Yuxin Shen

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EDUCATION

University of Edinburgh, School of Biological Science, Edinburgh, UK

PhD student in Biological Science (with internship) Oct 2022 – present

- BBSRC EASTBIO PhD student
- Research on machine learning for the optimization of cells

Imperial College London, Department of Chemical Engineering, London, UK

MSc in Advanced Chemical Engineering

Master of Science with Distinction (Grade: 76.26/100) Oct 2020 – Sep 2021

- Core Modules: Modelling of Biological Systems, Advanced Bioprocess Engineering, Advanced Process Operations, Dynamical Systems in Chemical Engineering, Biochemical Engineering, Advanced Process Optimisation, Advanced Process Design
- Master thesis: A comparative study of surrogate methods in model-based design of experiments for parameter precision

Fudan University, Department of Chemistry, Shanghai, China

BSc in Chemistry Sep 2016 – Jul 2020

- Core Modules: Physical Chemistry I, II, III, Organic Chemistry I, II, Inorganic Chemistry, Analytical Chemistry I, II, Introduction to Modern Biological Science, Topics in Organic Chemistry, Inorganic Synthesis, Experiments in Modern Analytical Chemistry, and other related experiments
- Summer Program in Chemical Biology at University of Hong Kong
- Undergraduate dissertation: Synthesis and phosphorylated peptides enrichment ability of $Fe_3O_4@mPDA@Ti^{4+}$

SCIENTIFIC RESEARCH EXPERIENCES

PhD Research

School of Biological Science, University of Edinburgh Oct 2022 – present

Supervisor: Dr. Diego Oyarzún and Prof. Grzegorz Kudła

Machine learning for genotype-phenotype mapping

- Combined biological domain knowledge in feature engineering for machine learning.
- Worked on both supervised learning and unsupervised learning for sequence-to-expression modelling.
- Supervised learning models include RF, MLP, CNN, GNN and foundational DNA language models.

Incorporate ODE models of the cell into the machine learning pipeline

- Worked on simulation of a whole-cell model and conducted parameter estimation using Julia.

Active learning for biological sequence design

- Created an active learning pipeline for sequence generation and selection for optimal cellular performance.

MSc Research

Department of Chemical Engineering, Imperial College London Nov 2020 – Sep 2021

Supervisor: Prof. Benoit Chachuat

A comparative study of surrogate methods in model-based design of experiments

- Applied different surrogates (High Dimensional Model Representation, Artificial Neural Network, Bayesian Neural Network) to approximate the model sensitivities
- Conducted design of experiments with the surrogate sensitivities, and compared the performance of surrogates
- Demonstrated the effectiveness of the surrogate method in reducing computational cost and analysed the best applicable conditions of each surrogate

RESEARCH OUTPUT

1. Shen, Y., Kudla, G., & Oyarzun, D. A. (2024). DNA representations and generalization performance of sequence-to-expression models. bioRxiv, 2024-02.

WORKING & INTERNSHIP EXPERIENCES

R&D Technologist

Research and Development, Unilever (China) Shanghai Branch Jan 2022 – May 2022

- Worked on product development (formulation development) in laundry products for Homecare sector
- Focused on new functions and sustainable solutions in liquid/concentrated laundry product formulation

Bioprocess Engineering Intern

Pall Corporation, Danaher Life Science Early Career Program Sep 2021 – Dec 2021

- Assisted upstream bioprocess design for gene therapy and monoclonal antibody production for CMO companies
- Designed single-use systems for bioreactors and the filtration processes

Lab Intern
Quality & Safety Department, Coca-Cola Beverages (Shanghai) Co., Ltd. Jul 2020 – Sep 2020
- Conducted sensory tests, Laser Diffraction Particle Size Analysis, LC-MS, spectrophotometry, etc.
- Provided product feedback and process solutions according to experimental results

Bioanalysis Intern
Industrial Research Institute, Shanghai Fosun Pharmaceutical (Group) Co., Ltd. Dec 2019 – Feb 2020
- Assisted the PK/PD bioanalysis of the APIs for the generic drugs
- Reviewed LC-MS methodology validation reports and bioanalytical reports

HONORS & AWARDS

BBSRC EASTBIO PhD studentship (4-year full scholarship) Jun 2022
Graduate Scholarship of Department of Chemistry (The Third Prize) Jun 2020
Professional Scholarship of Department of Chemistry Oct 2018 & Oct 2017
Outstanding Student Scholarship of Fudan University (The Third Prize) Oct 2019 & Oct 2018 & Oct 2017
First Prize in Chinese Chemistry Olympiad in Shanghai Oct 2015

SCHOOL EXPERIENCES

EASTBIO Student Representative
BBSRC EASTBIO DTP Oct 2022 – present
EASTBIO student representative for College of Science and Engineering, University of Edinburgh
- Organize panel and poster sessions in EASTBIO Symposium
- Attend EASTBIO information sessions for applicants

EASTBIO lead student representative on industrial engagement committee
- Work on maintaining the network between industrial partners and PhD students

PROGRAMMING SKILLS

Programming: Python, Julia, R, Octave
- Python Packages for Scientific Computing and Visualization: NumPy, Pandas, SciPy, NetworkX, Matplotlib, Seaborn
- Python Packages for Machine Learning & Deep Learning: Scikit-Learn, PyTorch, PyTorch Geometric, Tensorflow, JAX
- Julia Packages: DifferentialEquations, DiffEqFlux, Optimization, Catalyst
- Shell Command line operations, Git, basic software testing and packing

Deep Learning for Healthcare Certificate on Coursera
Deep Learning Specialization Certificate on Coursera
Machine Learning Specialization Certificate on Coursera

ADDITIONAL SKILLS

Chemical Structure Characterisation: NMR, UV, Mass spectroscopy, IR, Raman spectroscopy, GC, HPLC, Gel electrophoresis
Software: LaTeX, Aspen HYSYS, GAMS, gPROMS, ChemDraw, etc.
English: IELTS 7.5

ATTENDED WORKSHOPS

EMBL Symposium: AI and biology Mar 2024
- Flash talk and poster presentation

BBSRC Inter-DTP Module in Software Engineering Feb 2024
Synthetic Biology UK 2023 Nov 2023
- Poster presentation

ELLIS Summer School on Machine Learning for Healthcare and Biology Jun 2023
EASTBIO Annual Symposium Jun 2023
- Organizer of the ”Student Perspectives on Industry” session (poster and panel discussion)

AI, Engineering Biology & Beyond - Turing Institute Workshop Mar 2023
- Volunteer of this workshop

EASTBIO Thematic Meeting “Computational tools for integrated Omics” Feb 2023
- Host of this seminar