Copenhagen
carrascomurielj@gmail.com

Jorge Carrasco Muriel

GitHub: carrascomj
in: jorgecarrascom

Education

PhD in Computational Biology   Sep 2021 - Aug 2024
Technical University of Denmark

My PhD thesis 'Data-driven Analysis of C1 Metabolism' focused on bridging knowledge gaps across the central dogma in the carbon-fixing, non-model organism *Clostridium autoethanogenum* through computational, data-driven analysis:

– Bayesian kinetic model of C1 metabolism (proteomics, metabolomics, thermodynamics).
– Genome-scale metabolic modeling [1] and its visualization [2].
– Self-Supervised Deep Learning in Genomics.
– Machine signal processing (ML and Bayesian) for transcriptomics of C1 Metabolism.

MSc in Bionformatics and Systems Biology   Sep 2019 - July 2021
Technical University of Denmark

Main courses: Next Generation Sequencing, Machine Learning and Deep Learning, Cell factories and omics integration, Statistics and data analysis.

BSc in Biotechnology   Sep 2015 - June 2019
Technical University of Madrid

Main courses: Molecular biology, Progamming, Biochemistry, Mathematics and Statistics.

Work Experience

MSc Internship and thesis   Feb 2021 - July 2021
Ginkgo Bioworks   *Boston, MA*

– Developed a software package for proteomics, metabolomics and thermodynamics in metabolic modeling [3] (github).
– Data integration from different strain design projects at Ginkgo (proteomics, transcriptomics, thermodynamics).

Research Assistant   Oct 2019 - July 2021
DTU Bioengineering, Biosustain   *Kongens Lyngby, DK*

– Developed and maintained software related to Systems Biology and metabolic modeling during my MSc degree (caffeine, cameo, pytfa, memote).
– Coauthored a paper in dynamic flux balance analysis [4].

Internship   Aug 2020 - Sep 2020
Lundbeck   *Copenhagen, DK*

– Graph convolutional Networks for macromolecular graphs (PyTorch).
– Data Mining of PDBs (Python).

BSc Internship and thesis   Nov 2018 - April 2019
CBGP - Biotechnology and Genomics Plant Center   *Madrid, SP*

– Developed ODE simulation framework with metabolic models (github).
– Unsupervised learning and Markov Decision Process for data integration [5, 6].

INTERNSHIP   Nov 2018 - April 2019
Spanish Center for Biotechnology-CSIC   *Madrid, SP*
Optimization of bioprocesses through dynamic simulations with multi-strain genome-scale metabolic models.

Publications

[1] Bingqing He et al. "A Genome-Scale Metabolic Model of Methanoperedens Nitroreducens: Assessing Bioenergetics and Thermodynamic Feasibility". In: *Metabolites* 12.4 (Apr. 2022), p. 314. ISSN: 2218-1989. DOI: 10.3390/metabo12040314. (Visited on 05/09/2023).

[2] Jorge Carrasco Muriel et al. "Shu: Visualization of High-Dimensional Biological Pathways". In: *Bioinformatics* 40.3 (Mar. 2024), btae140. ISSN: 1367-4811. DOI: 10.1093/bioinformatics/btae140. (Visited on 08/05/2024).

[3] Jorge Carrasco Muriel, Christopher Long, and Nikolaus Sonnenschein. "Simultaneous Application of Enzyme and Thermodynamic Constraints to Metabolic Models Using an Updated Python Implementation of GECKO". In: *Microbiol Spectr* 11.6 (), e01705–23. ISSN: 2165-0497. DOI: 10.1128/spectrum.01705-23. (Visited on 08/05/2024).

[4] David S. Tourigny, Jorge Carrasco Muriel, and Moritz E. Beber. "Dfba: Software for Efficient Simulation of Dynamic Flux-Balance Analysis Models in Python". In: *Journal of Open Source Software* 5.52 (Aug. 2020), p. 2342. ISSN: 2475-9066. DOI: 10.21105/joss.02342. (Visited on 05/09/2023).

[5] Beatriz García-Jiménez et al. *Dynamic Simulations of Microbial Communities under Perturbations: Opportunities for Microbiome Engineerin*. 2020. DOI: 10.21203/rs.2.24431/v1. (Visited on 05/09/2023).

[6] Jorge Carrasco Muriel, Beatriz García-Jiménez, and Mark Wilkinson. *Modeling Recovery of Crohn's Disease, by Simulating Microbial Community Dynamics under Perturbations*. July 2019. DOI: 10.13140/RG.2.2.33350.63049.

Skills

*P*rogramming	Python, Rust, C++, Git, R, SQL, Stan
*D*ata Science & ML	Pytorch, Tensorflow, Spark, pandas, tidyverse, pyro
*C*ommunication	Spanish (native), English (C1, IELTS 7.5), German (beginner), Danish (beginner)
*O*ther	Fullstack (actix, fastAPI, flask), relational databases, CI/CD, Unix, WASM