上海交通大学自动化系
Department of Automation
Shanghai Jiao Tong University

系统控制与信息处理教育部重点实验室
Key Laboratory of System Control and Information Processing, Ministry of Education

学术报告会

时间：2025年5月7日 10:00
地点：电信群楼2-410会议室

时空智能——量化生物分子时空信号的机器学习技术

于国强 教授
清华大学

摘要:
Optical recording of intricate molecular dynamics is becoming an indispensable technique for biological studies, accelerated by the development of new or improved biosensors and microscopy technology. This creates major computational challenges to extract and quantify biologically meaningful spatiotemporal patterns embedded within complex and rich data sources, many of which cannot be captured with existing methods. Here, we introduce Activity Quantification and Analysis (AQuA2), a fast, accurate, and versatile data analysis platform built upon advanced machine learning techniques. It decomposes complex live imaging-based datasets into elementary signaling events, allowing accurate and unbiased quantification of molecular activities and identification of consensus functional units. We demonstrate applications across a wide range of biosensors, cell types, organs, animal models, microscopy techniques, and imaging approaches. As exemplar findings, we show how AQuA2 identified drug-dependent interactions between neurons and astroglia, and distinct sensorimotor signal propagation patterns in the mouse spinal cord。

简介:
于国强，清华大学自动化系长聘教授，清华大学麦戈文脑研究院研究员，清华大学信息国家研究中心研究员，教育部“长江学者”，国际期刊Neuron顾问委员会委员，BMC Bioinformatics和Bioinformatics Advances等国际期刊编辑，中国生物信息学学会（筹）生物医学影像信息学专委会主任，曾获得美国国家自然科学基金的青年成就奖（NSF CAREER Award），Neuron和BIBM等多家期刊会议最佳论文奖，弗吉尼亚理工大学杰出教师奖和突出研究成果奖。研究方向为人工智能与生物医学问题交叉，特别是对脑科学数据建模与分析感兴趣。任职清华前，曾任美国弗吉尼亚理工大学（Virginia Tech）电子与计算机工程系终身教授。是美国NIH脑计划联盟和数据科学联盟核心成员，曾担任美国NIH和NSF资助的R01和U19系列等5项科研项目首席科学家。以第一作者或通讯作者在国际著名期刊Cell, Nature Neuroscience, Neuron, IEEE PAMI, JMLR, Bioinformatics以及国际顶级学术会议NeurIPS，ICML等发表论文40多篇，以及在Science, Nature Medicine等其他杂志与学术会议发表文章60多篇。

（邀请人：孙仕亮）