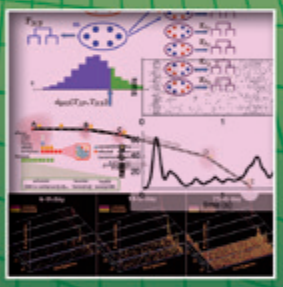
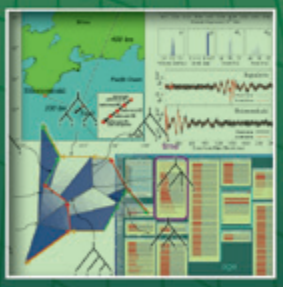
Research Organization of Information and Systems

The Institute of Statistical Mathematics

2013-2014

ISM





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Message from Director-General

Over the last financial year, which we should call the "First Year of Big Data", numerous seminars and symposiums relating to the utilization of "big data" were held across the spheres of industry, government, and academia. As a result, a large number of research and development projects and plans are now underway. Of course, while some people leap instantly at the latest, most popular topics, there will always be others who take a cool and cautious attitude to new trends. Some people even take the cynical view that the season of big data has already passed and that big data is now going rapidly downhill. This is probably inevitable in the case of the media, obsessed as they are by the topic of the moment, but nonetheless the essential fact that big data will have a deep impact on society needs to be clearly recognized.

Up until 20 or 30 years ago, money and information circulated within the structure of society in a rather gradual and steady way, somewhat similar to such physical phenomena advection and diffusion. Now, however, due to the mass penetration of the Internet, money and information move at high speed, without any connection to real-world distances. As a result, the role previously played by the constituents in a social structure has been lost, and many types of work and occupations are disappearing. Under this new structure, there are no first principles (governing equations) that describe the phenomena arising under this new structure, and the conveyance and processing of information—that is, computational services—are generating huge amounts of economic value. In the business world, big data are the measurements of this social structure. Thus, instead of solving governing equations, what has become important is to understand phenomena using clues provided by big data and to develop modeling techniques for enabling better predictions and decision-making.

Anticipating the full-scale advent of the "big data era", the Institute of Statistical Mathematics (ISM) identified the need for professional development to address the demands of this new era as a key goal of its second medium-term plan (financial year 2010–2015). Under the ISM's Network of Excellence (NOE) initiative, we are pursuing big-data-related R&D utilizing a wide range of tools, including machine learning, data assimilation, risk analysis, and next-generation survey methods. We are also striving to foster young data scientists, through various professional development programs at the ISM's School of Statistical Thinking, which serves as our principal base for education and training programs in statistical thinking.

The "Coop with Math Program", launched in November 2012, is a project that ISM is undertaking on contract for the Ministry of Education, Culture, Sports, Science and Technology (MEXT). Under the program, we are devising ways to promote research to stimulate innovation and creativity through collaboration between mathematics/mathematical science and various other sciences and industries, and big data is certainly an important focus of research in this initiative. Selected to serve as the core institution of this project, ISM is actively collaborating with eight major Japanese centers of research and education in mathematics and mathematical science as part of the initiative. As a research institute, ISM is wholeheartedly committed to fundamental research in fields related to data, with a view to fulfilling the expectations of society. In this effort, we look forward to your continued understanding and support.

Tomoyuki Higuchi
Director-General
The Institute of Statistical Mathematics

Institute Overview

Basic Research

Department of Statistical Modeling

The Department of Statistical Modeling works on the structural modeling of physical phenomenon related to numerous factors, and it conducts research on model-based statistical inference methodologies. By means of the modeling of spatially and/or temporally varying phenomena, complex systems, and latent structures, the department aims to contribute to the development of cross-field modeling intelligence.

Spatial and Time Series Modeling Group

The Spatial and Time Series Modeling Group works on the development and evaluation of statistical models, which function effectively in terms of predicting phenomena or scientific discoveries, through data analysis and modeling related to space-time-varying phenomena.

Complex System Modeling Group

The Complex System Modeling Group conducts studies in order to discover the structures of complex systems, such as nonlinear systems and hierarchical networks, through statistical modeling.

Latent Structure Modeling Group

The Latent Structure Modeling Group works on the modeling of variable factors as latent structures existing behind various dynamic phenomena in the real world. It also conducts research on methodologies for inference computation associated with structures on the basis of data related to phenomena.

Department of Data Science

The aim of the Department of Data Science is to contribute to the development of natural and social sciences by conducting research into the methodology of designing statistical data collection systems, measuring and analyzing complex phenomena for evidence-based sciences, and performing exploratory multivariate data analyses.

Data Design Group

The Data Design Group focuses on research toward designing statistical data collection systems and developing the related data analysis methods in a variety of survey and experimental environments.

Metric Science Group

The Metric Science Group studies methods for measuring and analyzing complex phenomena to extract statistical evidence behind them in the various fields of science.

Structure Exploration Group

The Structure Exploration Group advances statistical and mathematical research by applying or developing exploratory multivariate data analyses to clarify latent structures of real phenomena in various fields of both natural and social sciences.

Department of Mathematical Analysis and Statistical Inference

The Department of Mathematical Analysis and Statistical Inference carries out research into general statistical theory, statistical learning theory, optimization, and algorithms in statistical inference.

Mathematical Statistics Group

The Mathematical Statistics Group is concerned with aspects of statistical inference theory, modeling of uncertain phenomena, stochastic processes and their application to inference, probability and distribution theory, and the related mathematics.

Learning and Inference Group

The Learning and Inference Group develops statistical methodologies to describe the stochastic structure of data mathematically and clarify the potential and the limitations of the data theoretically.

Computational Inference Group

The Computational Inference Group studies mathematical methodologies in the research fields of numerical analysis, optimization, discrete mathematics, and control and systems theory for computation-based statistical inference as well as their applications.

NOE-type Research

Risk Analysis Research Center

The Risk Analysis Research Center is pursuing a scientific approach to the uncertainty and risks in society, which have increased with the growing globalization of society and the economy. The Center is also constructing a network for risk analysis with the goal of contributing to creating a safe and resilient society.

Research and Development Center for Data Assimilation

Research and Development Center for Data Assimilation aims to construct simulation models that can predict the future and to produce designs for effective observation systems by means of “data assimilation”, which is a fundamental technology integrating numerical simulations and observational data.

Survey Science Center

Founded on the accomplishments in social research by the Institute of Statistical Mathematics spanning over half a century including the Study of the Japanese National Character and the cross-national comparative research on national characteristics, the Survey Science Center was established in January of 2011 in order to facilitate further growth of the aforementioned sets of research as well as the establishment of networking ties with both domestic and international research organizations and the increase in the capacity to make contributions to wider society by creating what we call the NOE (Network Of Excellence).

Research Center for Statistical Machine Learning

Machine learning is a research field studying autonomous systems that learn from data. This field is based on the statistical science that concerns inference from data and the computer science that studies algorithms. The application of machine learning is broad, ranging from engineering, including robotics, and information sciences to natural science, such as brain science. This research center aims at supporting the academic community of the field, in addition to producing influential works via various joint projects.

Service Science Research Center

The aim of the newly established Service Science Research Center is to apply data-centric methodologies to the service fields — from marketing, supply chain management, and management engineering, to the modeling of social systems. We will integrate the insights from these fields to establish data-centric service sciences as a common discipline, through collaborations with universities and institutions worldwide, taking advantage of ISM’s Network Of Excellence (NOE) program.

Professional Development

School of Statistical Thinking

The School of Statistical Thinking was established as a center for the planning and implementation of various programs for professional development and education and training in statistical thinking. In the setting of a joint research facility, the school is working to develop professionals (specialists with broad knowledge and skills, modelers, research coordinators, etc.) equipped with the statistical thinking ability to meet the demands of the “big data era”, in which large-scale data sets are utilized for modeling, research coordination, and other applications.

Research Support

Center for Engineering and Technical Support

The Center for Engineering and Technical Support assists the development of statistical science by managing the computer systems used for statistical computing, facilitating public outreach, and supporting the research activities of both staff and collaborators.

Computing Facilities Unit

The Computing Facilities Unit is in charge of managing computer facilities, software for research, networking infrastructure and network security.

Information Resources Unit

The Information Resources Unit is responsible for maintaining an extensive library and an electronic repository, and is in charge of planning statistical education courses to popularize research results.

Media Development Unit

The Media Development Unit is in charge of the publication and editing of research results and is responsible for public relations.

The Practical Research Project for Financial Big Databases and for Credit Risk Validation Models

Formulating business needs and developing research network in financial risk society

It is major social interest to accurately estimate risk of credit administration and market investment. Our project develops the methodological solutions for this problem by statistical approach and probability theory. We manage the series of operations such as model building, system development and back testing valuation, using actual credit database. We plan research exchange between practicians and academicians in order to define paractician's problem and to supply its solutions to them.

Evaluation and selection for models of financial risk

Recent risk valuation models of credit risk and market risk are complicated due to big database and complex financial commodities. Therefore, it is important for the model user to select highly accurate model to be consistent with his purpose. Then, valuation measure of risk model is significantly needed. Our project contributes the valuation methods for financial institution and financial database company by considering a lot of risk measure on their perspective. For example, the estimation model of probability of corporate rejuvenation and the research for repayment capacity of corporate on default status are supplied to them to valuate accurate financial credit risk. We are promoting the project by collaborative alliance to banks.

Modeling and developing credit risk database

We develop a credit risk validation model using marginal database of banks and Credit Risk Database Guarantee Association. This model has practical performance to be implemented in relation to Basel II and International Financial Reporting Standards. New statistical method which reflects the character of financial data is promoted for missing value imputation and outlier correction when marginal database is developed. We confirm that KNN (k-nearest neighborhood) method is more efficient than empirical modification such as ACE (Imputation by Chained Equations) or imputation by preceding period data.

Satoshi Yamashita

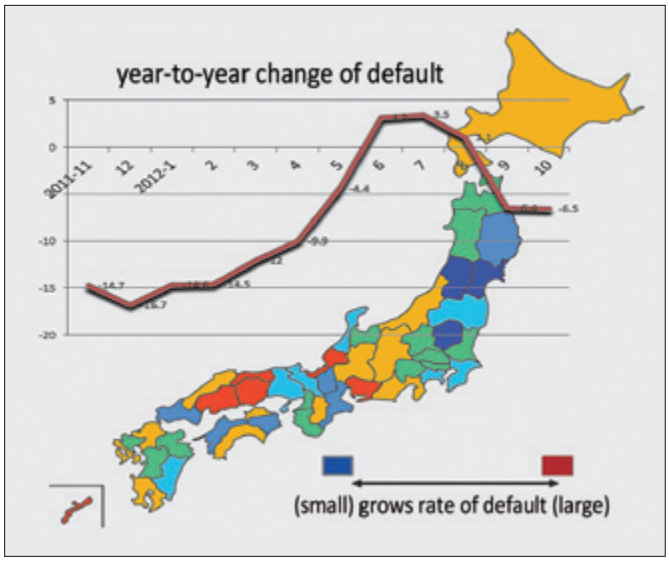


Figure 1: The earthquake time-space influence to credit risk by the marginal database.

