University of Stuttgart

Stuttgart Research Center Systems Biology (SRCSB)

Systems Biology Seminar Talk

„Hybrid models enabling neural computation with metabolic networks “

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10 a.m. – 11 a.m.

Online over Webex:
https://unistuttgart.webex.com/unistuttgart/j.php?MTID=mc6ba1dde657446695a0e6b8a6ef58c30

Abstract:

Metabolic networks have largely been exploited as mechanistic tools to predict the behavior of a strain, with a defined genotype, in different environments. However, the performance of this constraint-based modelling approach relies on labor intensive experiments to determine media intake fluxes. The presentation will show how a Recurrent Neural Network can perfectly surrogate constraint-based modelling, and make a metabolic network suitable for backpropagation and consequently be used as an architecture for machine learning. The performance of the hybrid - mechanistic and neural - model, trained with experimental datasets of Escherichia coli growth rates in different media composition, will be showcased on cross-validation sets. Artificial Metabolic Networks are expected to provide easier discovery of metabolic insights and to prompt new biotechnological applications.

CV:

Prof. Jean-Loup Faulon is a senior research director at INRAe (National Institute for Agronomical Research and Environment), the course director of a master program in Systems and Synthetic Biology at the University of Paris-Saclay, co-director of the CNRS International Research Network in Synthetic biology and co-founder of Abolis Biotechnologies. He is also Professor in Synthetic Biology affiliated to the Chemistry School at the University of Manchester. Jean-Loup Faulon obtained his PhD in 1991 in computational chemistry at Ecole des Mines, Paris and a Habilitation in 2007 in theoretical chemistry from the University of Strasbourg. From 1991 to 2008, Jean-Loup Faulon was a principal investigator and a distinguished scientist at Sandia, a US national laboratory. He has also been a research director at the Joint Bioenergy Institute and the director of the CNRS institute of Systems & Synthetic Biology from 2010 to 2015. Jean-Loup Faulon is the author of more than 150 peer-reviewed publications and book chapters in bioinformatics, systems biology and synthetic biology. His current research interest lies in the applications of artificial intelligence to biotechnologies. His research group has developed several machine learning tools to engineer strains for bioproduction and biosensing.

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