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Title

The Study of Intelligent Machines

Abstract

The capabilities of brains arise from the circuit architecture of the distributed neural circuits that compose the nervous system. In the past, our knowledge of brain circuit architecture was largely descriptive, based on classical neuroanatomy. This has changed recently, with brain-wide digital data sets being systematically gathered and computationally analyzed. At the same time, there has been significant technological progress in machine intelligence, due in part to algorithms inspired loosely by neural circuitry. The talk will present a cross-disciplinary research program that spans neural circuit mapping and the study of machine learning algorithms. The hope is that the simultaneous study of biological and technological intelligent machines will yield insights into common underlying principles.

Biography

Partha Mitra is the Crick-Clay Professor of Biomathematics at Cold Spring Harbor Laboratory in Cold Spring Harbor, NY. Dr. Mitra received his PhD in theoretical physics from Harvard in 1993. He worked in quantitative neuroscience and theoretical engineering at Bell Laboratories from 1993-2003 and as an Assistant Professor in Theoretical Physics at Caltech in 1996 before moving to Cold Spring Harbor Laboratory in 2003. Dr. Mitra holds the H N Mahabala Chair Professorship (visiting) at IIT Madras (India) holds adjunct positions at NYU and Cornell Medical School. Dr. Mitra is a fellow of the American Physical Society and a Senior Member of the IEEE.

Dr. Mitra is interested in understanding intelligent machines that are products of biological evolution (particularly animal brains), with the basic hypothesis that common underlying principles may govern these "wet" intelligent machines and the "dry" intelligent machines that are transforming the present economy. Dr. Mitra initiated the idea of brain-wide mesoscale circuit mapping, and his laboratory is involved in carrying out such mapping in the Mouse and the Marmoset. Whole brain imaging data from these projects at light microscopic resolution can be viewed at http://brainarchitecture.org/.

Dr. Mitra is the author of Observed Brain Dynamics (Oxford University Press) and cofounded and co-directed summer courses at the Marine Biological Laboratories and the Cold Spring Harbor Laboratory on Neuroinformatics, Genome-Wide Data Analysis and Vertebrate Neuroanatomy. He founded a course on Machine Intelligence and Brain Research at IIT Madras.