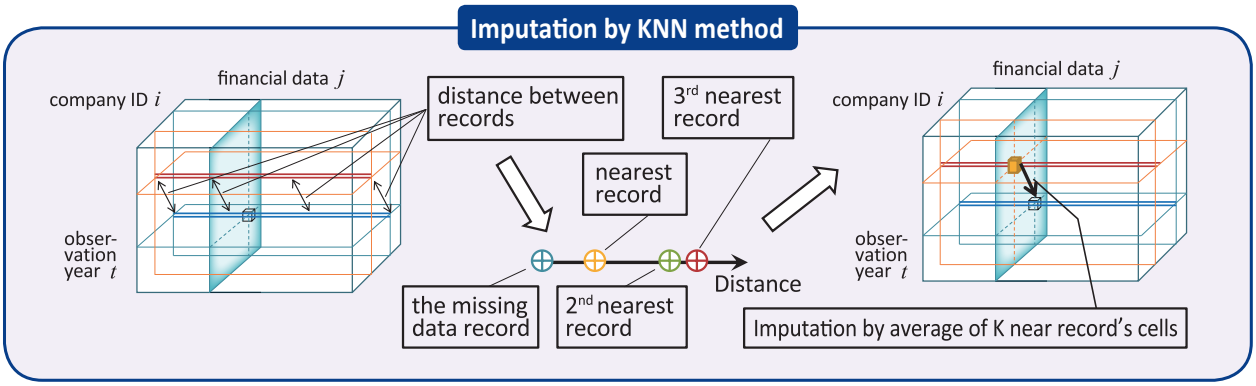


Figure 2: Conceptual diagram of kNN method for financial time series data.

The Effort of the Statistical Science towards Solution of Environmental Problems

Mission of the project

A risk analysis research center / environmental statistics research project aims at performing the contribution towards solution of the environmental problem which is a modern subject by developing the optimal new statistical methodology for each environmental problem (for example, the problem of dioxin, the problem of global warming, the problem of continuous use of safe water). Moreover, in order to realize this purpose, in cooperation with the community of environmental science, research is carried out including a visiting teacher or a project researcher.

Directional statistics in environmental science

It is possible to model the vanishing angles of migratory birds and the orientations of logs on the floor using distributions on the circle. Wind direction is a typical angular variable in environmental science, and it is important to use information on wind direction for a better understanding of, for example, radiation dose and ozone concentration. An angle has a special feature different from a linear variable in mathematics. We study statistical modeling and analysis of data which include angular observations in the framework of directional statistics.

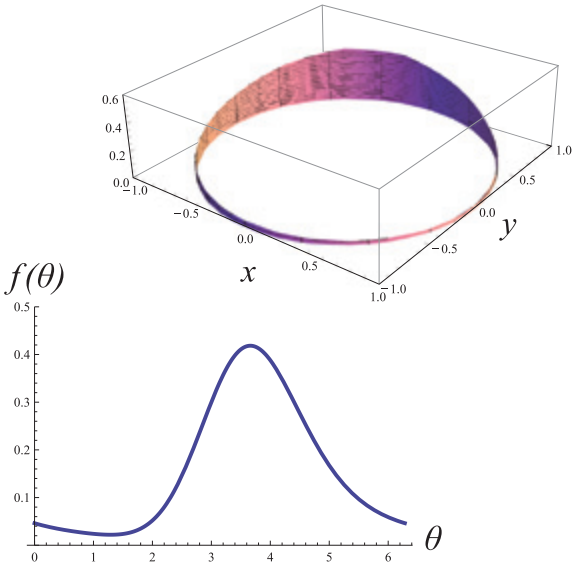


Figure 1: An example of circular distribution.

Statistical analysis of air radiation dose rates and degree of radio-contamination of soil in Fukushima

East Japan major earthquake struck East Japan on March 11, 2011. Subsequently, tsunami attacked Fukushima Daiichi Power Plot. As a result, in all of 1-3 Nuclear reactors, meltdown befell. Then, significant amounts of radioactive material have been released into environment. The Ministry of Education conducted a survey of the soil radioactive contamination and air radiation dose rate neighborhoods Fukushima Daiichi nuclear power plant in June-July, 2011. We analyzed the association between the air dose rate and the soil radiation contamination using the data. When there was precipitation at the measurement date, the coefficient of determination has become a 64%. The determination coefficient reduced to 29% for a day with no precipitation. According to this analysis, about 20% to 30% of air radiation dose rate cannot be explained by the degree of soil radioactive contamination directly beneath. It was suggested that local decontamination may have a limited effect on reducing the air radiation dose rate.

Koji Kanefuji

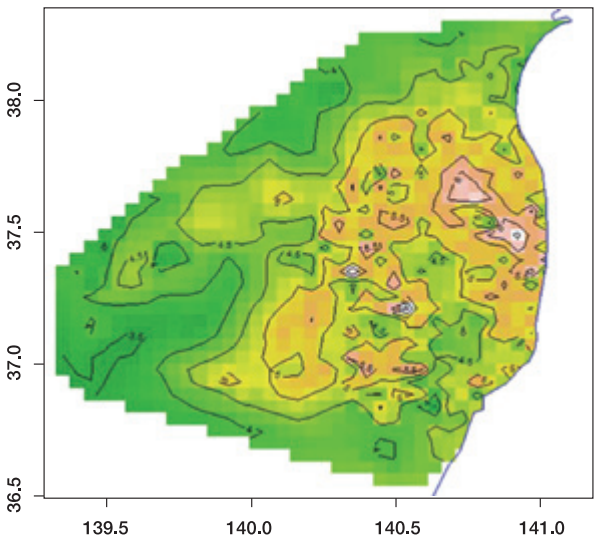


Figure 2: Observed spatial distribution of degree of cesium-contamination (logarithmic value of Bq/m^2) of soil in Fukushima.

Data Assimilation for Solid Earth Science

Learning from the 2011 Great East Japan Earthquake

Although the Great East Japan Earthquake on March 11, 2011 was one of oceanic interplate earthquakes, which are rather predictable due to their periodicity, the magnitude of approaching tsunamis was underestimated even by numerical simulations using massively parallel computers, global-scale observation networks, and the Earthquake Early Warning System, which makes full advantages of IT. Later research has clarified that observation data actually contained much information indicating the tsunamis, therefore simulation models in which such information was properly embedded would have accurately predicted their magnitude. Harmonious integration of simulations and observations through data assimilation (DA) is important in anticipation of the forthcoming Tokai-Tonankai-Nankai Earthquake.

Seismic phenomena recorded in non-seismic observations

Recent elaborated Earth observation sensors enable us to detect seismic phenomena even from non-seismic observations. For instance, DA research on GPS data has revealed that two oceanic plates are firmly bonded in “asperities” and slippery in other regions. Accumulated energy due to plate subduction may be released at once in asperities as great earthquakes. Another example is that microbarometers often detect “sound of earthquake”, which is acoustic wave that is emitted from the hypocenter and propagated in the upper atmosphere. Seismoacoustic waves excited by tsunamis of the Great East Japan Earthquake traveled several thousands of kilometers, oscillating the ionosphere at an altitude of several hundreds of kilometers. This phenomenon motivates us to establish a tsunami early warning system utilizing such seismoacoustic waves, which propagate much faster than tsunamis.

Data assimilation system for seismoacoustic waves

Our DA system has successfully reproduced the seismoacoustic wave propagation due to the Iwate-Miyagi Nairiku Earthquake and the ionospheric oscillation due to the Great East Japan Earthquake utilizing ISM Supercomputing System for Statistical Science (Fig. 1). We implemented a DA procedure on a parallel computer to estimate source parameters rapidly and accurately from microbarometer data at Sugadaira and Shionomisaki. The system simulates many scenarios of seismoacoustic wave propagations based on hypocenter solutions, and estimates probability density functions of the parameters by assimilating the observation data in conjunction with the Markov chain Monte Carlo method (Fig. 2). We are currently concentrating on speeding up the DA process and the observation data handling with the aim of realizing a practical system that can rapidly compute the magnitude and arrival time of an approaching tsunami, which is predicted to arrive within a few minutes in the case of the expected Tokai-Tonankai-Nankai Earthquake.

Hiromichi Nagao

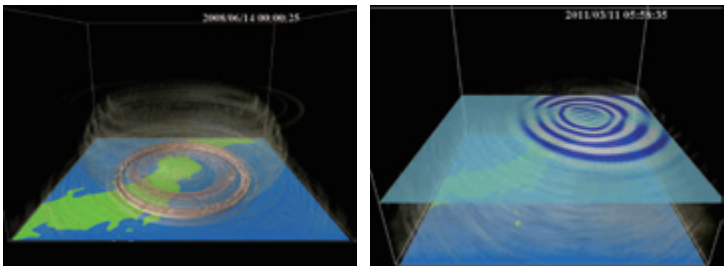


Figure 1: (Left) Propagation of seismoacoustic waves excited by the 2008 Iwate-Miyagi Nairiku Earthquake, and (right) ionospheric oscillation due to the seismoacoustic waves excited by the 2011 Great East Japan Earthquake, both of which were reproduced by data assimilation.

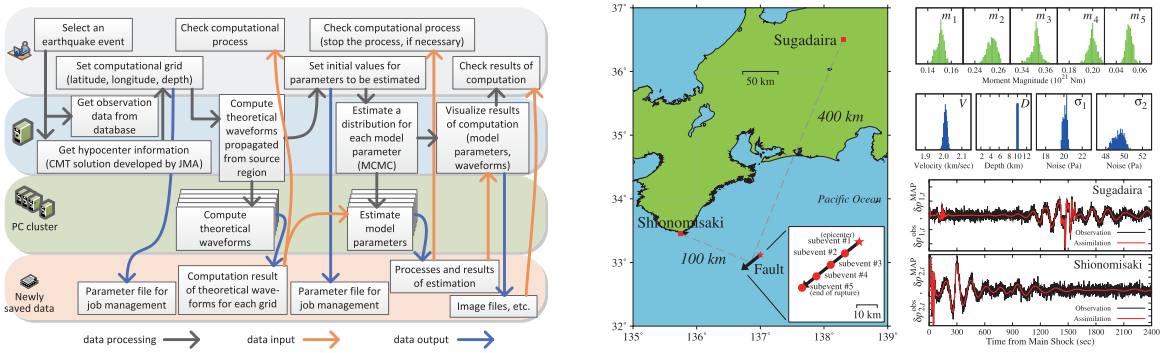


Figure 2: (Top) Workflow in the data assimilation system for seismoacoustic waves, and (bottom) its validation based on a twin experiment assuming seismoacoustic waves excited by the Tonankai Earthquake, which is predicted to take place in the near future.

Simulation-based Design of Intervention Programme against Influenza

Continuous appearance of new influenza strain

New influenza strains appear continuously via mutations and genetic reassortments. The worldwide spread of infection, namely pandemic, occurs because the most of people do not have immunity against such a virus. The so-called swine flu in 2009 is one of such pandemics. Fortunately, this strain is low pathogenic and the symptom is comparable to that of seasonal flu. However, human infection cases of an avian flu strain with an extremely high mortality rate are reported in the end in the 90's. The threat comparable to a Spanish flu in 1918 would be brought, if this strain evolved to acquire a steady infectivity to human beings.

