Yuanfang XIANG

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EDUCATION

Bachelor of Engineering in Artificial Intelligence　　　　　　　　09/2022-06/2026 (Expected)

■ **Nanjing University,** Nanjing, China
● Relevant Coursework:
　Mathematical Analysis (94/100), Advanced Algebra (91/100), Discrete Mathematics (91/100),
　Mathematical Logics (92/100). Machine Learning (91/100), Advanced Machine Learning (100/100),
　Knowledge Representations and Reasoning (95/100).
● GPA: **4.52/5.00 (Ranking top 15%)**
● Thesis (In progress):
　Abductive-Learning-Based Data-Knowledge Alignment and Its Application in Genetic Perturbation Prediction
● Supervisor: CAS Academician, Prof. Zhi-Hua Zhou

■ **University of California, Berkeley,** USA **(Exchange Programme)**　　　　　06/2023-08/2023
● Coursework: Data Structures (A), Functional Neuroscience (A+)

PUBLICATIONS

● **Yuanfang Xiang**, Lun Ai, Adaptive Data-Knowledge Alignment in Genetic Perturbation Prediction, In *International Conference on Learning Representations*, 2026 (Accepted, Preprint: arxiv.org/abs/2510.00512)

● Feng Pan, Haibo Li, Jinwei You, Jiao Cang, Yanchufei Zhang, **Yuanfang Xiang**, Chenchen Yu, Lianjun Pan, Qipeng Zhang, Regulation of Endothelin Receptor Expression by MicroRNAs in the Corpus Cavernosum of Type 2 Diabetes Mellitus-Induced Erectile Dysfunction, *Biochemical Pharmacology*, 2025 (DOI: [10.1016/j.bcp.2025.117397](10.1016/j.bcp.2025.117397))

● Jing Zhao, Jingjing Liu, Nuo Zhang, Jing Wang, Lingfeng Qin, **Yuanfang Xiang,** Jiao Zhang, Qingwei Meng, Xiuxiu Wang, Wei Wei, Polyphosphate-driven metabolic network dynamically regulates bioelectricity generation in electroactive microorganism Shewanella, *Trends in Biotechnology*, 2025 (Under review)

RESEARCH EXPERIENCES

Industrial Internship on Knowledge-augmented AI for Protein Design　　　　12/2025- Present

■ Major Research Participant, Yangtze Delta AI Lab & BGI Genomics Changzhou Synthetic Biology Institute
● **Objective:**
To develop novel methods guiding protein design with biological-knowledge-augmented, comprehensible AI.
● **Main work:**
1. Building a model for thermal-stability prediction and optimization
2. Currently modelling protein thermal-stability with mechanistic reasoning based on protein secondary and tertiary structural information
3. Seeking approaches to integrate mechanistic modelling with Transformer-based learning on protein sequence
4. Hosting the regular meeting of the technical team (4 people) and organizing the collaboration

Research on Neuro-Symbolic Integration in Genetic Perturbation Modelling　　　12/2024- Present

■ Major Research Participant, Prof. Julio Saez-Rodriguez's Group, EMBL-EBI
● **Objective:**
To enable human-comprehensible and self-refined understandings in genome-scale systems biology modeling.
● **Main work:**
1. Constructed a microbial genome-scale perturbation model with Abductive Learning (a Neuro-Symbolic framework) for predicting genome-scale response to genetic perturbations.
2. Integrated Transcriptional Regulatory Networks (TRNs) and Genome-scale Metabolic Networks (GEMs) as knowledge bases for explainability and structured priors.
3. Developed neuro-symbolic fusion mechanisms with knowledge refinement strategies to address knowledge-data inconsistencies in real-world applications.
4. Contributed to an *ICLR 2026* paper on neuro-symbolic methods for genetic perturbation prediction.

