PhD student: Machine learning in plant regulatory genomics

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Company: VIB

Location: Ghent

Category: computer-and-mathematical

Job descriptionThe Vandepoele research lab (Comparative Network Biology - https://www.vandepoelelab.be/) invites applications for a fully-funded PhD project for 1 year and extended with another 3 years (after positive evaluation) to study regulatory genomics in plants using different computational and -omics approaches.Starting from large-scale experimental datasets (e.g., bulk and single-cell RNA-Seq, ChIP/DAP-Seq protein-DNA interaction data, bulk, and single-cell ATAC-Seq) and the application of diverse supervised machine learning approaches (e.g., feature-based, deep learning, and explainable artificial intelligence), the goal of the project is to unravel the complex regulatory code controlling gene expression in the multicellular model plant Arabidopsis thaliana. Together with your colleagues in the Vandepoele lab, sharing complementary expertise in plant biology, genomics, and informatics, you will focus on characterizing the regulatory sequences driving context-specific gene expression in different organs, cell types, and stress conditions. Experimental validation of your computational results will be performed through collaboration with wet lab colleagues in the VIB-UGent Center for Plant Systems Biology.Relevant publicationsObtaining genetics insights from deep learning via explainableartificial intelligence. Novakovsky G, Dexter N, Libbrecht MW, Wasserman WW, Mostafavi S. Nat Rev Genet. 2023 Feb;24(2):125-137. doi: 10.1038/s41576-022-00532-2Predicting transcriptional responses to heat and drought stress   from genomic features using a machine learning approach in rice. Smet D, Opdebeeck H, Vandepoele K. Front Plant Sci. 2023 Jul 17;14:1212073. doi: 10.3389/fpls.2023.1212073MINI-EX: Integrative inference of single-cell gene regulatory networks in plants. Ferrari C, Manosalva Pérez N, Vandepoele K. Mol Plant.2022 Nov

7;15(11):1807-1824. doi: 10.1016/j.molp.2022.10.016Charting plant gene functions in the multi-omics and single-cellera. Depuydt T, De Rybel B, Vandepoele K. Trends Plant Sci. 2023 Mar;28(3):283-296. doi: 10.1016/j.tplants.2022.09.008 ProfileEssentialYou obtained excellent gradesin your bachelor and MSc degree (i.e., you belong to the top 25% of your cohort). Good programming (Python) and Linux/Unix/command-line skills are a must. You have a good understanding of molecular biology and recent RNA and DNA-based -omics profiling methods. You are enthusiastic about computational / systems biology and want to learn more about applying machine learning for (single-cell) regulatory data analysis.You have good communication and writing skills and have an excellent knowledge of written and spoken English. You are highly motivated,self-critical, you work with rigor, and you work accurately. You combine being a team player with a strong sense of autonomy and responsibility.You are willing to apply for additional funding when eligible.Desirable but not required Experience with machine learning (e.g., Scikit-learn/PyTorch/Tensorflow/Keras) is a plus.Experience with explainableAI (e.g., SHAP) is a plus. Experience withhigh-performance computing, software containers is a plus. Knowledge about plantbiology/genomics is a plus. Experience with software development tools (e.g., GIT/Nextflow) is a plus. We offerAn intellectually stimulating, international and multi-disciplinary research environment Access to state-of-the-arttools and (CPU/GPU) infrastructureHigh-quality training to develop hard and soft skills (VIB and UGent Doctoral Schools) Opportunities to participate in (inter)national workshops and scientific conferences A competitive salary including benefits The VIB-UGent Center for Plant Systems Biology is a world-leading science institution on the Techlane Campus in Ghent, Belgium. Ghent University is among the top 100 global universities according to several international rankings.Tentative starting date: August 2024 (to be discussed). How to apply?Interest candidates are invited to submit a detailed CV (clearly mentioning your computational skills), a cover letter outlining their research interests and relevant experience, academic transcripts, and contact information for at least one reference.Please submit your application via the VIB application tool.For more information or inquiries about the position, mail to klaas.vandepoele@psb.vib-ugent.beWe look forward to welcoming you to our team at the VIB-UGent Center for Plant Systems Biology!

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