Infection spread forecast by simulation

The prediction of epidemics by the simulation is important to design effective intervention programmes. After 2000, as parallel computing is getting popular, agent-based epidemic simulations become realistic approach. In an agent-based simulation, some model city, consisting of households, schools, workplaces and so on, is constructed in computer and infectious transmissions are carried out stochastically inside temporal and local groups formed as result of individual activities. This "direct approach" enables us to incorporate the effect of individual interventions like school closures in a selected local region naturally into simulations.

Vaccine vaccination plan to maximize herd immunity

We studied how degree the collected immunity is enhanced by optimising the order of vaccination among social groups. It should be impossible to prepare an enough stockpile of vaccines for all the residents and it is necessary to set priorities. In the present policy, vaccines are distributed in the following order: medical practitioners, high risk persons (including elderly persons) and miscellaneous. This policy is based on the idea that students and office workers can endure the disease. However, it is necessary to give priority to students and the office workers, who have a large contact frequency, from the viewpoint of enhancing the collective immunity. Actually, our simulations show that if students and employees are dosed for the first one month, the illness attack ratio in the non-vaccinated group is decreased below the half, whereas this ratio is almost changeless, if non-workers are targeted. In addition, the former vaccination plan reduces also the mortality rate in all age groups and hence it can be say that the collective immunity is improved without sacrificing high risk persons.

Masaya M. Saito

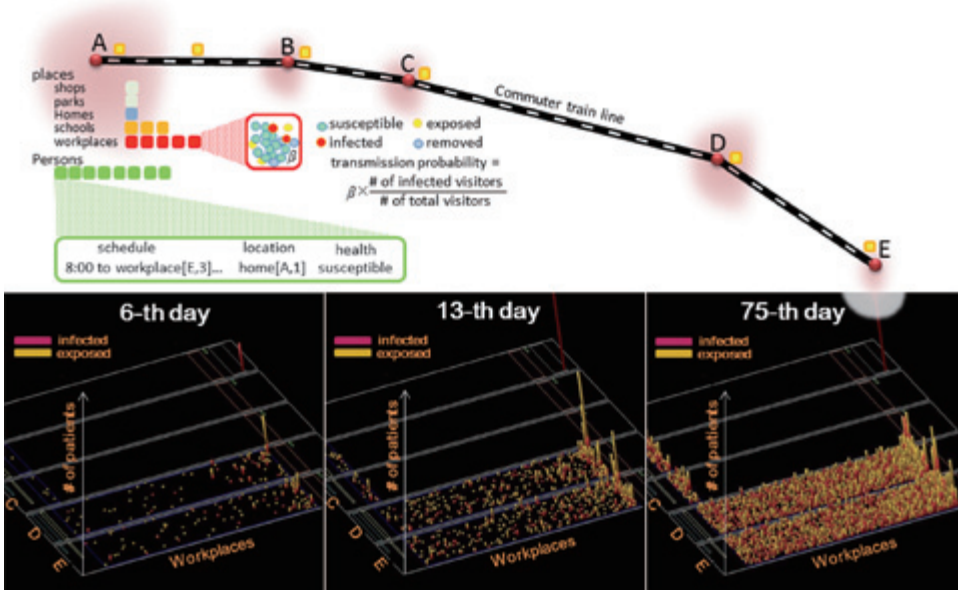


Figure : (Top) The schematic illustration of our simulator, (Bottom) Infectious spread over a model city.

Research on Survey Methodology and Planning of Cooperative Training Survey

Process of social survey and research on survey methodology

The Institute of Statistical Mathematics (ISM) has been conducting many social surveys for almost sixty years. One purpose of these surveys is to study public opinions in Japan. Another important purpose is to study survey methodology in real-life settings.

Social surveys mainly consist of two processes, as is depicted in figure 1. One is the process of sampling (right hand side), where representativeness of the sample is the main concern. The other is the process of measurement (left hand side), where we try to capture the opinion of respondents exactly. Each step in Figure 1 has its own methodological subjects to be studied.

Practice of survey research by ISM

Formerly surveys of ISM were administered by ourselves with supports from many universities, employing students as part-time interviewers. But during the past two decades this tradition has been lost, entrusting most of the survey operation to survey company. Worsening survey circumstances in the present society do not allow us to ask non-professional interviewers to complete our survey. But this also meant that we have gradually lost opportunities for research on survey methodology.

Start-ups of the collaborative training survey

More recently, social science departments of many universities have undergone curriculum reformation which places more emphasis on survey practice. In line with this trend, Survey Science Center has begun to administer what we call "Collaborative Training Survey", under close cooperation with university departments and other survey-related institutions. Thus, we will offer faculty members and students more chances to participate in large-scale surveys.

As a start-up, we conducted a nationwide survey on "Social Stratification and Social Psychology" (SSP survey) in 2010 with Osaka University. In 2011 we carried out a joint survey with National Institute for Japanese Language and Linguistics (NINJAL) called "Fourth Survey of Language Standardization in Tsuruoka". This is a cooperative survey project between ISM and NINJAL since 1950, and the survey in Tsuruoka-city, Yamagata Prefecture, has been repeated at about twenty-year intervals. The design of this survey is a combination of a repeated cross-sectional survey and panel survey as is depicted in Figure 2.

We are planning to continue this kind of survey practice for the coming years, with the support of visiting professors from outside the institute. The goal of this activity is to broaden the base of research on survey methodology by fostering more survey professionals.

Tadahiko Maeda

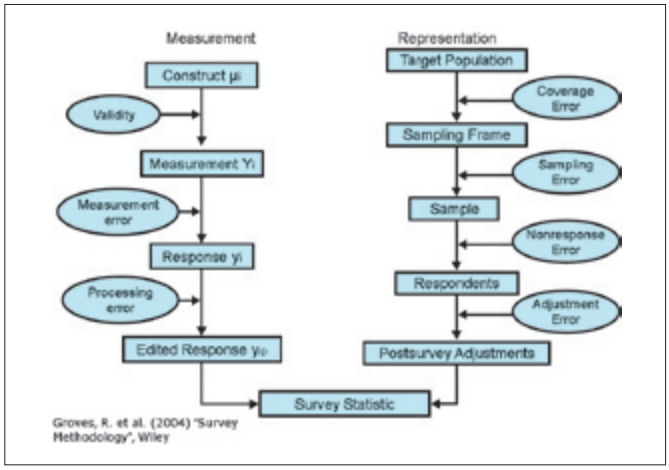


Figure 1: Process of social survey and subject of research on survey methodology.

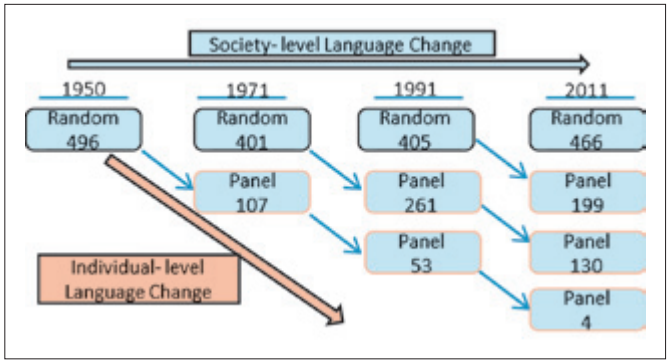


Figure 2: Design of Survey of Language Standardization in Tsuruoka, Sixty years of Cooperative Project with NINJAL.
"Random" refers to a survey on a sample randomly selected, "Panel" refers to a panel survey on the same informants. Numbers in the rectangle indicate sample size.

Building a Database of Social Survey Results

Objective of the social survey information research project

The Social Survey Information Research Project at the Survey Science Center has been collecting social survey results and building a social survey database so that anyone can browse the survey results easily on the Web. A single survey provides limited information, particularly in the recent deteriorated survey environment. Multidimensional analysis using various types of social surveys is essential for comprehending the complicated aspects of modern society. This research project studies the methodologies for building a database and develops statistical methods for analyzing data. The group intends to make the database available for public use.

A comprehensive report of a survey on the Japanese national character

The core data used to develop the database is obtained from a survey on the Japanese national character, which is conducted on a regular basis by the Institute of Statistical Mathematics. This survey has been conducted every five years since the first 1953 survey. The next thirteenth survey will be conducted in the autumn of 2013. The questionnaire items in the survey concerned the attitudes of the participants toward life, environment, religion, politics, race, the Japanese people, and so forth. The results of this longitudinal survey, which are crucial for evincing the transition of Japanese character, are already available on the Internet. More comprehensive results, including cross-tabulation tables and graphs, are also provided on the Internet.

Database of related surveys

The survey on the Japanese national character is by no means the only survey conducted by the Institute. Various interrelated comparative surveys and experimental surveys have also been conducted. One of them is public opinion survey in Tokyo conducted since 1953 to 1982. Another is residents survey conducted in Tama area, which has been started after the removal of the Institute to Tachikawa city in 2009. The results of these surveys are also included in the database and made accessible to the public one at a time. The potential users of this database, including not only researchers but also the general public, will be able to analyze the data from various perspectives. The visualization software developed in this project is provided for other institutions, whose results are also linked from the project web page.

Takahiro Tsuchiya

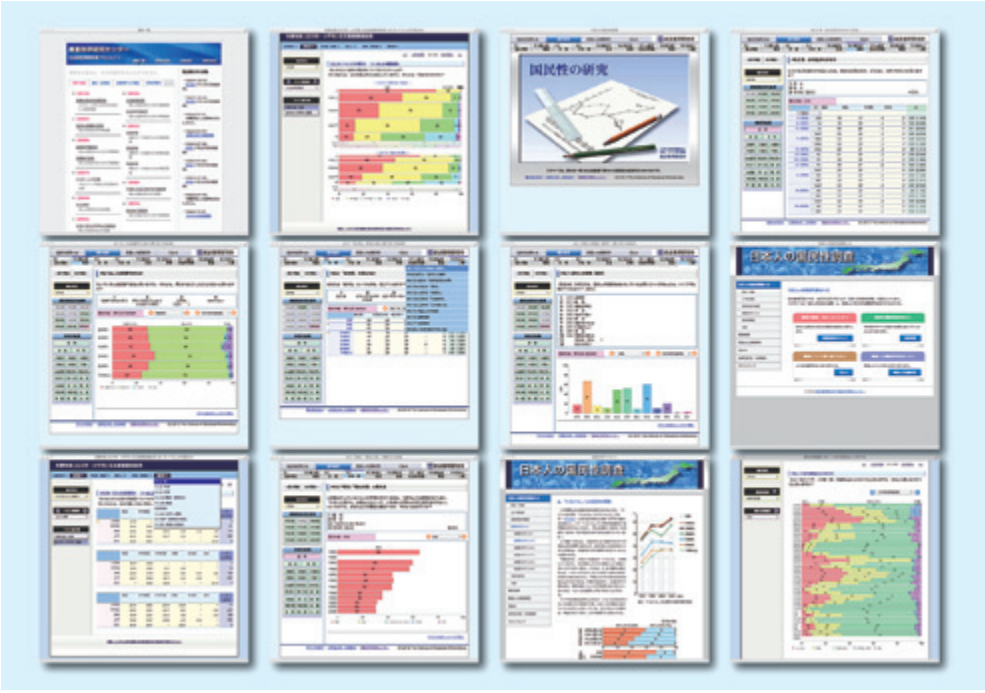


Figure: Browsing survey results on the web.

