Post-Doc Position
Reinforcement Learning for Robust Bioreactor Control

Topic profile

theory/math

coding

wet-lab

Tags

#machine learning

#bioprocessing

#digital twins

Supervision

Benedikt Bollig

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Matthias Függer

CNRS Researcher at ENS Paris-Saclay

Thomas Nowak

Professor at ENS Paris-Saclay

We are looking for

Prerequisites are a completed PhD in a relevant subject (e.g., computer science or biology), a background in machine learning, and coding experience (in Python). We expect a curious, driven attitude and interest to work with us on an experimental setup in the wet-lab. The position is for one year and can be extended for another year.

The team

You will be part of an interdisciplinary research team at Laboratoire Méthodes Formelles in the ENS Paris-Saclay, near Paris, working at the interface between machine learning and synthetic biology.

Research

Many products of industrial or biomedical relevance, such as pharmaceuticals, biofuels, vaccines, etc., are manufactured by cultivating cells in a bioreactor. Finding a bioreactor setup or control policy that maximizes production while maintaining safe product quality is a paramount concern. The prevailing practice is to determine these by wet-lab experiments.

In this research program, we are looking for ways to save on time- and cost-intensive experiments by combining digital twins (a bioreactor's digital replica) with machine learning, particularly reinforcement learning. Specifically, we will train machine-learning models on biochemical reaction networks, an essential building block of digital twins allowing for realistic simulation of bioreactor runs. Despite the inherent stochasticity of many biochemical processes, we aim for a reinforcement-learning framework that provides bioreactor control policies with guarantees on the production outcome. Synthesized control policies will be validated in wet-lab experiments using a bioreactor at our disposal.

You are interested or would like to join us?

Please mail your questions or, in case you would like to apply, a short statement of interest, a curriculum vitae, and a list of publications to Benedikt Bollig (bollig@lmf.cnrs.fr), Matthias Függer (mfuegger@lmf.cnrs.fr), and Thomas Nowak (thomas@thomasnowak.net). Applications will be considered until the end of October 2023. The post-doc position is fully funded by the PEPR IA project SAIF and is expected to be taken up at the beginning of December 2023.