

IST-1: Neuroinformatics Group

Professor Yukiyasu Kamitani, Associate Professor Yukiori Goto,
Lecturer Hiroshi Hosokawa, Assistant Professor Shingo Maegawa

We study how the brain gives rise to behavior and experience by computational modeling of neural and behavioral data. We seek to realize communication technologies that directly connect the brain and the world.

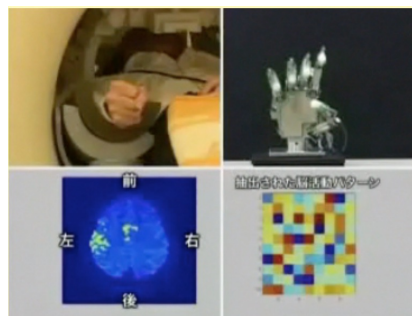
Brain decoding

Methods for decoding human brain signals are developed to reveal mental contents and to understand underlying mechanisms.



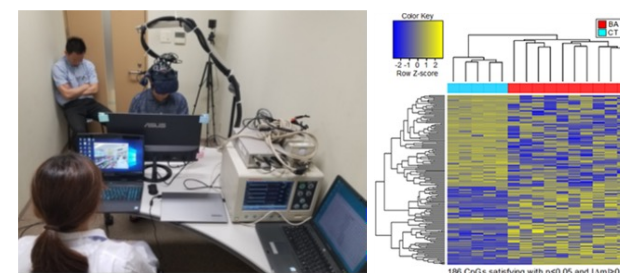
BMI

New approaches to brain-machine interfaces (BMI) are studied to effectively connect the brain and the world.



Neural basis of mental disorders

Neural activity and circuits associated with dysfunction in psychiatric disorder are identified.



Message to Applicants

We welcome applicants with diverse backgrounds. The ideal candidate will have interests in both neuroscience and AI.

Lab Information

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Address: Frontier Science Building #501,
Medicine Camus
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IST-2: Psychoinformatics Group

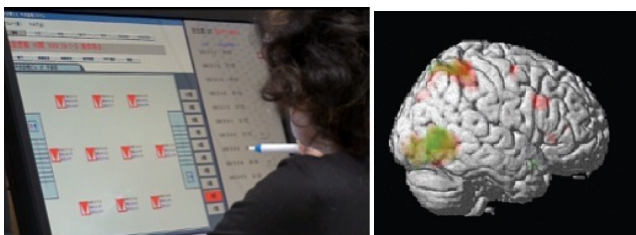
Professor Takatsune Kumada, Associate Professor Ryoichi Nakashima

It is important to solve problems related to the interaction between information technology and humans. Our goals are to understand the mechanisms of the human mind and to introduce knowledge about the human mind into informatics.

Mechanisms of human cognition

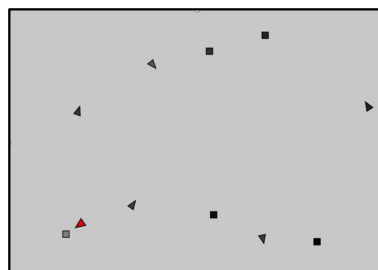
Investigation of human cognition by methods of psychology and neuroscience

- Attention (information selection)
- Executive function (behavior control)



Agents' personality estimation

Expression of personality by the movement of the agent (e.g., triangle)
When people see the movement, they tend to feel that the agent has a specific personality.



Cognitive interface

Driving situations:
Building a machine learning model that discriminates the driver's state from driving behavior



Message to Applicants

We welcome motivated students who are interested in the human mind and deal with the problems in the field (the boundary areas among psychology, brain and cognitive science, and informatics).

Lab Information

HP: <https://www.genome.ist.i.kyoto-u.ac.jp>
Address: Room 130, Research Building No. 7
Contact: t.kumada@i.kyoto-u.ac.jp



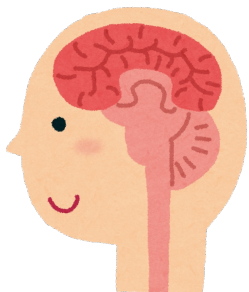
IST-3: Cognitive Informatics Group

Professor Shin'ya Nishida, Associate Professor Hiroaki Mizuhara, Assistant Professor Kiyofumi Miyoshi

We are studying the mechanisms of human cognitive information processing through psychological and behavioural experiments, functional brain measurements, and computer simulations. We are also interested in the comparison of the information processing characteristics between AIs (artificial neural networks) and humans.