Statistical Analysis for English Mental Lexicons

Abstract of the research

This research began when Prof. Mitsuru Orita of Univ. Kumamoto, a researcher on English learning, asked me how to analyze the data of experiments on English native speakers and English-learners and evaluate the difference of their mental lexicons statistically.

The data is collected by asking two groups of examinees, thirty English native speakers and thirty English-learners, to classify fifty English words. We do the same examinations for various kinds of English words, for example, with different frequencies of appearance and different word classes and analyze the difference of their results.

In this research, we assume that the structure of each mental lexicon is a dendrogram as in Fig.1. Thus, our target is the evaluation of the difference between two dendrograms.

Permutation test for dendrograms

In order to compare the two dendrograms, we proposed a data analysis by a permutation test which generates many random dendrograms under a hypothesis of the equivalence of mental lexicons of the two groups and compare them with the dendrograms of the original data. Fig. 2 is a summary of the permutation test.

The method proposed here is completely novel, so we need to justify it by theory. Therefore we proved the consistency of the permutation test under an assumption of local linearity on the algorithm for constructing dendrograms. The assumption holds, fortunately, for most of the ordinary algorithms used for making dendrograms.

Theory and application of simplicial fans

Statistical data used for permutation tests have a simple structure usually. However the set of dendrograms has a complicated geometrical structure called a simplicial fan (Fig. 3). While general simplicial fans are too complicated to be analyzed, the simplicial fan of dendrograms has a good mathematical property called CAT(0). By using the property, we proposed a permutation test by using the geodesic distance.

Further target

In addition to the examinations explained above, we have done various kinds of examinations, for example, for elementary level learners or with translated words. We expect such results can be used for making efficient tools to study English and have already begun a group research project on that purpose with some specialists of English learning.

Kei Kobayashi

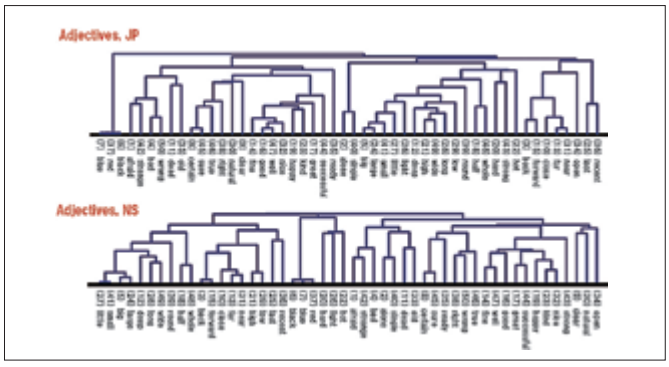


Figure 1: Dendrograms for adjectives
(top: Japanese, bottom: native speakers).

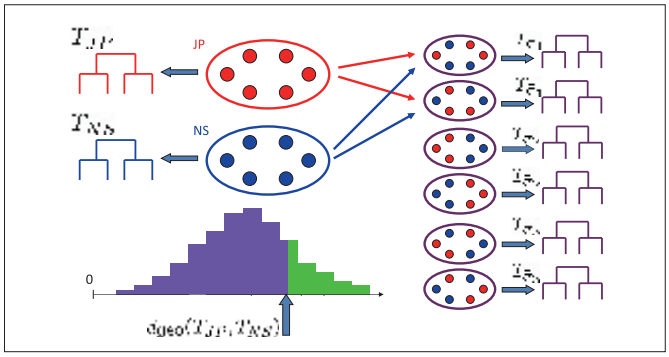


Figure 2: Sketch of the permutation test for dendrograms.

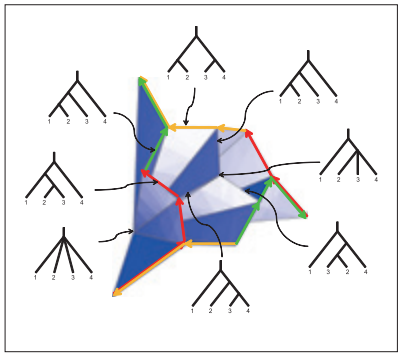


Figure 3: A simplicial fan of dendrograms.

Reading the Neural Code

Motivation

Perception, memory, learning and decision-making are processes carried out in the brain. The performance of such intelligent tasks is made possible by the communication of neurons (the cells of which the brain consists) through sequences of voltage pulses called "spikes." I am interested in formulating methods of extracting information from the neuronal activity exhibited while the brain carries out high-level processes. For this purpose, I have been working on constructing methods for analyzing the statistics of neuronal spikes.

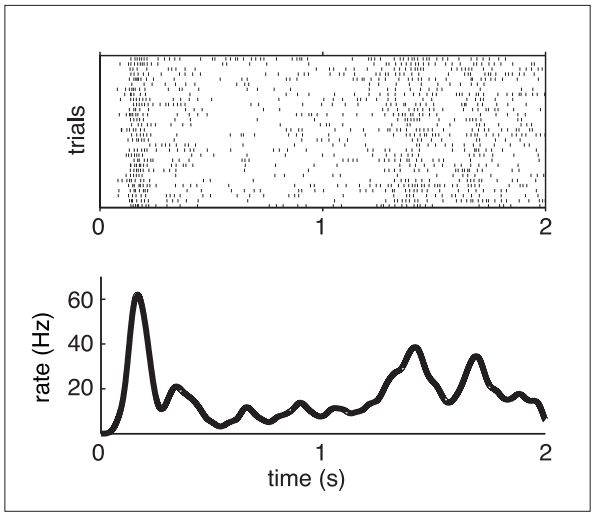


Figure 1: (Top) raster plot of spike trains.
(Bottom) an estimated firing rate.

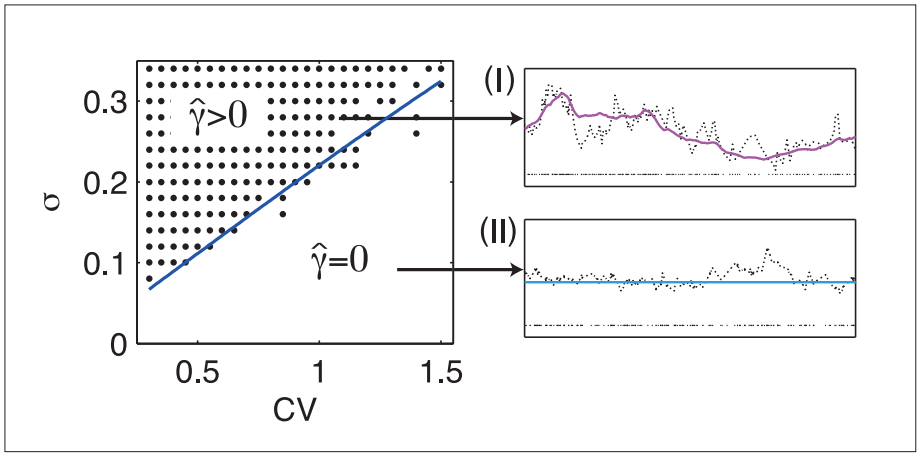


Figure 2: The lower bound below which the underlying rate variation is not detectable (solid line).

Summary of recent work

Neural activity in cortex exhibits variability (Figure 1), the characteristics of which are specific to each neuron and are strongly correlated with the function of the cortical area. However, its neural coding advantages, or limitations posed by this variability are not completely understood. In a recent study, we address a question of how the information about variation of firing rate, carried by spike trains, is related quantitatively to the variability of neuronal firing.

For this purpose, we introduce the relative entropy as a measure of information on variable firing rate. We then give an explicit interpretation of this information in terms of detectability of rate fluctuation: the lower bound of detectable rate fluctuation, below which the temporal variation of firing rate is undetectable with a Bayesian decoder, is entirely determined by this information (Figure 2). We show that the information depends not only of the variation of firing rates (i.e., signals), but also significantly on the dispersion properties of firing described by the shape of the interspike interval distribution (i.e., noise properties).

With the basis of our theoretical results, we are going to analyze real data, to estimate how much information biological spike trains contains.

Shinsuke Koyama

Statistical Methods for Large-scale Data in Service Industries

Statistical data analysis in service industries

According to the rapid development of computer technology including the Internet, huge amount of data are generated and stored continuously in service industries like POS data. We have to analyze such large-scale data to clarify the data generation process and to acquire useful knowledge for future activity. For solving those problems, we focus on interactive data visualization and symbolic data analysis (SDA).

Aggregation and interactive visualization of large-scale data

When we first face complicated large-scale data generated in service industries, data visualization techniques utilizing the recent computer technology is helpful to extract the hidden useful features in it, Figure 1 is an example of visualizing POS data in a certain convenience store chain by using several linked spineplots. A spineplot is a variation of barchart.

In these graphics, data for the customers whose ages are 20s and 30s are selected and highlighted by an interactive operation (see the area "age"). Corresponding data in other spineplots are also highlighted at the same time. These graphics show several useful characteristics of data. For example, proportions of these customers are higher in nighttime than in daytime (see the area "time").

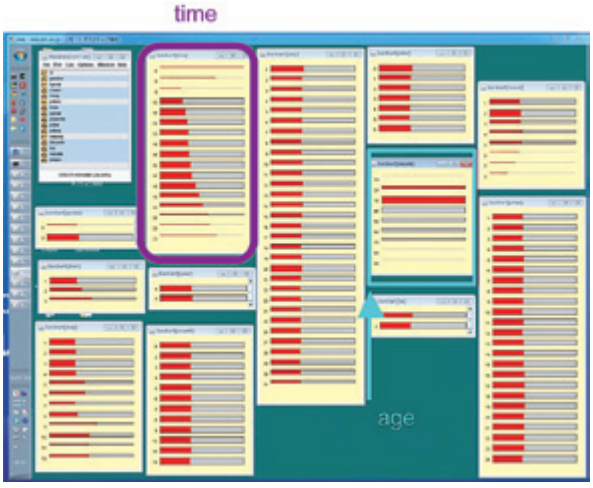


Figure 1: An example of visualization of POS data in a certain convenience store chain.

Figure 2 is generated in the process of analyzing Web log data produced in a real-estate searching website. Two barcharts illustrate numbers of real-estate properties in special wards in Tokyo metropolitan municipal district and suburban Tama area. In these graphics, the distribution of real-estate properties is clearly shown by aggregating huge amount of original data.

In this way, visualization software which can aggregate and operate large-scale data interactively and easily is indispensable to clarify features of complicated huge amount of data.

Development of statistical methodologies for analyzing aggregated large-scale data

For analyzing large-scale data of service industries, we are often interested in groups which consist of naturally and meaningfully similar individuals. Such groups are considered as "concepts" in symbolic data analysis (SDA). In SDA, "concepts" are expressed by symbolic data (SD) such as interval, histogram, etc. SDA provides techniques for analyzing such SD by extending existing analysis techniques, such as principal component analysis, clustering, and multidimensional scaling. In these techniques, groups are described by the information about marginal distribution. We notice that the information based on marginal distribution is not sufficient for several analyses. Thus, we use some information of joint distribution in a group for analyzing groups. For this purpose, we propose the concept of aggregated symbolic data (ASD) which use more information than the marginal distribution, for example, covariance information among variables, and study several required analysis techniques for ASD.