Research on Applications of Abductive Learning   04/2024- Present
■ Research Participant, LAMDA (Learning And Mining from DatA) Group, Nanjing University
● <u>**Supervisor:**</u> Prof. Zhi-Hua Zhou
● <u>**Objective:**</u>
To apply Abductive Learning (ABL) to integrate knowledge-driven and data-driven AI in biological discovery.
● <u>**Main work:**</u>
1. Conducted literature research on theories and algorithms of neuro-symbolic approaches and their biological applications.
2. Developed an ABL-based system integrating external knowledge bases with gene expression prediction methods.
3. Analyzed general and theoretical advances in machine learning (online learning, rehearsal learning, reinforcement learning, learn wares, etc.).
4. Built foundations for my bachelor's thesis, *Abductive-Learning-Based Data-Knowledge Alignment and Its Application in Genetic Perturbation Prediction*.

Research on Regulatory Effects of miRNAs   10/2023- 01/2025
■ Research Participant, Prof. Qi-Peng Zhang's Lab, Nanjing University
● <u>**Objective:**</u>
To investigate neural regulations on instinctive behaviors, focusing on microRNA-mediated leptin regulations and neural regulation of addictive behaviors.
● <u>**Main work:**</u>
1. Performed transcriptomic data alignment, enrichment analysis, and ontology annotation.
2. Analyzed miRNA sequencing data related to leptin regulation.
3. Conducted literature review and theoretical and computational research on neural mechanisms of addictive behaviors.
4. Contributed to a Biochemical Pharmacology paper on microRNA regulation in diabetes-induced erectile dysfunction.

COURSE PROJECTS

***NEMU* RISC-V Emulator Project** (Introduction to Computer Systems)   08/2023- 12/2023
● Developed a full-system RISC-V emulator on x86 architecture using C, including:
    - Built a virtual machine emulating RISC-V instructions and hardware behaviors.
    - Implemented peripheral devices (I/O mapping, keyboard, VGA, audio, etc.).
    - Designed an operating system with system calls, time-piece-sharing, virtual memory, file systems, etc.
● Achieved compatibility with modern games through system integration.
● Approximately 20,000 lines of code total; personally contributed ~7,000 lines.

Deep Neural Network-based Image Super-Resolution (Python Programming)   05/2023- 06/2023
● Constructed an Image Super-Resolution model based on convolution neural networks (CNN) and Generative Adversarial Networks (GAN).

COMPETITIONS

The Collegiate Computing Competition of China   03/2025–08/2025
■Second Prize, Team Leader
● Created genetic perturbation prediction models using abductive learning and genome-scale modeling.

AI+ Innovation Competition, Nanjing University   06/2024–11/2024
■First Prize (Ranked1st), Team Leader
● Developed an abductive learning and biological ontology-based AI method in gene expression and regulation prediction, and a synthetic biology research workflow for constructing regulation pathways based on the AI method.
● Organized implementations and collaborations of the Git repository. Presented for the judging session.

iGEM (International Genetic Engineered Machine) Competition   11/2023–10/2024
■Gold Medal & Nominated Track Best Prize, Dry Lab Team Leader
● Developed AI models to predict regulatory pathways of polyphosphate metabolism in electroactive microbes.
● Organized works of the dry lab team and collaborations with the wet lab. Presented all works of the dry lab team for judging and poster sessions.

HONORS
● **People's scholarship**, Nanjing University (2023, 2024, 2025)

SKILLS
■ **Languages**: Chinese (Native) • English (fluent, TOEFL: 107)

■ **Computer skills**: Proficient in Python and C (capable of independently developing systems with 5,000+ lines of code), familiar with data science tools (PyTorch, Scikit-Learn, NumPy, Pandas, etc.), and Bioinformatic tools (transcriptomic analysis, ontology, regulatory and metabolic simulation, etc.)

EXTRACURRICULAR ACTIVITIES
● Member of the executive team, Photography Association of Nanjing University (2022-2024)
● Volunteer, Nanjing University Freshman Recruitment (2023-2024)