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PhD student: deep learning in genomics to decode cellular identities in the human brain

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Company: VIB

Location: Leuven

Category: business-and-financial-operations

Description

The Yves Moreau and Stein Aerts research labs are looking for a shared PhD student to apply deep representation learning and large language models to decipher the genomic regulatory code, with a focus on the human brain. You will engineer new AI models to predict cell-type specific expression of all protein-coding genes in the genome, across diverse cell types in different regions of the human brain. Techniques will include Transformers, self-supervised learning, reinforcement learning, and generative AI models. Explainability of your models is essential, to discover new biological rules of the genomic regulatory code. As a secondary aim, your trained models can be applied to interpret human genetic variation and to improve the prediction of disease risk from the genome sequence.

The project, funded by an FWO Strategic Basic Research (SBO) grant, will focus on designing and testing genomic enhancers to target transgenes to specific cell types in the mouse brain and in cultured human brain biopsies using adeno-associated viral vectors. Whereas you will focus on AI modeling, other members in the consortium will perform wet-lab experiments to test your predictions and designed DNA sequences. This provides an opportunity to get acquainted with “wet-lab” experimental research. The PhD student will be stationed at in the Moreau group but will be embedded in both the and the labs as well as the new and the. The PhD student will be jointly supervised by Yves Moreau and Stein Aerts.

Publications

Check out some of our recent publications

From the Aerts lab, related to deep learning in genomics: Minnoye & Taskiran, Genome Research 2020; Kalender Atak & Taskiran, Genome Research 2021 Janssens, Aibar & Taskiran, Nature 2022 Taskiran et al., BioRxiv 2023 For all publications, see .

From the Moreau lab, related to deep learning: Verplaetse et al., Genome Biology 24 (1), 224, 2023 Passemiers et al., arXiv:2304.02383, 2023 Oldenhof et al., arXiv:2303.05148, 2023 Raimondi et al., Bioinformatics 37 (16), 2275-2281, 2021 For all publications, see

Profile

You obtained a Master's in Computer Science, Artificial Intelligence, Bioinformatics, Physics, Engineering, Bio-engineering, or equivalent. Please note that to be admitted to the doctoral training distinction (= cum laude) based on your study results or professional realizations is a strict requirement.

Comprehensive AI background (deep learning, probabilistic modeling, generative AI)

Proficient in Python programming

Experience with machine learning is a plus (e.g., PyTorch/Tensorflow/Keras)

Experience with explainable AI (e.g., SHAP) is a plus

Experience with high-performance computing, software containers

Experience with genomics is a plus, but not essential

Ability to work independently and in a team.

Proficiency in oral and written English.

We offer

Access to state-of-the-art compute & GPU infrastructure

A stimulating international research environment

You can be engaged in our SBO consortium, bringing together research labs across the University of Leuven, University of Antwerp, and VIB

Competitive salary and benefits

Fully funded PhD scholarship, but encouraged to apply for a national PhD fellowships (e.g., FWO).

Starting date: as soon as possible

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