More specifically, we will study, design, implement, and test new algorithms to recommend visits of a patient to a physician after a certain type of surgery.

Mission confiée

Goal of this PhD

The goal of this PhD is to study a new setting for bandits from a set of different perspectives:

- design algorithms that t to this setting
- from the theoretical point of view, aiming at formally proving properties of these algorithms
- assess their performance in synthetic environments
- assess their performance in the real setting, using the data that have been collected for more than 10 years at CHU Lille.

The main expected outcomes of this work are:

- publications in ML (NIPS, ICML, COLT, JMLR, ...) and in medicine,
- a software prototype,
- a PhD diploma, lights shed on how ML algorithms may improve post-surgery patient follow-up.

Principales activités

This PhD aims at studying non stationary bandits and their application in a certain context. Bandits model how an agent can learn to decide which sequence of actions to perform in an unknown environment [1, 2]. To learn an optimal behavior, the algorithm has to balance exploitation and exploration: exploitation of already acquired knowledge, and exploration to improve the knowledge about the situation, hence improvement decision making. While most of the works already done in the bandit literature deal with a fixed (stationary) environment, we will consider bandits in a non stationary environment in this PhD. Non stationary can mean many things. Indeed, we will consider so that it is the targeted application. This bandit model will be studied from a theoretical point of view to bound formally its performance. Experiments will complement this part.

The model will also be tested on empirical data, that is the data collected by the physicians on their patients. The goal is to recommend the type of the next visit the patient has to pay to a physician (GP, hospital, emergency, ...), and when this visit should happen. The bandit algorithms will be assessed on these data.

References


Compétences

- a strong interest in the topic of this PhD, machine learning, theory and practice.
- serious knowledge in statistics, probabilities, and applied maths more generally.
- ability (and interest in) to develop python programs; knowledge of and

Informations générales

- Thème/Domaine : Optimisation, apprentissage et méthodes statistiques
- Ville : Villeneuve d’Ascq
- Centre Inria : CNRS - Lille - Nord Europe
- Date de prise de fonction souhaitée : 2020-11-01
- Durée de contrat : 3 ans
- Date limite pour postuler : 2020-03-31

Contacts

- Equipe Inria : SEQUEL
- Directeur de thèse : Maillard Odalric-Ambrym / Odalric.Maillard@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 chercheurs et ingénieurs 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 contribuent à faire émerger et grandir des projets scientifiques ou entrepreneuriaux qui impactent le monde.

L’essentiel pour réussir

The PhD candidate will join the SequeL Inria group. She will be located in SequeL, on the campus of Villeneuve d’Ascq. She will interact with all the members of SequeL, currently made of 4 permanent researchers and more than 20 PhD students, and a couple of post-docs and engineers. The interactions with the group at CHU will be very easy, the CHU being located in Lille, just 30 minutes from Inria. SequeL is also a research group at the UMR CRISTAL, allated to the CNRS. The PhD will be done in the École Doctorale SPI. Administratively speaking, this is a PhD in Computer Science. This PhD will be co-supervised by Odalric-Ambrym Maillard and Philippe Preux.

The salary is the usual PhD grant salary in France. In France, a PhD is supposed to be defended at the end of the 3rd year of work.

Consignes pour postuler

CV, application letter, list of publications, one or more letters of recommendation and a short research statement.

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
experience with scikit-learn and other ML python packages is a plus.
  • ability to interact and people in English.

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 (after 6 months of employment) 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

Rémunération
1st and 2nd year : 1 982€ Gross monthly salary (before taxes)
3rd year : 2085€ gross monthly salary (before taxes)