

Research Internship

Reinforcement Learning for Robust Bioreactor Control

Topic profile

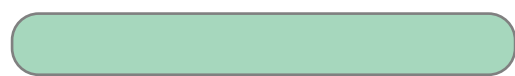
theory/math



coding



wet-lab



Tags

#machine learning

#bioprocessing

#digital twins

Supervision

Bunmi Adejimi

Post-doc at ENS Paris-Saclay

Benedikt Bollig

CNRS Researcher at ENS Paris-Saclay

Matthias Fuegger

CNRS Researcher at ENS Paris-Saclay

Thomas Nowak

Professor at ENS Paris-Saclay

What we are looking for

What we value most is a curious and driven attitude. An ideal candidate has a solid wet-lab experience in microbiology and an interest in artificial intelligence.

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 send us your questions and/or a short statement of interest and a curriculum vitae, to Benedikt Bollig (bollig@lmf.cnrs.fr), Matthias Függer (mfuegger@lmf.cnrs.fr), and Thomas Nowak (thomas@thomas-nowak.net). The start date of the internship is flexible, but the goal is to start in summer 2024.