Nobuo Shimizu

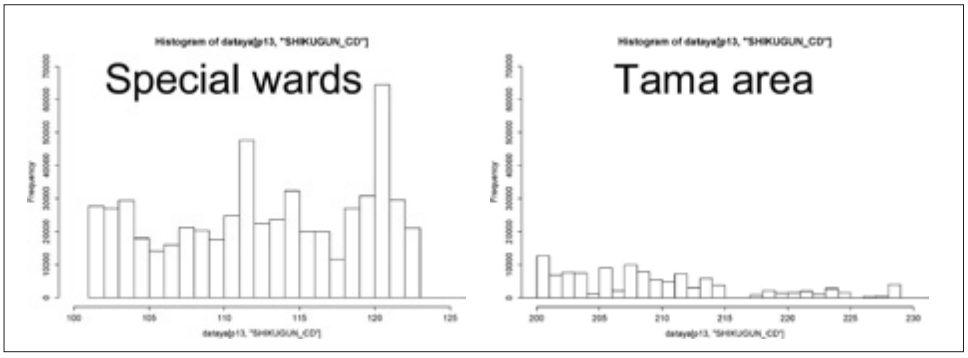


Figure 2: An example of visualization of distribution for real-estate properties in Tokyo metropolitan area.

Data Analysis Improving the Satisfaction of Individual Consumer

Modeling for information extraction of individual

Recently, a new topic of study, called service science, has been attracting attention because decision making regarding services that had conventionally been carried out based on experience or perception have come to be performed scientifically. As one of the main themes in service science, we can cite consumer heterogeneity. Companies have become able to obtain data at an individual level; however, it is still necessary to model the overall structure in order to extract information on individual consumers because there are few data about each individual. On the other hand, because of the progress of sensor technologies, companies have become able to obtain large-scale and detailed data about consumers. At this center, by fusing the approaches that have originally developed in marketing science, service engineering, artificial intelligence, and statistical science, we study data analytical techniques to improve the satisfaction of individual consumers. We introduce two study examples in the following.

Optimization of internet ad delivery system

Because of the progress of Internet technologies, this way of thinking about advertisement is changing. In the new Internet ad delivery system called real-time bidding (RTB), which has been rapidly spreading recently, the ad shown is determined by an auction. By means of this system, companies have become able to deliver an ad to only specific users based on their browse history. The effect of an ad largely depends on the users who see it, so it is crucial to understand to whom a company should show an ad. At this center, we are developing a system for effective ad delivery.

Movie recommendation by a service engineering approach

There are many products and services around us, and anyone is now able to obtain information about them. Therefore, determining what items a company shows to customers has become a very important task. We developed an algorithm that recommends the best movies to each user by using probabilistic latent semantic analysis (PLSA), which was originally proposed as a way to estimate the meaning of documents from word matrices in natural language processing. Specifically, we assume the existence of common latent classes among users and items and that each item and user stochastically belongs to each class. The algorithm enables high-precision prediction even for users whose browse history is not sufficiently recorded by analyzing the attribution of the users belonging to the class.

Tomoyuki Higuchi

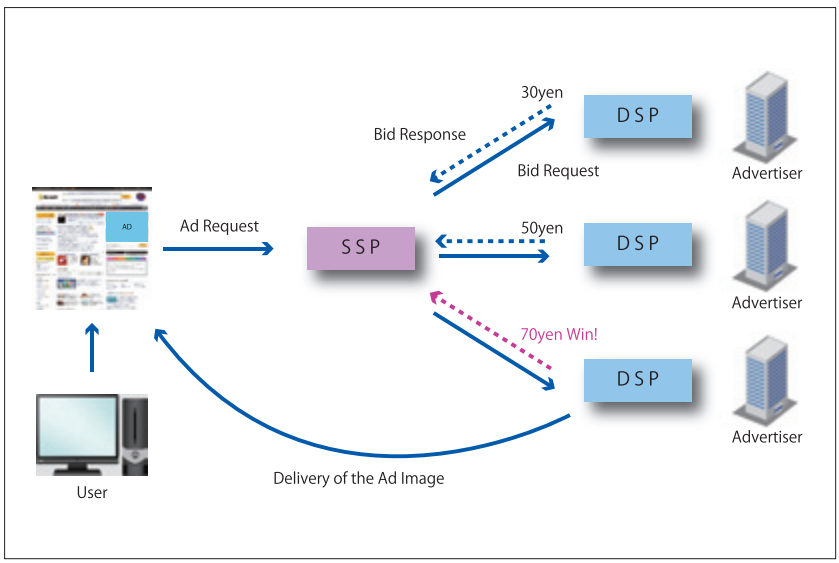


Figure 1: Conceptual Diagram of RTB.

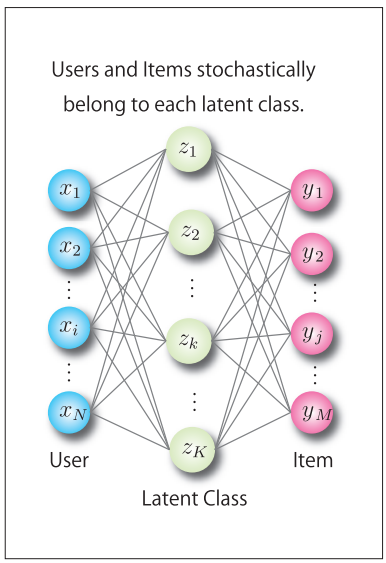


Figure 2: Graphical Model of PLSA.

Building a Framework for Advancing Strategic Research and Pursuing a New Approach to Collaborative Research

Biaxial Structure

The Institute of Statistical Mathematics pursues research and education along the two lines of basic research and NOE (Network Of Excellence)-type research, (we explain about "NOE" later), conducted by the basic research departments along a horizontal axis and the NOE-type research centers along a vertical axis (Figure 1). By its nature, the basic research departments cut across and link various disciplines, developing tools for interdisciplinary research. The field of statistical mathematics must itself evolve to meet the changing needs of society and the data environment, and is therefore constantly evolving as a field of study. At the same time, there are approaches and directions that remain unchanged as the field evolves. For that reason, we have chosen not to call it fundamental research or foundational research but "basic research", to reflect both the fixed and evolving qualities of statistical mathematics. There are three basic research departments: statistical modeling, data science, and mathematical analysis and statistical inference. These departments engage in cutting-edge research to develop methodologies for rational prediction and decision making, based on data and existing knowledge. Each of the Institute's permanent researchers is assigned to one of these basic research departments.

Research Facilities

The Institute's research facilities comprise the NOE (Network Of Excellence)-type research centers and the school for developing professionals. The NOE-type research centers (vertical axis) are staffed by permanent researchers within the Institute, project researchers (post-doctoral staff), and visiting professors and researchers. The current NOE-type research centers are the Risk Analysis Research Center, Research and Development Center for Data Assimilation, Survey Science Center, Research Center for Statistical Machine Learning, and Service Science Research Center. These centers conduct research activities that interface statistical mathematics with individual scientific disciplines in order to find solutions to urgent social problems. In addition, these centers promote the NOE activities as the cores in each NOE domain.

We launched the School of Statistical Thinking to foster and promote "statistical thinking". In the School of Statistical Thinking, researchers and students who have an eye on the creation of a new statistical research field and various people who realize the necessity of statistics in their particular research field train together to foster statistical thinking. For that, we have changed the personnel system to post newly employed assistant professors at the School of Statistical Thinking.

NOE (Network Of Excellence) Project

In accordance with the second medium-term plan of the Research Organization of Information and Systems, the Institute of Statistical Mathematics has set as a goal the establishment of NOE (Network Of Excellence) in statistical mathematics. We have been establishing NOE in the five research areas of integrated risk research, next-generation simulation, survey science, statistical machine learning, and service science. The NOE Project pursues activities to establish new methodologies in their respective research fields and serve as hubs for interdisciplinary interaction. We operate an NOE Promotion Unit to strengthen our coordination skills and to facilitate the overall advancement of the NOE Project, crucially supporting the goal of erecting a fourth scientific methodology in our knowledge society that extends beyond resolving individual problems. The Advisory

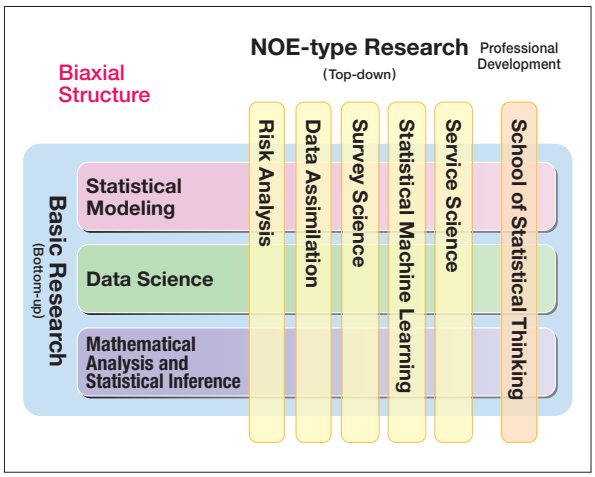


Figure 1: Biaxial Structure for research and education

Senior Advisor, RIKEN Brain Science Institute	Dr. Shun-ichi Amari
Adjunct Professor, Graduate School of System Information, Kobe University	Dr. Yoshio Oyanagi
President, Shiga University	Dr. Takamitsu Sawa
Professor Emeritus, Tokyo University	Dr. Motoyuki Suzuki
President, Center for International Public Policy Studies	Prof. Naoki Tanaka
President, The Japan Pharmaceutical Manufactures Association	Dr. Isao Teshirogi
Professor, Sociology and Research Methodology School of Cultural and Creative Studies, Aoyama Gakuin University	Dr. Kazufumi Manabe
Director-General, Center for Research Development and Strategy, Japan Science and Technology Agency	Dr. Hiroyuki Yoshikawa
Director-General, Institute for Monetary and Economic Studies	Prof. Tomoo Yoshida

Table 1: Advisory Board of the NOE Project

Board of the NOE Project, which is organized as experts in the private sector, academia, and the government (Table 1), advises our Managing Committee of the NOE Project and each NOE-type research center so that we can formulate a unified management strategy for the project.

On September 24th, 2012, we held the Advisory Board meeting of the NOE Project in order to explain our past NOE activities and to collect opinions from the members of the Advisory Board for further research activities in the next stage of the NOE Project. (Photo 1)

The Institute has created a new logo in light of the continued growth of research under the NOE. The logo (Figure 2) symbolizes the advancement of comprehensive research through the combined and cumulative efforts of the five NOE, alongside the research efforts in their respective research areas. The logo is used for the activities of the NOE Project at the Institute and at our related organizations.

統計数理研究所
NOE形成事業

Figure 2: logo

Photo 1: Advisory Board meeting on Sept. 24th, 2012

Expansion of Activities by NOE (Network Of Excellence)

The Institute is actively pursuing agreements with other research organizations in order to expand the role of the five NOE-type research centers as core research hubs. In the 2012-2013 Japanese academic year, we have signed new Memorandum of Agreements with two Japanese institutes and three foreign organizations.

