A state of the art, bibliography and scientific references are available at the following URL: https://team.inria.fr/polaris/

For a better knowledge of the proposed research subject:
- Write research papers
- Develop numerical studies on applications
- Present research results at the main international conferences of the field.

The recruited person will be in connection with B. Gaujal and J. Anselmi who will supervise the PhD student.

The person recruited is responsible for developing the PhD thesis.

Important information concerning the COVID-19 epidemic: In case the rules by the French government and Inria related to the epidemic make it impossible for the candidate to physically start the position at Inria Grenoble, the position will start with teleworking.

Mission confiée
Assignments:
With the help of Bruno GAUJAL and Jonatha ANSELMI, the recruited person will be taken to complete a PhD.

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- Write research papers
- Develop numerical studies on applications
- Present research results at the main international conferences of the field.

At the intersection of machine learning, optimization and applied probability, the objective of this thesis consists in applying learning mechanisms to develop efficient online algorithms to optimize network dynamics and route particles towards the shortest paths. The building block underlying this project is the theory of Restless Multarmed Bandits (RMB) [3], a special case of Markov Decision Processes (MDP) [2]. RMBs and MDPs form a general family of controlled stochastic models suitable for the design of sequential decision-making problems. They appear in many fields such as biology, engineering, computer science, economics, medicine, operations research and provide powerful classes of processes for the modeling of complex systems. In a RMB problem, at each point in time one has the option of working on exactly d of N projects: a project (equivalently bandit, arm, object, etc.) is interpreted as a stochastic process evolving in a Markovian manner. Each project continues to evolve over time but the structure of its transitions depends on whether the project is in operation or not. At any point in time, a reward is received from each project depending on its state and its operation status. The goal is to design an optimal policy, i.e., a sequential rule for determining which project to activate at each point in time in order to maximize the expected cumulative discounted reward. The RMB problem is computationally difficult to solve. Matter of fact, it is PSPACE-hard in general [1]. In 1988, Whittle [3] proposed a relaxation of RMB problems where the constraint of having at most d bandits active at a time is relaxed to a time-average or discounted version of the constraint. Under some technical condition, called indexability, an optimal solution of such relaxation can be described by index values. This provides a heuristic for the original RMB problem, which is referred to as Whittle’s index policy in the literature. Whittle’s index policy is in general not an optimal solution for the

Informations générales

- Thème/Domaine : Calcul distribué et à haute performance
- Ville : St Martin d’Hères
- Centre Inria : CRI Grenoble - Rhône-Alpes
- Date de prise de fonction souhaitée : 2020-10-01
- Durée de contrat : 3 ans
- Date limite pour postuler : 2020-05-26

Contacts
- Equipe Inria : POLARIS
- Directeur de thèse : Anselmi Jonatha / jonatha.anselmi@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.

L’essentiel pour réussir

We are looking for highly motivated candidates willing to work both in computer science and applied mathematics. Some background on applied probability and optimization is highly appreciated.

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’autorisations 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
original problem but it performs strikingly well in practice. The starting point of this work is therefore the Whittle's index policy. In this respect, the primary objective consists in providing efficient methods to be able to apply it even in settings where the controller has not information about model parameters at time zero but can implement some learning mechanism.


**Compétences**

Technical skills and level required: Excellent student in applied probability and optimization.

Languages: French or English

Relational skills: Good communication skills will be a plus.

**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**