Human information processing

We integrate psychophysics with media informatics to understand human sensory processing and cognitive judgments.



Media technology using perceptual characteristics

We develop perception-based media technologies and leverage cognitive neuroscience for information engineering.



Brain mechanisms of communication

Functional brain measurements such as EEG and fMRI are used to elucidate the brain communication mechanisms.



Message to Applicants

We are a laboratory belonging only to the graduate school and have no undergraduates, so all master's students start their research at the same starting line after admission. Necessary knowledge is acquired through daily research.

Lab Information

Lab HP: <http://www.cog.ist.i.kyoto-u.ac.jp/>
Address: Room 304, Research Building No.12
Contact: nishida.shinya.2x@kyoto-u.ac.jp



IST-4a: Computational Cognitive Neuroscience

Professor Hiroyuki Nakahara

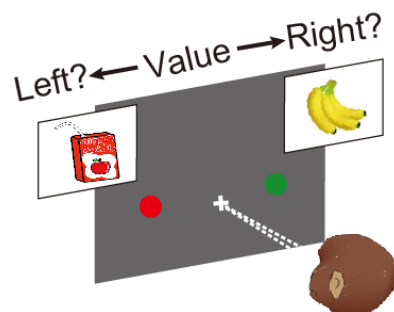
The long-term goal of our laboratory is to understand the computational principles that underlie the way neural systems realize adaptive behavior, decision-making, and associated learning; in particular, reward-based learning and social decision-making

Social decision-making



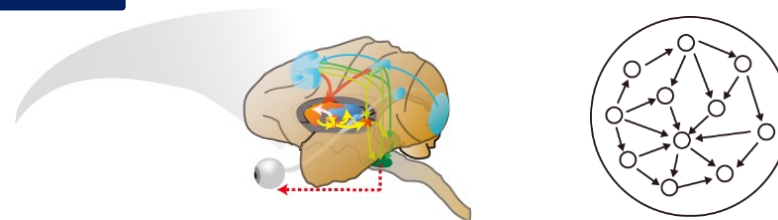
- * Computational theory of mind
- * Neural computations for empathy, social norm

Reward-based learning & decision-making



- * Reinforcement learning
- * Neural computations for emotion and mood

Theoretical neuroscience



- * Model-based analysis
- * Brain intelligence: representation learning and Bayes inference

Message to Applicants

Candidates should have strong interest in our research topics. Experience related to either human experiment or quantitative skills such as math/computer/statistics is desirable.

Lab Information

Lab HP: : <http://www.itn.brain.riken.jp/japanese/recruit.html>

Address: Room 135, Research Building No. 7

Contact: hiroyuki.nakahara@riken.jp



IST-4b: Computational Cognitive Neuroscience Group: Brain and Cognitive Sciences Division

Adjunct Professor Wataru Sato

This group aims to understand the neurocognitive mechanisms of the human mind, and to validate this understanding by creating androids that have (or can be perceived to have) the human mind.

Our current main research interests are in emotion and emotional interaction.

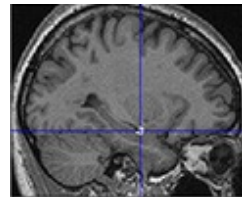
Psychological research

To investigate human behavior and information processing, we conduct cognitive psychological experiments that measure ratings and reaction times. We also measure physiological responses such as electromyography and electrodermal responses.



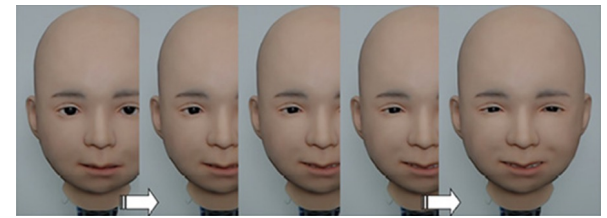
Cognitive neuroscience research

To investigate the neural basis of human information processing, we conduct functional neuroimaging research, electroencephalography research, and neuropsychological research (on patients with unilateral amygdala damage).



Android research

We aim to implement human-like psychological activity in androids. We investigate human participants' psychological and neural responses to the developed androids.



Message to Applicants

We welcome students who aim for the unique integration of psychology, neuroscience, informatics, and robotics.