From a methodological perspective, our Institute is focusing all activities on advancing research in each of the research fields of risk research, next-generation simulation, survey science, statistical machine learning, and service science. Also, we plan to unite the five NOE mentioned above with the NOE Research Promotion Organization. Using this NOE Research Promotion Organization, the Institute will aim to develop new research areas and establish new collaborative research systems (Figure 3). To learn more about the project, please visit the website of NOE (http://noe.ism.ac.jp/english/)

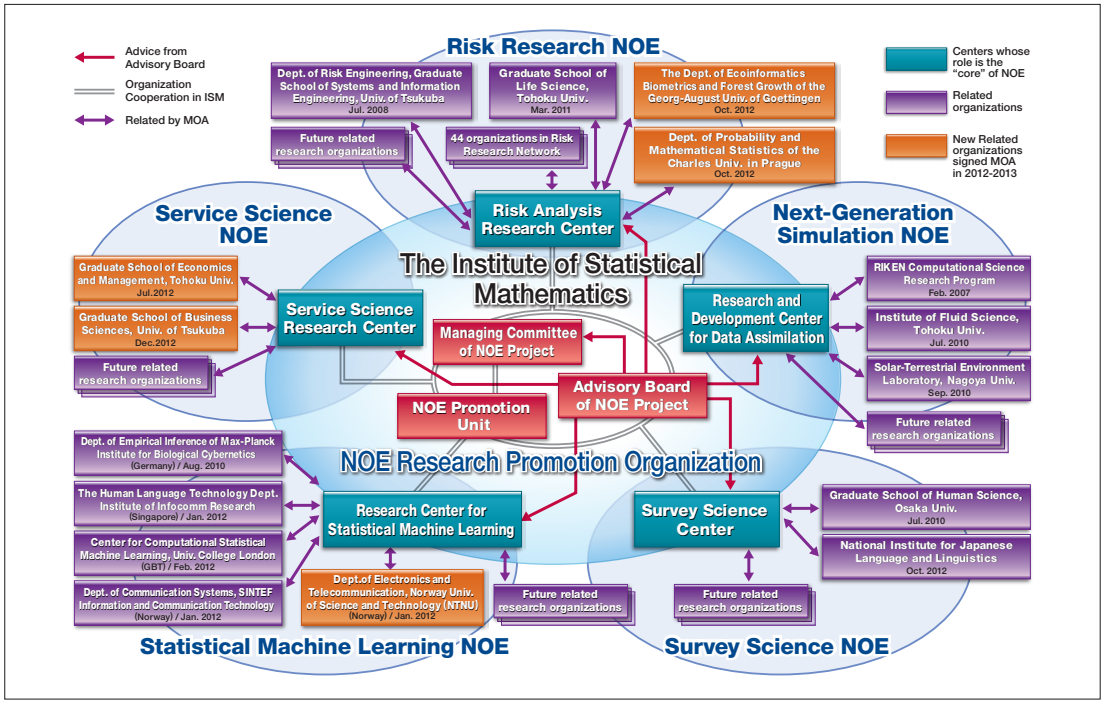


Figure 3: Relationship Diagram of Network Of Excellence

Project for Fostering and Promoting Statistical Thinking

Because of the "data explosion" in modern society, people who can think and handle such data statistically and retrieve useful information are greatly required in all fields of science and society. The Japanese education system unfortunately has fallen short in producing a sufficient number of people who have useful statistical thinking abilities. We established the School of Statistical Thinking in ISM to improve this situation. We hope that our activities, including tutorial courses, seminars, and cooperative research projects, are useful for developing professionals with the proper knowledge and skills to tackle complicated problems involving huge amounts of data.

Research Collaboration Start-up

The Institute had been providing a consultation service on statistical science. Along with the launch of the School of Statistical Thinking in November 2011, this service was reorganized as a research collaboration start-up. This program, being one of the projects to foster and promote statistical thinking, is mainly aimed at supporting applied scientists and other related people. Expert statisticians affiliated with the Institute give scientists and others advice on statistical modeling, data analysis, and research. Some cases develop into official research collaborations, which are our primary duty as an interuniversity research institute. The start-up program covers a variety of topics, ranging from introductory to more specialized studies. Half of the clients are from the private sector, and the rest are staff at public organizations, university professors, or students. The Institute accepts about 20 cases annually, some of which benefit society in diverse ways.

Open-type Human Resource Development Program

In order to foster and promote "statistical thinking", the Institute of Statistical Mathematics invites proposals of research projects and workshops to develop young researchers. In FY 2013, two projects and four workshops have been adopted after review.

Statistical Mathematics Seminar Series

The Institute holds weekly seminar series on statistical mathematics every Wednesday. The seminars are led by in-house and external lecturers to showcase their latest studies. These lectures are free to attend. To view the seminar schedule and learn more about the program, please visit the Institute of Statistical Mathematics website.

http://www.ism.ac.jp/

Open Lecture

We hold an open lecture during Education and Culture Week every year (November 1 through 7), to introduce the Institute's activities and to promote statistical science. We invite lecturers to speak on a timely topic relating to statistical science. The lecture is open to the general public. For further information, please visit the website of the Institute of Statistical Mathematics.

http://www.ism.ac.jp/kouenkai/

Tutorial Courses

History

The Statistical Education Program started in 1944, the year that the Institute of Statistical Mathematics was founded, as an education program at the Numerical Computation Training Center of the Science Research Technical Assistant Training Center of the Ministry of Education, located within the Institute. In 1947, the affiliated Statistical Technician Training Center was opened as an educational organization for statistical technicians and instructors.

As social needs have changed, the purpose of the education program has gradually shifted away from supplying statistical technicians for the government, towards educating working people. Tutorial courses were therefore initiated.

In 1985, the Institute was reorganized as a member of the Inter-University Research Institute Corporation, and the affiliated Statistical Technician Training Center was abolished. However, in response to consistent public demand for tutorial courses, the Center for Engineering and Technical Support, together with other departments, ran three to four courses annually. In 2005, the number of courses rose to 13. Since April 2012, the School of Statistical Thinking, which the Institute launched in November 2011 in order to foster and promote statistical thinking, has been running tutorial courses. In 2012, the number of courses was 11.

Courses

The total number of courses held from 1969 to March, 2013 was 293, with a total of 21,363 participants. These courses covered a wide range of fields from basic to applied statistics. The following table lists the courses held in the past year:

Year	Category	Title	Month	Number of participants
2012	Standard course	Statistical Analysis by Information Criteria	April	90
	Advanced course	An Introduction to Statistical Analysis by the Theory of Martingales	June	38
	Basic course	Basic Course of Statistics	July - August	98
	Basic course	Introduction to Multivariate Analysis	August	95
	Basic course	Analysis of Sample Surveys with R	September	38
	Standard course	An Introduction to Statistical Graphical Models	November	38
	Standard course	Statistical Analysis of Forest Growth Data and Its Applications	December	26
	Standard course	Statistical Methods for Missing Data	December	99
2013	Standard - Advanced course	Introduction to Statistical Topic Models	January	69
	Advanced course	Bayesian Data Analysis; Case Examples	February	20
	Standard course	Theory and Practice of Information Processing Based on Sparsity, —Compressed Sensing and Related Topics—	March	65

The schedule of tutorial courses can be found on the website of the Institute of Statistical Mathematics.

http://www.ism.ac.jp/lectures/kouza.html

Research Cooperation

International Cooperation

Associated Foreign Research Institutes

Organization name	Address	Conclusion day
The Statistical Research Division of the U.S. Bureau of the Census	USA (Washington)	July 27, 1988 -
Stichting Mathematisch Centrum	The Kingdom of the Netherlands (Amsterdam)	May 10, 1989 -
Statistical Research Center for Complex Systems, Seoul National University	The Republic of Korea (Seoul)	October 17, 2002 -
Institute for Statistics and Econometrics, Humboldt University of Berlin	Germany (Berlin)	December 8, 2004 -
Institute of Statistical Science, Academia Sinica	Taiwan (Taipei)	June 30, 2005 -
The Steklov Mathematical Institute	Russia (Moscow)	August 9, 2005 -
Central South University	China (Changsha)	November 18, 2005 -
Soongsil University	The Republic of Korea (Seoul)	April 27, 2006 -
Department of Statistics, University of Warwick	The United Kingdom (Coventry)	January 16, 2007 -
The Indian Statistical Institute	India (Kolkata)	October 11, 2007 -
Department of Empirical Inference, Max Planck Institute for Biological Cybernetics	Germany (Tubingen)	August 11, 2010 -
Faculty of Medicine, University of São Paulo	Brasil (São Paulo)	April 15, 2011-
Deparztment of Communication Systems, SINTEF Information and Communication Technology	Norway (Trondheim)	January 30, 2012-
Human Language Technology Department Institute for Infocomm Research	Singapore (Singapore)	February 16, 2012-
Centre for Computational Statistics and Machine Learning, University College London	The United Kingdom (London)	February 16, 2012-
Department of Electronics and Telecommunications, Norwegian University of Science and Technology	Norway (Trondheim)	May 22, 2012-
Department of Probability and Mathematical Statistics, Charles University in Prague	Czech Republic (Prague)	October 10, 2012-
The Department of Ecoinformatics, Biometrics and Forest Growth of the Georg-August University of Goettingen	Germany (Goettingen)	October 18, 2012-

Research Collaboration

This academic study program provides researchers from other academic institutes with access to the facilities of the Institute, and provides opportunities for researchers to conduct theoretical and applied studies on statistics.

Number of Activities

2007	2008	2009	2010	2011	2012
120	138	154	135	172	182

Fields of Research Collaboration

Research collaboration is classified by research field as follows. Applicants can use the table below to find the most appropriate type of project.

