NCM SATELLITE MEETING DETAILED DAILY PROGRAM

NCM Satellite Meeting, Toyama, Japan
April 22 & 23, 2019
Scientific session will be held at the Toyama International Conference Center

Predictive coding and active inference to know and explore the world

Exploration is innate to our motor control and motor learning systems. A central computational function of our brain is to proactively generate action to gain valuable sensory states rather than passively react to changes of the environment. In this function, the optimal inference via integration of the prediction and the feedback information from the external world plays a critical role. A question here is how our nervous system for motor function embeds this computation.

In the past two decades, a normative approach on motor control and learning has illustrated that the brain is capable of controlling the body in a stochastically optimal manner by integrating multimodal sensory information every time seconds. Indeed, the Bayesian theory, the Kalman filtering theory, as well as the LQG theory have provided us with a unified computational account of the motor control. However, the block diagram view of the computational anatomy of the brain might miss something important buried in the sophistication in the hierarchical architecture of the motor nervous system.

The goal of this satellite meeting is to discuss how the computational integrity of the motor control system is achieved with the predictive coding of the sensory outcome and errors which are embedded differently among multiple layers of hierarchical structure in the sensorimotor transformation mediated by the nervous system. To explore this view, we adopt a multi-disciplinary approach by getting together with the robot scientists, the computational/behavioral scientists, and the neurophysiologists.

The satellite is organized by Tadashi Isa, Kyoto University; Kazuhiko Seki, National Institute of Neuroscience; Daichi Nozaki, The University of Tokyo; and Jun Izawa, Tsukuba University

Monday April 22

17:00 – 19:00   Satellite Registration, ANA Crowne Plaza Hotel Lobby

18:00 – 19:00   Satellite Drinks Reception, ANA Crowne Plaza 1F Café

Tuesday April 23

08:00 - 08:30   **Registration**

08:30 – 09:30   **Tutorial Lecture: A theory of how active behavior stabilizes neural activity: Neural gain modulation by closed-loop environmental feedback**
Taro Toyoizumi & Takuya Isomura, RIKEN CBS

9:30 – 10:00   **Coffee Break**

10:00 – 11:50   **Session 1: Active inference in broad perspective**

10:00 – 10:30   **Cognitive neurorobotics studies using the framework of predictive coding and active inference**
Jun Tani, Okinawa Institute of Science and Technology

10:30 – 11:00   **Neuronal attractor dynamics: coupling perception, movement generation, and learning**
Yulia Sandamirskaya, ETH

11:00 – 11:30   **Lateralized modulation of responses to sensory consequences of voluntary actions**
Roy Mukamel, Tel-Aviv University

11:30 – 11:50   **Large-scale cortical networks for hierarchical prediction in coding in the primate brain**
Zenas Chao, Kyoto University

11:50 – 13:00   Lunch

13:00– 14:00   **Session 2: Active inference in the multiple sensorimotor loops**

13:00 – 13:30   **Spinal and cortical neural mechanism for active inference in volitional movement**
Kazuhiko Seki, National Center for Neurology & Psychology

13:30 – 14:00   **Goal-directed adaptive motor control in mice**
Mackenzie Mathis, Harvard University

14:00 – 14:20   **Predictive eye movement control in fish and humans**
Yutaka Hirata, Chubu University

14:20 – 14:40   **The somatosensory cortex encodes anticipatory signal during voluntary movement**
Tatsuya Umeda, National Center for Neurology & Psychology

14:40 – 15:10   **Coffee Break**

15:10 – 17:00   **Session 3: Predictive motor control viewed from active inference**

15:10 – 15:40   **Predictive setup of implicit sensorimotor processing according to tasks and environments**
Hiroaki Gomi, NTT

15:40 – 16:10   **Sensory-motor reverberating circuit controls perception**
Masanori Murayama, RIKEN CBS

16:10 – 16:40   **Predictive sensing: The role of motor signals in vestibular processing during active movements**
Kathleen Cullen, Johns Hopkins University

16:40 – 17:00   **Driving limb control principles using a neuromechanical Drosophila model**
Victor Lobato-Rios, EPFL

17:00 – 17:15   **Transition Time**

17:15 – 18:15   **Keynote Lecture - Computational models for learning from a small sample**
Mitsuo Kawato, ATR

19:30 – 21:30   **Opening Reception for Annual Meeting,**
Please Note: If you registered to attend the Satellite Meeting ONLY and want to attend the dinner, tickets can be purchased at the registration desk.