Lab Information

Lab HP: <https://watarusato.shin-gen.jp/MainE.html>
Address: Kyoto University (Kyoto) or Guardian Robot Project, RIKEN (Keihanna)
Contact: wataru.sato.ya@riken.jp



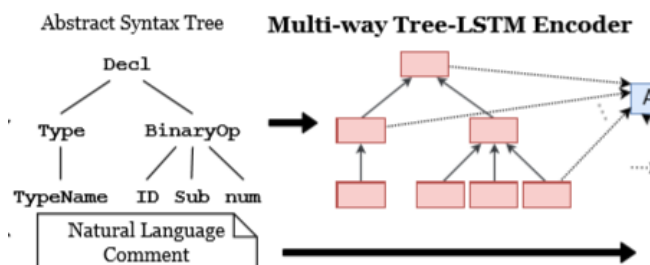
IST-5: Computational Intelligence Group

Professor Akihiro Yamamoto

We focus on establishing new foundations of intelligent systems, in particular, algorithms for machine learning and knowledge extraction from discrete data and its application to many fields including bio-informatics. We are also relationships between machine learning, mathematical logic, and computational algebra.

Machine Learning from Structured Data

Machine Learning methods for discrete and structured data such as parsing trees of program source codes and HTML data.



Data Mining

Mining methods for extracting useful and readable knowledge in the form of closed sets from binary data (relation data)

	1	2	3	4	5	6	7
a		1	1	1	1	1	1
b		1	1				
c				1	1	1	
d				1			
e		1	1				
f	1			1			
g					1	1	1
h		1	1	1			
i	1			1			

→

	1	2	4	5
a	1	1	1	1
b		1		
c			1	
d			1	
e		1		
f	1		1	
g				1
h		1	1	
i	1			1

Toward XAI

Adversarial perturbation for discrete data In order to give the correctness of Machine Learning, and implement XAI

An occasionally funny but overall limp fish-out-of-water story.

Negative sentence



An occasionally **hilarious** but overall limp fish-out-of-water story.

Positive Sentence

Message to Applicants

Students interested in either system construction or basic theory are welcome. You will proceed your research smoothly if you are familiar with mathematical methods such as dynamic programming.

Lab Information

Lab HP: <http://www.iip.ist.i.kyoto-u.ac.jp/>
Address: Room 324, Research Building No. 7
Contact: akihiro@i.kyoto-u.ac.jp



IST-6: Collective Intelligence Group

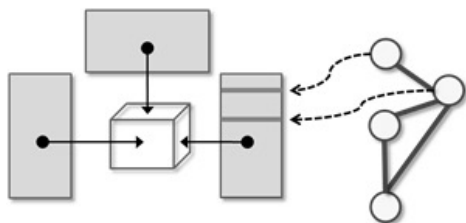
Professor Hisashi Kashima

Assistant Professor Koh Takeuchi, Program-Specific Assistant Professor Han Bao

Our research focus is on advanced data analysis methods such as machine learning, data mining, and human computation, and on their real world applications in various fields such as marketing, healthcare, and industrial systems.

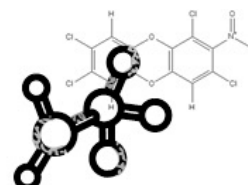
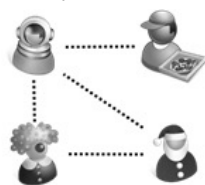
Machine Learning

Finding new data analysis problems, and developing mathematical models and high-performance algorithms for them, e.g., graph-structured data analysis.



Novel Applications

Developing novel advanced applications of data analysis technologies and linking data analysis technology to the real world. Application fields: healthcare, education, transportation, materials science, drug discovery, human resource management, finance,



Human Computation

Tackling problems that are difficult to solve with artificial intelligence alone by combining human intelligence and machine intelligence through crowdsourcing.



Message to Applicants

We are looking for students who are motivated to conduct research that will have an impact on the world using data analysis.

