PhD studentship in bioinformatics: Perturbation-based Multi-omics Inference of Gene Regulatory Networks

at the Science for Life Laboratory in Stockholm, Sweden, which is a strong research environment for large-scale life science research, and a joint physical center for a number of computational and life science groups at Stockholm University, KTH, and Karolinska Institutet. The research project will be supervised by Professor Erik Sonnhammer (http://sonnhammer.org/).

The goal of this project is to advance gene regulatory network (GRN) inference from multi-omics data by developing novel AI techniques that exploit the knowledge of gene perturbations (experimental design). It has previously been shown that using the perturbation design greatly boosts the quality of GRN inference on bulk data. The aim is to leverage this principle and develop new technology to unleash perturbation-based GRN inference for single-cell and spatial multi-omics data, to boost GRN quality and add the cell type and tissue heterogeneity dimensions to causal regulatory analysis. A deep learning framework will be developed with a specialized architecture to efficiently connect data with specific gene perturbations. A system for inferring the perturbation design based on gene expression and chromatin accessibility data will also be developed. The framework will be addapted and applied to spatial data to connect the GRN models to specific tissue phenotypes and to gain a better understanding of e.g. cancer development.

The successful candidate must be highly motivated and have an M.Sc. in bioinformatics or related field, and knowledge of molecular biology. Alternatively, an M.Sc. in molecular biology or related field and at least 1 year of documented practical experience in bioinformatics research and programming. Extensive experience with Python, Matlab, and R, and good UNIX knowledge are essential skills, as well as familiarity with biological omics data analysis techniques. Experience with PyTorch or TensorFlow is highly meriting.

To apply, follow the instructions on https://sonnhammer.org/download/ads/open.html. The position is fully funded for 4 years of full-time study and offers a competitive salary and excellent computational resources. For further information about the research project, contact Erik.Sonnhammer@scilifelab.se, Tel: +46-(0)70-5586395, http://sonnhammer.org