ISM Fields

Number	Fields	Number	Fields
a	Spatial and time series modeling	f	Computational statistics
b	Intelligent information processing	g	Mathematical statistics
c	Graph modeling	h	Learning and inference
d	Survey research	i	Computational mathematics
e	Multidimensional data analysis	j	Others

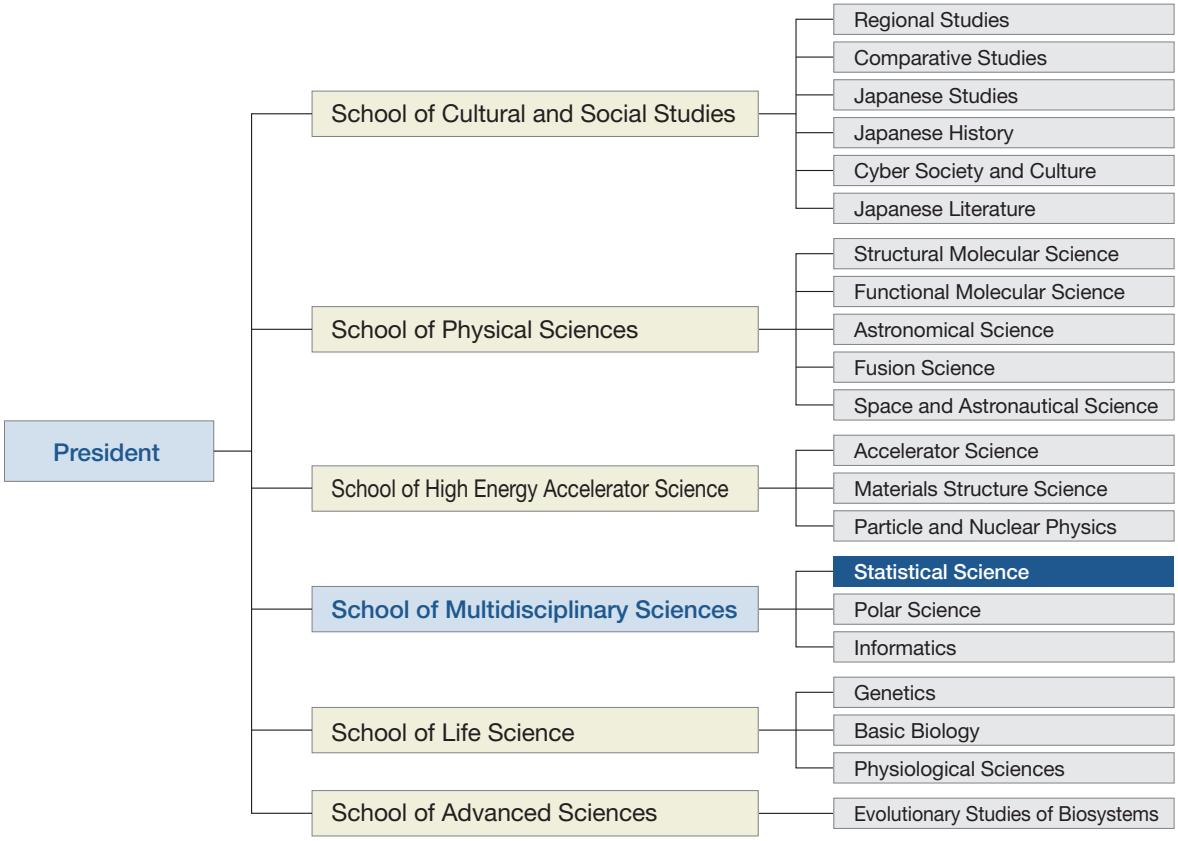
Major Research Fields

Number	Fields	Major Research Domains
1	Statistical mathematics	Mathematical theory of statistics, optimization, etc.
2	Information science	Algorithms, use of computer in statistics, etc.
3	Biological science	Medicine, pharmacy, epidemiology, genetics, etc.
4	Physical science	Space, planet, earth, polar region, materials, etc.
5	Engineering	Mechanics, electronics, control, chemistry, architecture, etc.
6	Human science	Philosophy, art, psychology, education, history, geography, culture, language, etc.
7	Social science	Economics, law, politics, society, management, official statistics, population, etc.
8	Others	Other research fields

Graduate School Program

Organization

The Institute of Statistical Mathematics is one of the platforms of the Graduate University for Advanced Studies (the headquarters in Hayama, Kanagawa), which was opened in October 1988 to offer graduate education. Since its opening, the Institute has created the Department of Statistical Science and, since April 1989, has accepted students for education and research in doctoral programs. In 2006, the Institute adopted a five-year system, offering either a five-year education and research program, or a three-year education and research program starting from the third year of study.



Outline of Education and Research

The course includes designing of data-gathering systems, modeling, inference and forecasting in order to extract information and knowledge from the real world based on empirical data, as well as basic, mathematical and applied education and research related to these fields. The course aims to provide the student with skills that help to contribute to solving important and connected issues and give the ability to perform original research.

Field of Education and Research	Contents
Statistical Modeling	Education and research focuses on dynamic modeling such as spatial and space-time modeling, graphical modeling of temporally and/or spatially inter-related complex phenomena, and intelligent information processing. We also provide education and research on statistical inference based on various models, methods of calculation for inference, and evaluation of models based on data.
Data Science	We provide education and research on data design, investigation and analytical methods to cope with the uncertainty and incompleteness of information, as well as on computational statistics.
Mathematical and Statistical Inference	We provide education and research on the theory of statistics and related basic mathematics, statistical learning theory to extract information from data by automated learning and inference techniques; as well as theory and applications of optimization and computation algorithms which serve as the basis for computational inference.

Features of Education and Research

- The course is the only integrated doctoral program on statistical science in Japan. It has received students from a wide variety of disciplines and has offered education and research on statistical science by professors specialized in many different fields, from theory through to practical applications.
- The Institute of Statistical Mathematics, the platform for the course, is equipped with a world-class super computer, high-speed 3D graphic computers and simulators to generate physical random numbers, as well as a variety of software, including original statistical software developed by the Institute.
- The academic publications and books on statistical and mathematical sciences produced are some of the best in the world.
- In its role as an inter-university research institute, the Institute holds frequent workshops and seminars by visiting professors and researchers from both Japan and abroad. Students are free to attend and participate.
- It is possible to collaborate with researchers from other universities and institutions. It is also possible for students to develop their own projects by participating in research projects with other institutions through the Transdisciplinary Research Integration Center, Research Organization of Information and Systems.

Course Requirements and Type of Degree Granted

- Requirements to complete the course are as follows:
  Completion of at least 40 credits while a graduate student of five years, or completion of at least 10 credits while a doctorate student of three years who graduated Master's course meeting all the criteria set by the thesis committee of the Institute and successfully completing the final examination.
- On completion of the course, either a Doctorate in Statistical Science or, if the thesis deals mainly with an inter-disciplinary field related to statistical science, a Doctorate of Philosophy is awarded.
- The required number of years of study will be flexible if a student demonstrates outstanding research results.

Number of Students (As of April 1, 2013)

■ Doctor's course five years

Year of enrollment	2008	2009	2010	2012	2013
Number of students	1 ①	1 (1)	2	2	2

■ Doctor's course three years

Year of enrollment	2007	2008	2009	2010	2011	2012	2013
Number of students	1 ①	2 ②	2 ②	3 ③	7 ⑤	3 ②	3

* The figures in parentheses indicate the number of foreign students being supported at government expense.
* The figures in circles indicate those who are employed by other organizations.

University Background of Students

National and public universities

• Hokkaido University (1) • Tohoku University (2) • Fukushima University (1) • University of Tsukuba (6) • Saitama University (1) • Ochanomizu University (1) • Hitotsubashi University (6) • Chiba University (1) • The University of Tokyo (17) • Tokyo Medical and Dental University (1) • Tokyo Gakugei University (1) • Tokyo Institute of Technology (4) • Tokyo University of Marine Science and Technology (1) • Tokyo University of Agriculture and Technology (1) • Tokyo Metropolitan University (1) • Shizuoka University (1) • Japan Advanced Institute of Science and Technology, Hokuriku (1) • Nagoya University (3) • Toyohashi University of Technology (2) • Kyoto University (4) • Osaka University (2) • Osaka City University (1) • Nara Institute of Science and Technology (1) • Okayama University (2) • Shimane University (3) • Kyushu University (2) • Oita University (1)

University Background of Students

Private universities

• Okayama University of Science (1) • Tokyo University of Science (6) • Kyoto Sangyo University (1) • Keio University (6) • Waseda University (8) • Chuo University (7) • Toyo University (1) • Nihon University (2) • Hosei University (7) • Kurume University (1) • Japan Women's University (1) • Shibaura Institute of Technology (1) • Nanzan University(1)

Foreign universities

• Aston University (1) • University of California, Irvine (1) • Universidade Eatadual of Campians (1) • University of Colorado at Boulder (2) • University of Dhaka (2) • University of Hawaii (1) • Jahangirnagar University (2) • University of Malaya (1) • Ohio University (1) • University of Rahshahi (2) • Stanford University (1) • Center for Analysis and Prediction, China Seismological Bureau (1) • Northeastern University of Technology, China (1) • The Hong Kong University of Science and Technology (1) • University of Science and Technology of China (1) • Chinese Academy of Sciences, Institute of Applied Mathematics (1)

Degrees Awarded

Year	2007	2008	2009	2010	2011	2012
Doctor of Philosophy	7 [1]	4 [1]	5 [1]	7 [1]	4	6 [1]

* [ ] Ph.D. on the basis of the dissertation only (included in the total)

Alumni

National and public universities, and public organizations

• Obihiro University of Agriculture and Veterinary Medicine • University of Tsukuba • University of Hyogo • The University of Tokyo • The University of Electro-Communications • Saitama University • Nagoya University • Kyushu University • Kyushu Institute of Technology • University of the Ryukyus • The Institute of Statistical Mathematics • Tohoku University • Yokohama National University • Hokkaido University • Tokyo Institute of Technology • Hiroshima University • JAXA's Engineering Digital Innovation Center • Kyoto University • Nara Institute of Science and Technology • Bank of Japan • Japan Broadcasting Corporation • Railway Technical Research Institute • Statistical Information Institute for Consulting and Analysis • Government Pension Investment Fund • Public School

Private universities

• Sapporo Gakuin University • Tokyo Health Care University • Meiji University • Doshisha University • Josai University • Nihon University • Komazawa University • Aichi University of Technology • Tokyo University of Information Science • Shibaura Institute of Technology • Rikkyo University

Foreign universities

• Jahangirnagar University • Victoria University • Massey University • University of Otaga • Statistics New Zealand • University of Rajshahi • University of California, Los Angeles • Asia-Pacific Center for Security Studies Department • Central South University • Hong Kong Baptist University • University of South Carolina • The University of Warwick

Private companies, etc.

• Hitachi, Ltd. Central Research Laboratory • NTT Communication Science Laboratories • Seiwa Kikaku • NLI Research Institute • Mizuho Trust and Banking • Nomura Securities Co., Ltd. • ATR Computational Neuroscience Laboratories • Toyota Motor Corporation, Higashi-Fuji Technical Center • Schlumberger Limited • Macquarie Securities, Japan • Non-Life Insurance Rating Organization of Japan • Barclays Global Investors • Open Technologies Corporation • Yamaha Corporation • Goldman Sachs Asset Management L.P. • CLC bio Japan, Inc. • Bank of Tokyo-Mitsubishi UFJ • Pfizer Japan Inc. • Doctoral Institute for Evidence Based Policy • Sony Corporation • NTTIT Corporation • Sompo Japan Insurance Inc. • Qualicaps Co., Ltd. • Bridgestone Corporation

Facilities and Equipment

Computational Resources

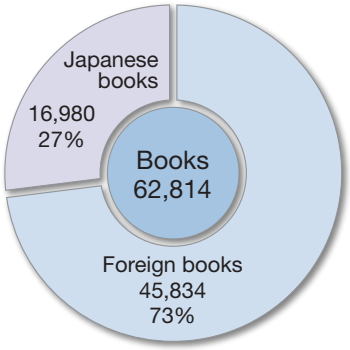
Since January 2010, the Supercomputer System for Statistical Science has been in operation and has analyzed a large volume of statistical data. The main components are a shared memory system (Fujitsu SPARC Enterprise M9000 with 2 nodes, the first with 64 quad-core SPARC64 CPUs and 2 TB of main memory, and the second with 24 quad-core SPARC64 CPUs and 1 TB of main memory), and a distributed memory system (Fujitsu PRIMERGY RX200S5 with 360 nodes, each with 2 quad-core Xeon X5570 CPUs and 48 or 24 GB of main memory. In total, 2880 cores and 12.1 TB of memory are available). The system also includes a large-scale shared storage system (1.37 PB disk storage supported by RAID6), a physical random number generating system (two random number generator boards, each of which can generate random numbers at 400 MB/s) and a visualization system (including a SXRD projector with a maximum resolution of 4,096 × 2,160 and a 200-inch rear projection screen).