Lab Information

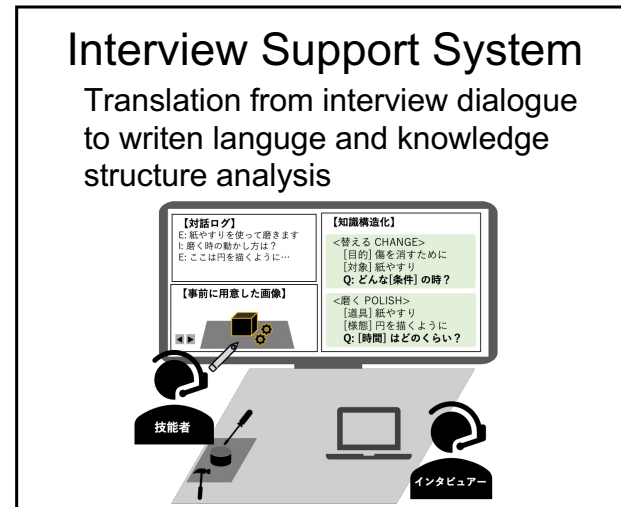
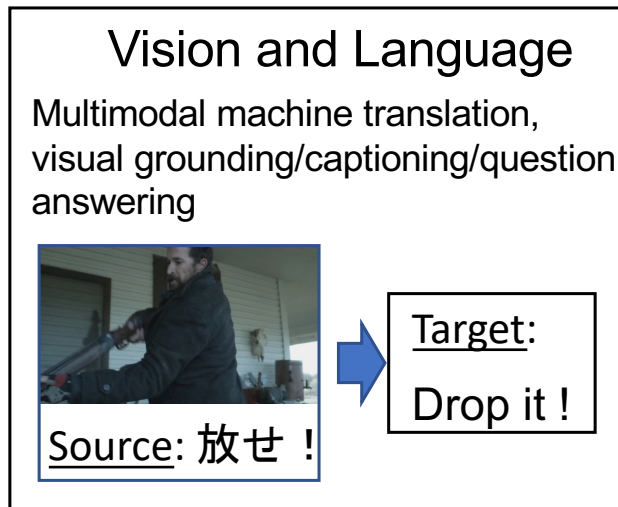
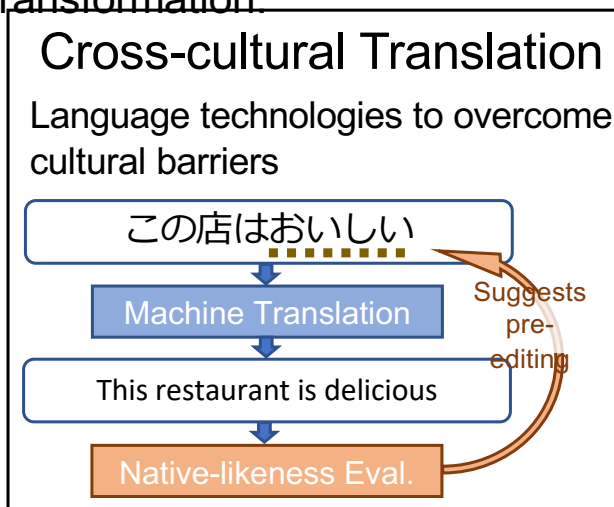
Lab HP: <http://www.ml.ist.i.kyoto-u.ac.jp/>
Address: Room 304, Research Building No. 7
Contact: kashima@i.kyoto-u.ac.jp



IST-8: Language Media Processing Group

Program-Specific Professor Sadao Kurohashi, Program-Specific Associate Professor Chenhui Chu,
Senior Lecturer Yugo Murawaki, Program-Specific Assistant Professor Yin Jou Huang, Program-Specific Assistant Professor Fei Cheng

Our goal is to understand human language processing and enable computers to communicate like humans. We conduct fundamental research on language understanding with large language models, and applied research on translation, dialogue, knowledge structuring, and other areas with potential for societal transformation.



Message to Applicants

We are looking for students who are interested in pushing back the boundaries of conventional thinking, are not afraid of failure, and are willing to try anything new.

Lab Information

Lab HP: <https://nlp.ist.i.kyoto-u.ac.jp/EN/>
Address: S208, Research Building No. 9
Contact: contact@nlp.ist.i.kyoto-u.ac.jp



IST-9: Speech and Audio Processing Group

Professor Tatsuya Kawahara, Associate Professor Kazuyoshi Yoshii,
Assistant Professor Koji Inoue, Program-Specific Assistant Professors Eita Nakamura & Keiko Ochi

Speech communication plays a key role in human intelligence. We are studying intelligent processing of speech, audio and music exchanged by human beings for automatic recognition, understanding and interaction systems.

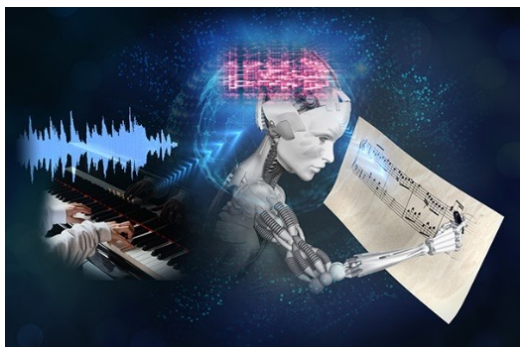
Speech Recognition

Automatic speech recognition (ASR) of lectures and meetings, and also natural language processing (NLP) for segmenting and extracting information structures,



Audio & Music

Source separation of mixed-source audio signals and automatic transcription of music audio signals.



