



Graduate School of Informatics
Kyoto University

Department of Systems Science

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Laboratory for Integrated Systems Biology

Department of Systems Science

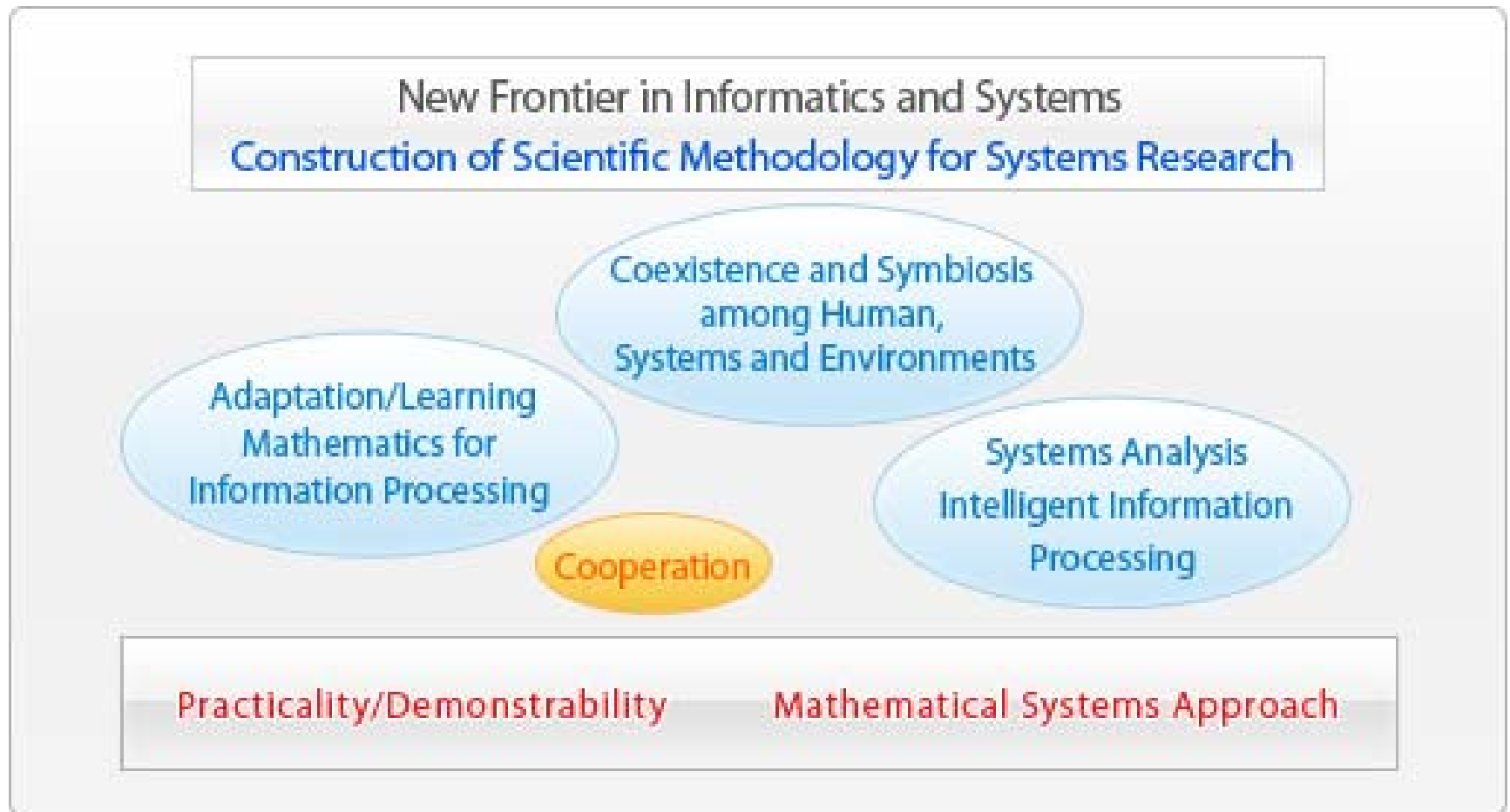
New Frontier in Informatics and Systems

Research and education in the Department of Systems Science deals with a new and unified approach to varied technological problems **from the standpoint of systems science.**

Emphasis is also placed upon the understanding of **complicated mutual interactions, hierarchical systems, distributed or parallel self-determination, human-machine interfaces, biomedical engineering, and medical information systems.**

Our Department supplies a variety of programs for solving pertinent system problems: **the analysis, design, control of systems, decision making and simulation algorithms and techniques, as well as their bases in applied mathematics, application software, and hardware.**

