Offer #2024-07709

PhD Position F/M Gene set analysis of scRNA-seq data from multiple samples

Contract type : Fixed-term contract

Level of qualifications required : Graduate degree or equivalent

Fonction : PhD Position

Context

The SISTM team is looking for a PhD student on the subject of non-parametric Bayesian mixture modeling applied to cell type deconvolution from bulk transcriptomic RNA-seq data. The SISTM team belongs to both the Inserm U1219 Bordeaux Population Health and the INRIA Bordeaux Sud-Ouest research centers. Its activity is focused around developing and applying high-dimensional statistical learning methods and mechanistic modeling for innovative vaccine trials.

Single-cell RNA-seq (scRNA-seq) technology measures gene expression in hundreds or even thousands of cells from a single biological sample, allowing to study molecular mechanisms at the single-cell resolution. In immunology, this technology is increasingly used to disentangle the complex immune response to infection (or vaccination) while accounting for cellular heterogeneity in, the blood. Differential Expression Analysis (DEA) allows to identify which genes are differentially expressed across different conditions, cell types, timings or exposures. However, DEAs often encounter challenges related to statistical power and stability, notably due to the dynamic nature of gene expression and cellular state heterogeneity. Investigating instead gene sets associated with specific immune functions, derived from prior biological knowledge, can enhance the statistical power and stability of the analysis while facilitating the biological interpretation of results. Such a method could be applied to single-cell RNA-seq real dataset investigating the immune response to SARS-CoV-2 infection in humans, to investigate the difference in immune cells response to infection associated with various COVID severity levels

Contact :
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Assignment

- Scientific monitoring of new differential analysis methodologies for scRNA-seq data, which has been evolving rapidly in recent years.
- Developing novel methods for analyzing scRNA-seq data from multiple samples.
- Developing novel methods for gene set analysis of scRNA-seq data.
- Developing novel methods for controling multiple testing in gene set analysis of scRNA-seq data.
- Implementing development as an R package available on Bioconductor.
- Benchmarking new developments and apply them to real data from immunological studies.
- Communicating your results in international conferences and as scientific articles published in international peer-reviewed journal.

Main activities

- Monitoring scientific literature.
- Coding and implementation of existing methods.
- Conceptual development of new approaches.
- Implementation of new approaches
- Simulation and comparison of methods.
- Presentation of implemented methods both inside and outside the team, in the form of oral communications and/or scientific articles.

Skills

- A working knowledge of R programming and package development.
- A solid expertise in Biostatistics.

- A marked interest for biomedical and immunological research, and for its applications

Benefits package

- Subsidized meals
- Partial reimbursement of public transport costs
- 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

Remuneration

- 2100€ / month (before taxs) during the first 2 years,
- 2190€ / month (before taxs) during the third year

General Information

- **Theme/Domain :** Modeling and Control for Life Sciences
  Statistics (Big data) (BAP E)
- **Town/city :** Bordeaux
- **Inria Center :** Centre Inria de l'université de Bordeaux
- **Starting date :** 2024-10-01
- **Duration of contract :** 3 years
- **Deadline to apply :** 2024-06-25

Contacts

- **Inria Team :** SISTM
- **PhD Supervisor :**
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About Inria

Inria is the French national research institute dedicated to digital science and technology. It employs 2,600 people. Its 200 agile project teams, generally run jointly with academic partners, include more than 3,500 scientists and engineers working to meet the challenges of digital technology, often at the interface with other disciplines. The Institute also employs numerous talents in over forty different professions. 900 research support staff contribute to the preparation and development of scientific and entrepreneurial projects that have a worldwide impact.

Warning : you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.

Instruction to apply

Thank you to send:
- CV
- Cover letter
- Master marks and ranking
- Support letter(s)

Defence Security :
This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST).Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

Recruitment Policy :
As part of its diversity policy, all Inria positions are accessible to people with disabilities.