Dialogue Systems

Spoken dialogue systems integrating verbal and non-verbal information for humanoid robots that behaves like and naturally interacts with human beings.



Message to Applicants

We welcome those interested in advanced pattern recognition and machine learning including deep learning and/or speech communication.

Lab Information

Lab HP: <http://sap.ist.i.kyoto-u.ac.jp/EN/>
Address: Room 417, Research Building No. 7
Contact: kawahara@i.kyoto-u.ac.jp



IST-10: Computer Vision Group

Professor Ko Nishino, Associate Professor Shohei Nobuhara, Assistant Professor Marc A. Kastner

We conduct multifaceted research towards elevating computer vision to a truly intelligent perceptual modality with self-driving, AR/VR, and elderly support as the driving application domains.

Perceiving People

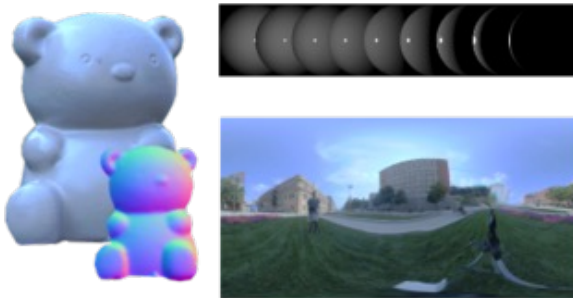
Understanding of a person's attention, intention, actions, and interactions from sight.



Crowd tracking

Perceiving Things

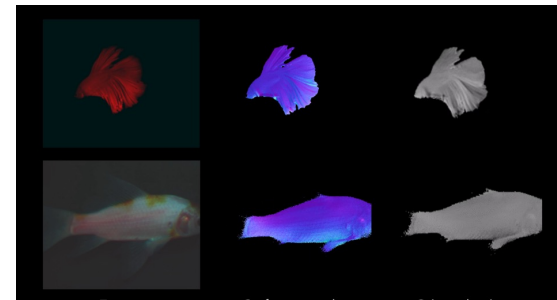
Estimation of physical and semantic information, such as illumination, reflectance, geometry, and material, from object and scene appearance.



Reflectance and illumination estimation

Seeing Better

Development of novel imaging systems that use computation as an integral part, referred to as computational photography.



3D shape and normal estimation

Message to Applicants

We look forward to working on far-reaching research with students who can think outside the box and enjoy either or all of theoretical derivation, coding, or experimentation.

Lab Information

Lab HP: <https://vision.ist.i.kyoto-u.ac.jp/>
Address: Room S-303, Research Building No.9
Contact: nishino.ko.5a@kyoto-u.ac.jp



IST-11: Human Sensing Group

Professor Yuichi Nakamura, Associate Professor Kazuaki Kondo, Assistant Professor Kei Shimonishi

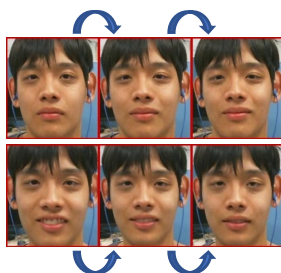
This group designs and implements human-centered cyber-physical systems with visual and somatic interactions, e.g., systems that provide motion and action assist, media that provide communication support, and media that enable memory and experience sharing, which increase self-efficacy and self-esteem of the users.

Human Sensing

Recognition or estimation of intention, emotion, or other internal states which may include estimation of QOL (Quality Of Life) by observing human behaviors and facial expressions.



attention estimation



internal state estimation from facial expression

Motion Assist

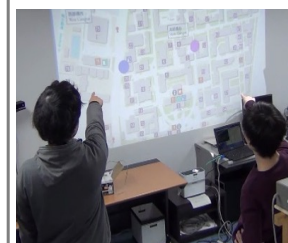
Power assist, motion support based on user intention and motion prediction, which is provided based on the sensing of motion and posture, and muscle sensing as well.



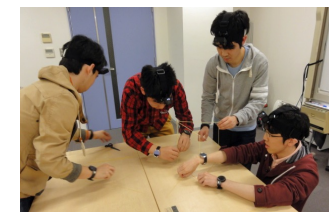
motion assists through estimating user's intention

Communication Support

Analyses of a variety of human-human communications such as conversation, presentation, collaborative works, and design of information and robot systems that supports those human activities.



pointing interface



group work analysis and supports

Message to Applicants

We invite students who investigate a future framework of human-centered systems with us. Required knowledge on image and signal processing, and DNN, etc. can be acquired through research activities.

