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TURING CENTRE
FOR LIVING SYSTEMS

Internship – bioinformatics engineer

Turing Centre for living systems

The Turing Center for Living Systems (CENTURI) is seeking a bioinformatics intern with a strong interest in the analysis of -omics data, primarily from high-throughput sequencing. The intern will work on an academic research project, within an engineering platform with a variety of skills.

During the internship, the student will work more specifically on a research project of transcriptomic analysis of the somatosensory cortex using a single-cell RNA-sequencing approach. The goal of the internship is to highlight transcriptional alterations during the development of somatosensory cortex cell types after deletion of the Neurod2 gene associated with autism.

Project description

Loss of the Neurod2 transcription factor, which is normally expressed in cortical excitatory neurons, is responsible for autistic disorders. Mice deficient (KO) for the Neurod2 gene show specific phenotypes such as impaired social behavior, migration, connectivity and neuronal excitability. This project aims to study the cell types and genes involved in this mechanism by analyzing single-cell RNA-seq data from Neurod2 WT and KO cortices at three ages (P8, P16 and P30).

The main axes of the internship project are as follows:

- 1- Identify the cell types and genes modified by the Neurod2 germline mutation.
- 2- Capture the temporal changes in gene expression of these cell types at the three ages.
- 3- Set up an analysis pipeline that can be reused on a computing cluster by the research project team.

Missions

The student will be responsible for:

- Take charge of the bioinformatics analyses of the project's single-cell RNA-seq data.
- Research the best methods currently published to achieve the required results.
- Design analysis reports to communicate results.
- Adapt the designed analysis pipeline to make it executable on HPC cluster.





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Profile sought

We are looking for a Master 2 student in bioinformatics with a strong interest in the analysis of biomic data, mainly from high-throughput sequencing, and in particular for single-cell RNA-seq. The trainee will analyze single-cell RNA-seq data while applying the good practices of open science (FAIR principles).

We are looking for a rigorous and autonomous person, capable of interacting easily with multidisciplinary teams (biology, bioinformatics, physics, mathematics, computer science) and of communicating on his/her analysis choices and results. Expertise and/or interest in R/Python code and neuroscience will be a plus.

Terms of reception

The Turing Center for Living Systems (CENTURI) is an interdisciplinary research center based in Marseille. The objective of the CENTURI project is to decipher the complexity of biological systems through the understanding of how biological function emerges from the organization and dynamics of living systems. In this context, the CENTURI multi-engineering platform (<https://centuri-livingsystems.org/multi-engineering-platform/>) has been created to provide additional expertise for academic research, in the field of bioinformatics but also image processing, optics/biophotonics, mechatronics, microfluidics, software/data management. The engineers are there to help and advise the CENTURI community in their daily research questions and to participate in longer term projects.

This internship project is the result of an interdisciplinary collaboration between the bioinformatics department of the CENTURI multi-engineering platform and the cortical development team of the Mediterranean Institute of Neurobiology (INMED).

The internship will take place at the CENTURI multi-engineering platform and will be co-supervised by Thomas Vannier (Bioinformatics engineer at the CENTURI multi-engineering platform) and Antoine de Chevigny (CNRS Researcher at INMED) who is the leader of this research project.

The student will be trained in single-cell RNA-seq data analysis and HPC cluster computing.

A very good experience in the analysis of single-cell data is present on the hosting platform but also in the CB2M team of the Marseille Luminy Immunology Center (CIML) with whom the trainee will be able to be helped in his/her analysis choices. The trainee will have access to the computing cluster of Aix-Marseille University (Mesocentre) to carry out this project which relies on the analysis of a large amount of data and algorithms that are expensive in terms of computing time.

Subject to mutual interest, CENTURI may offer a two-year fixed-term contract as a bioinformatics study engineer within the CENTURI multi-engineering platform.

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