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OKINAWA INSTITUTE OF SCIENCE AND TECHNOLOGY
沖縄科学技術大学院大学

THEORETICAL SCIENCES VISITING PROGRAM

TSVP TALK

What Can Artificial Neural Networks Learn From Biological Neuromodulatory Systems?

2024
FRI.

May. 31

15:00–16:00

HYBRID L5D23, ZOOM



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Neuromodulators are signalling chemicals in the brain, which control the emergence of adaptive learning and behaviour. Neuromodulators including dopamine, acetylcholine, serotonin and noradrenaline operate on a spectrum of spatio-temporal scales in tandem and in opposition to reconfigure functions of biological neural networks and to regulate global cognition and state transition. Although neuromodulators are important in shaping cognition, their phenomenology is yet to be fully realized in artificial neural networks (ANNs). In this talk, I will first give an overview of the biological organizing principles of neuromodulators in adaptive cognition and highlight the competition and cooperation across neuromodulators. I will then discuss ongoing research on bio-inspired mechanisms of neuromodulatory function in ANNs and propose a computational framework to incorporate their diverse functional settings and inspire new architectures of “neuromodulation-aware” ANNs.

Newcastle University

Srikanth Ramaswamy

Dr. Srikanth Ramaswamy, is a Marie Curie Fellow, a Lister Prize Fellow and an Assistant Professor in computational neuroscience at Newcastle University. He is also a Fulbright Scholar at MIT and a Theoretical Sciences Visiting Scholar at OIST. He directs the Neural Circuits Laboratory at Newcastle University. His research focuses on the role of neuromodulators in shaping cognition in biological neural networks and building biologically-informed neural network models. He is a founding scientist of the Blue Brain Project at Ecole Polytechnique Federale De Lausanne (EPFL). He earned his PhD at the EPFL in computational neuroscience, where he developed data-driven modelling frameworks for biologically detailed digital models of neural networks. As a scientist of colour, Dr. Ramaswamy is passionately committed to promoting diversity, equity, and inclusion and is a founding member of the ALBA network, where he leads efforts to advance DEI in neuroscience, including launching the ALBA diversity podcast series in late 2020, highlighting the stories of emerging neuroscientists from underrepresented backgrounds.



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