Lab Information

Lab HP: <http://www.ccm.media.kyoto-u.ac.jp/>
Address: Room 306, Research Building No. 5
Contact: lab@ccm.media.kyoto-u.ac.jp



IST-12: Text Media Group

Professor Shinsuke Mori and Assistant Professor Hirotaka Kameko

We are researching computer processing techniques for natural languages (such as Japanese and English) that are normally used by humans. We are also working on information processing for multimedia via natural languages.

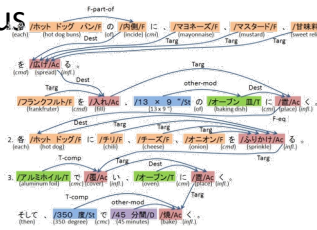
Resources and Tools

It's important for natural language processing research to develop and release language resources and processing tools. We are continuously developing language resources to solve problems. At the same time, we also develop and release tools for domain-specific processing with adaptation.



Procedural Text Understanding

A procedural text is a document that represents a procedure, such as a cooking recipe or assembly instructions. One of the goals of natural language understanding is to device the correct procedure from these natural language documents. We focus on procedural texts such as recipe texts to understand these documents.



Explanation of Machine Thinking

The improvement of AI technologies has been remarkable, and they surpass humans in many areas. Our goal is to show how computers think by using natural language that is easy for humans to understand. We focus on game commentary generation to show the reasons of AI's decisions.



Message to Applicants

We focus on language understanding and the relationship between the real world and natural language. We respect independence of students.

Lab Information

HP: <http://www.ista.media.kyoto-u.ac.jp/home-e.html>
Address: Room 315, Research Building No. 5
Contact: forest@i.kyoto-u.ac.jp



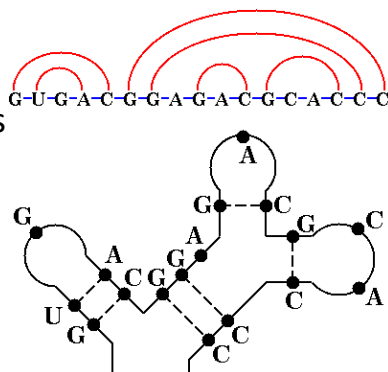
IST-13: Biological Information Networks Group

Professor Tatsuya Akutsu, Associate Professor Takeyuki Tamura, Assistant Professor Tomoya Mori

This group is studying bioinformatics, especially on mathematical models and algorithms for analyzing such data as DNA, proteins, and their networks. The laboratory is located in the Uji campus, and you can study in a calm environment.

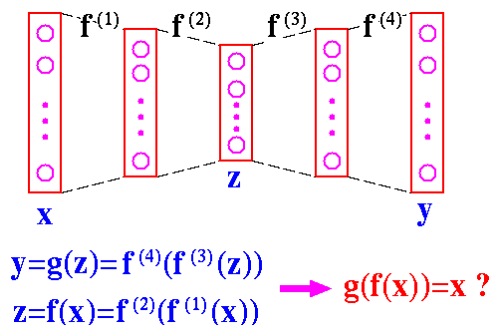
Prediction of Functions of Protein/RNA data

We develop methods for prediction of functions from sequence and structure data of proteins and RNAs.



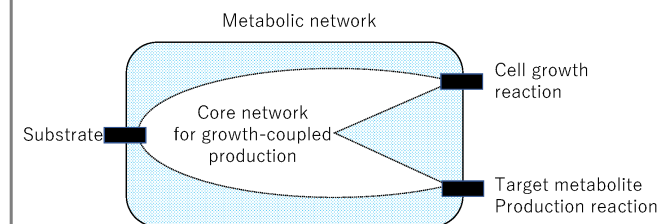
Discrete Models of Neural Networks

We mathematically analyze the relationship between the compression ratio and #nodes/layers of autoencoders.



Design of Metabolic Networks as Cell Factories

We develop algorithms and software for design of metabolic networks that produce useful substances.



Message to Applicants

Our motto is biology for the subject and mathematics for the method. You need an interest in biology, but no knowledge on it. However, programming skill is required..

Lab Information

Lab HP: <https://www.bic.kyoto-u.ac.jp/takutsu/index.html>
Address: Room CB317, Uji Research Building I
Contact: takutsu@kuicr.kyoto-u.ac.jp