Research Activities



Laboratories

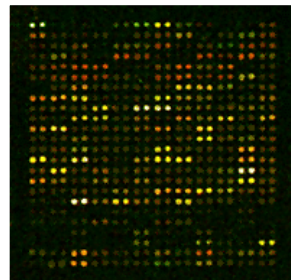
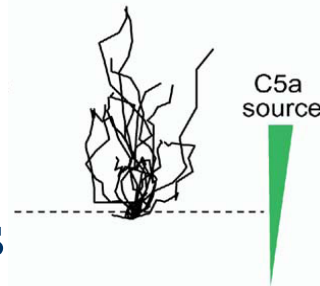
(9 laboratories)

Human Machine Symbiosis	Mechanical Systems Control
	Human Systems
	Symbiotic Systems
System Synthesis	Adaptive Systems Theory
	Mathematical System Theory
Systems Informatics	Information Systems
	Integrated Systems Biology
	Biomedical Engineering
Applied Informatics	Media Computing

Research in laboratory for integrated systems biology

URL: ishiilab.jp

- Computational neuroscience
 - Mathematical models of brain's information processing
- Systems biology
 - Mathematical models of cells and neurons
 - Large-scale computer simulations of biological systems
- Applications of bioinformatics
 - Robotics, gene expression analyses, ...
 - Image processing

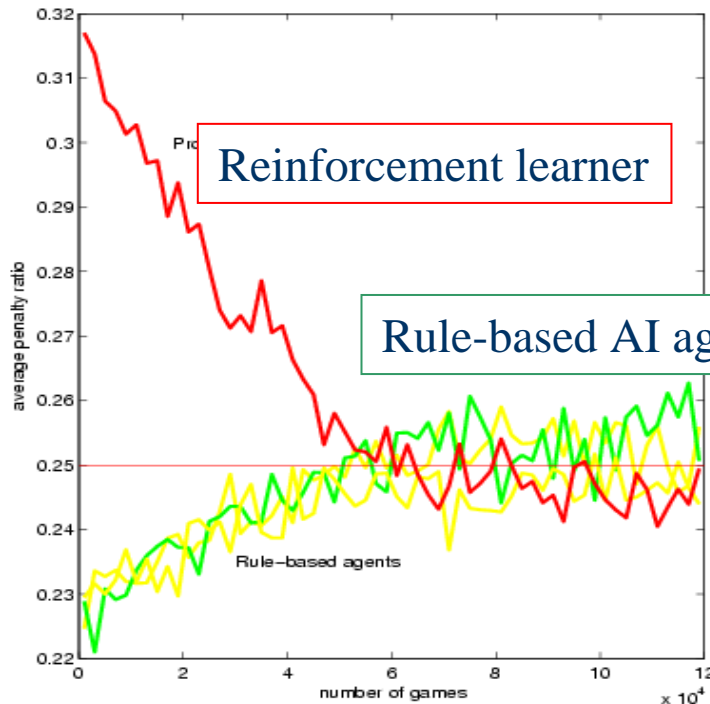
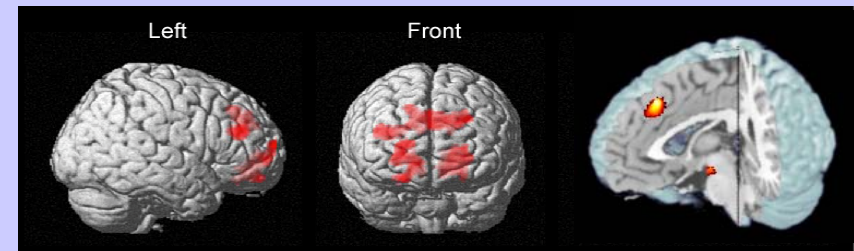


Theory and application of reinforcement learning

A model of decision making in uncertain environments

Brain imaging analysis

-Uncertainty resolution is done in the prefrontal cortex



Autonomous learning of a card game 'hearts' is achieved by reinforcement learning agent

Autonomous adaptation of a biped robot to unknown environments

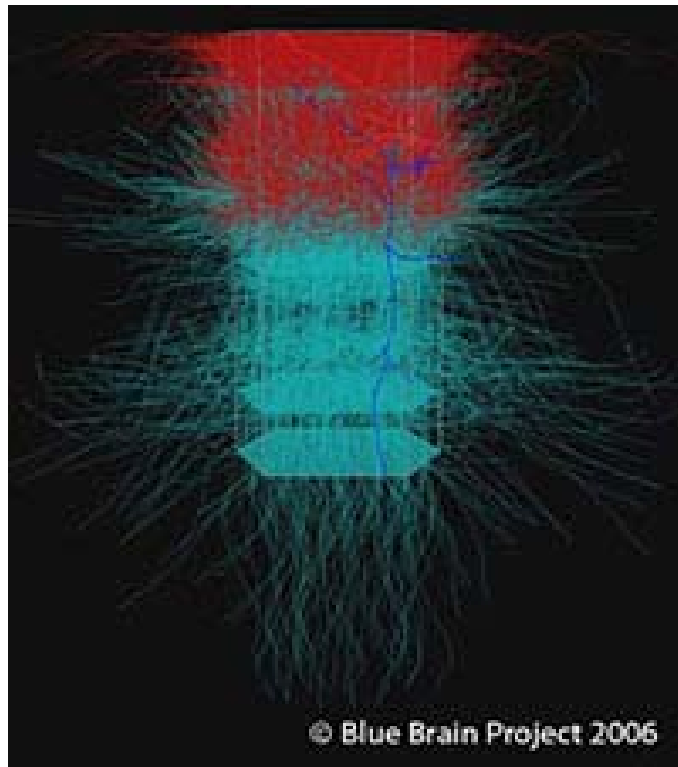


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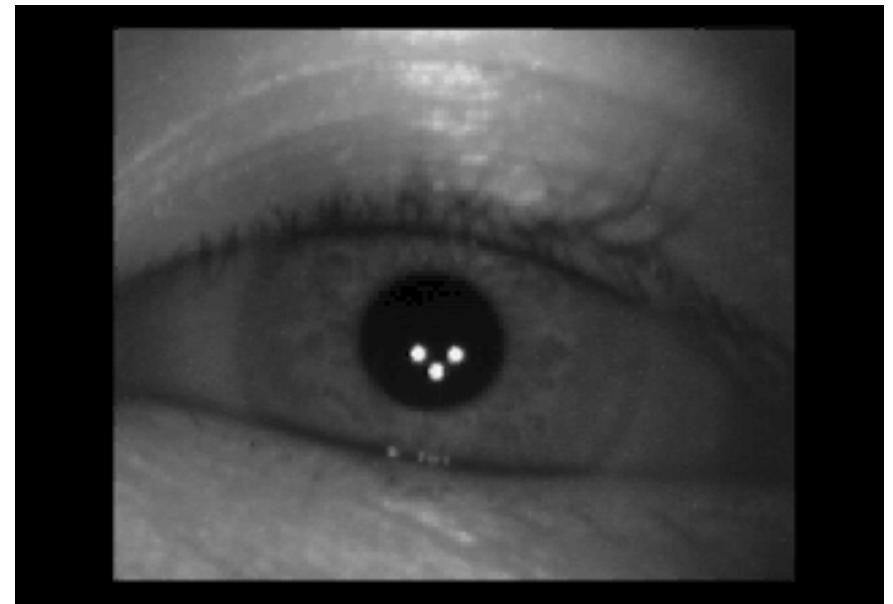
Hierarchical modeling and simulation of the human brain

Large scale simulation of the brain and neural systems

Simulation on the next generation supercomputer



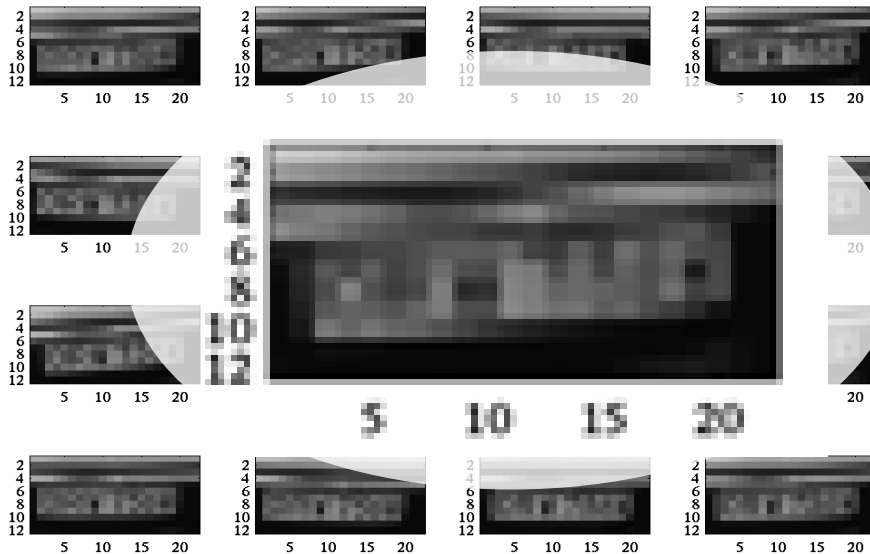
Target: real-time simulation of the mammalian visual system



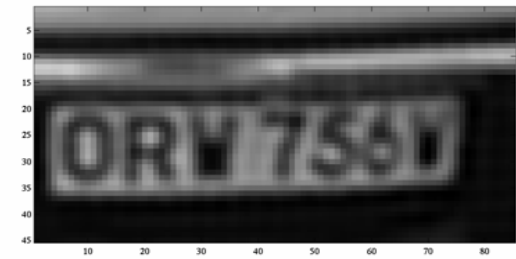
Demo: saccadic and smooth pursuit eye movements

Bayesian superresolution

Integrating information from multiple uncertain sources in image processing



Multiple low-resolution images



A high-resolution image

The image resolution is increased by 16 times, by integrating information from 16 low-resolution images of the same scene.