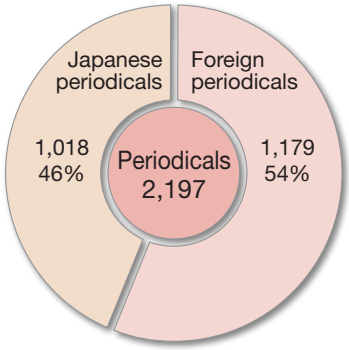
In the office building, the primary Local Area Network (LAN) consists of an Ethernet network using 10GBASE-SR for the main trunk and 1000Base-T for branches. The personal computers in researchers' offices, the Supercomputer System for Statistical Science are all connected to this network. A wireless LAN system that supports IEEE 802.11a,b,g,n is also available in the area of the building occupied by the institute. These LAN systems enable distributed processing and computing resources and statistical data to be used effectively. Comprehensive network security measures have been implemented such as a firewall system, anti-virus software, and an intrusion prevention system. To encourage joint research with researchers both in Japan and abroad, as well as the exchange of e-mails, the network is connected to the Internet through SINET3 (1 Gbps).

Supercomputer System for Statistical Science

Library and Materials (As of April 1, 2013)

We have a large number of major Japanese/foreign journals covering a wide variety of fields including statistics, mathematics, computer science and informatics. In addition, we also have a large library consisting of books on humanities, social science, biology, medical science, science and engineering.





Besides contributed to Japanese and foreign publications, we also have a collection of journals that we publish ourselves: Annals of the Institute of Statistical Mathematics (English; Springer), Proceedings of the Institute of Statistical Mathematics (Japanese), ISM Survey Research Report (Statistical Researches mainly related to the Japanese National Character), Computer Science Monographs, Cooperative Research Reports (for collaborative research projects), Research Memorandum, ISM Reports on Statistical Computing, and ISM Report on Research and Education.

All materials are properly catalogued and can be searched from the web in order to meet the needs of researchers working in a wide of fields. We also accept photocopy requests.

Finance and Buildings

Administration Subsidy and Others (2012)

Type	Personnel expenses	Non-personnel expenses	Total
Expenditure	690,464	938,298	1,628,762

Unit: ¥1,000

Accepted External Funds (2012)

Type	Subcontracted research	Joint research	Contribution for scholarship	Total
Items	11	7	4	22
Income	70,193	6,392	4,600	81,185

Unit: ¥1,000

Grant-in-Aid for Scientific Research "KAKENHI" (2012)

Research Category	Items	Amount Granted
Grant-in-Aid for Scientific Research (S)	1	34,190
Grant-in-Aid for Scientific Research (A)	5	56,940
Grant-in-Aid for Scientific Research (B)	4	24,180
Grant-in-Aid for Scientific Research (C)	15	19,500
Grant-in-Aid for Challenging Exploratory Research	5	6,240
Grant-in-Aid for Young Scientists (B)	11	11,960
Grant-in-Aid for Research Activity Start-up	1	1,170
Grant-in-Aid for JSPS Fellows	2	2,000
Total	44	156,180

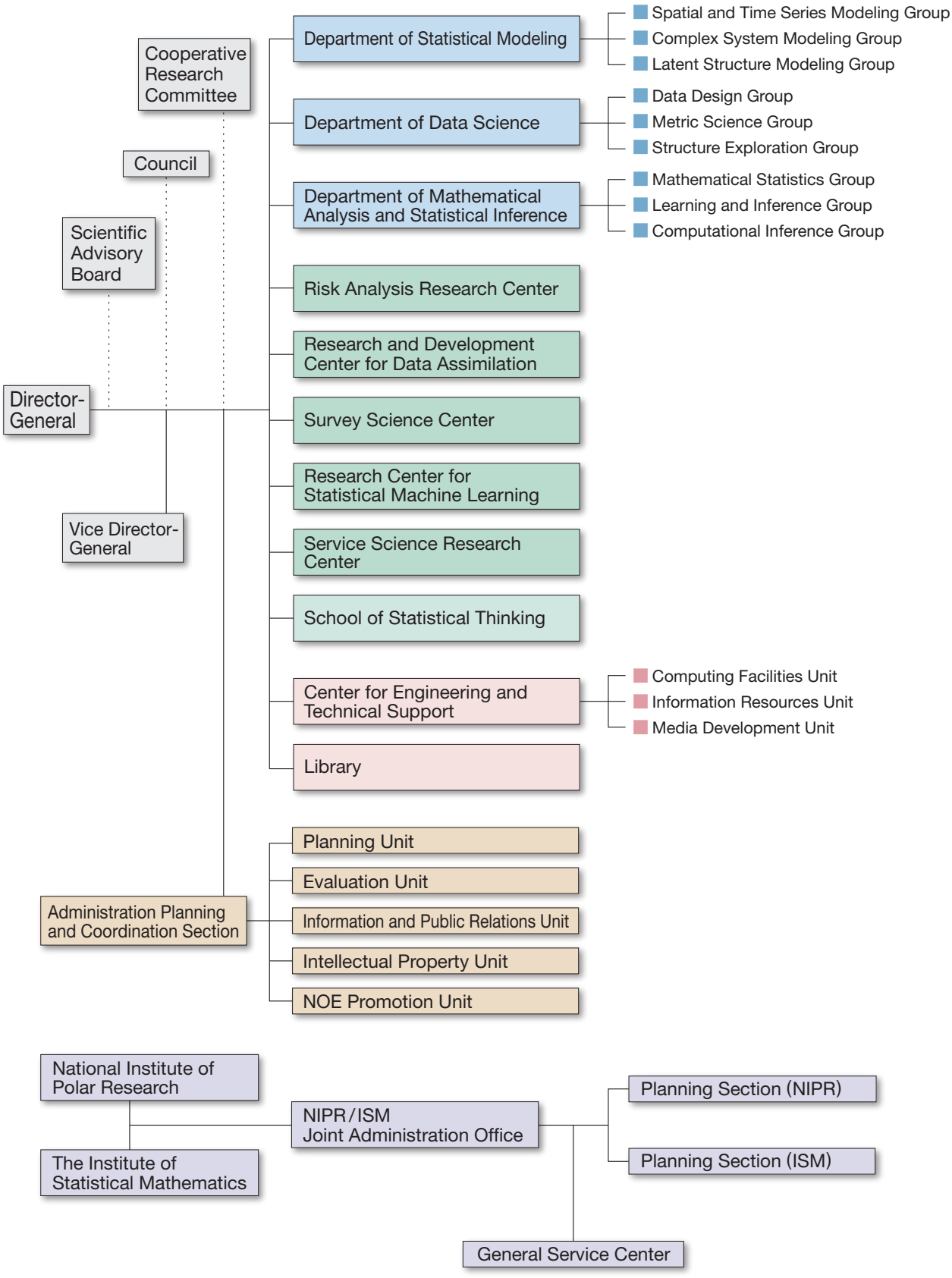
Unit: ¥1,000

Site and Buildings (As of April 1, 2013)

Site Area	62,450m^2
Area for Buildings (total)	16,026m^2

Organization

Organization Diagram (As of August 1, 2013)



Number of Staff (As of April 1, 2013)

Type	Director-General	Professor	Associate Professor	Assistant Professor	Administrative Staff	Technical Staff	Total
Director-General	1						1
Department of Statistical Modeling		5	7	2			14
Department of Data Science		5	7	4			16
Department of Mathematical Analysis and Statistical Inference		6	5	4			15
Center for Engineering and Technical Support						10	10
Administration Planning and Coordination Section					1		1
NIPR/ISM Joint Administration Office					11 (29)	1 (2)	12 (31)
Total	1	16	19	10	12 (29)	11 (2)	69 (31)

( ) Total number of staff of NIPR/ISM Joint Administration Office.

The number under Technical Staff at the Center for Engineering and Technical Support includes one staff member who retired because of age but was reemployed in a different position.

Staff (As of August 1, 2013)

Director-General Tomoyuki HIGUCHI

Vice Director-General Hiroe TSUBAKI | Vice Director-General Yoshiyasu TAMURA | Vice Director-General Hiroshi MARUYAMA

Department of Statistical Modeling

Director Tomoko MATSUI

Spatial and Time Series Modeling Group

Prof. Nobuhisa KASHIWAGI | Prof. Tomoyuki HIGUCHI | Assoc. Prof. Jiancang ZHUANG

Assoc. Prof. Genta UENO | Assist. Prof. Shinya NAKANO

Complex System Modeling Group

Prof. Yoshiyasu TAMURA | Prof. Junji NAKANO | Assoc. Prof. Yukito IBA

Assoc. Prof. Yumi TAKIZAWA | Assoc. Prof. Fumikazu MIWAKEICHI | Assist. Prof. Shinsuke KOYAMA

Visiting Prof. Takehiro FUKUI | Visiting Prof. Hiroko NAKANISHI | Visiting Assoc. Prof. Kazuhiro AOYAMA

Latent Structure Modeling Group

Prof. Hiroshi MARUYAMA | Prof. Tomoko MATSUI | Assoc. Prof. Yoshinori KAWASAKI

Assoc. Prof. Ryo YOSHIDA | Project Assist. Prof. Sayaka SHIOTA

Department of Data Science

Director Takashi NAKAMURA

Data Design Group

Prof. Takashi NAKAMURA | Prof. Ryozo YOSHINO | Assoc. Prof. Naomasa MARUYAMA

Assoc. Prof. Tadahiko MAEDA | Assoc. Prof. Takahiro TSUCHIYA | Assist. Prof. Toshihiko KAWAMURA

Visiting Prof. Kazufumi MANABE

Metric Science Group

Prof.	Satoshi YAMASHITA	Assoc. Prof.	Kenichiro SHIMATANI	Assoc. Prof.	Masayuki HENMI
Assist. Prof.	Nobuo SHIMIZU	Assist. Prof.	Hisashi NOMA		

Structure Exploration Group

Prof.	Hiroe TSUBAKI	Prof.	Koji KANEFUJI	Assoc. Prof.	Jun ADACHI
Assoc. Prof.	Manabu KUROKI	Assist. Prof.	Yoo Sung PARK		

Department of Mathematical Analysis and Statistical Inference

Director Satoshi KURIKI

Mathematical Statistics Group

Prof.	Satoshi KURIKI	Assoc. Prof.	Yoichi NISHIYAMA	Assoc. Prof.	Shuhei MANO
Assist. Prof.	Takaaki SHIMURA	Assist. Prof.	Shogo KATO	Assist. Prof.	Kei KOBAYASHI

Learning and Inference Group

Prof.	Shinto EGUCHI	Prof.	Kenji FUKUMIZU	Assoc. Prof.	Shiro IKEDA
Assoc. Prof.	Hironori FUJISAWA	Assoc. Prof.	Daichi MOCHIHASHI	Project Assist. Prof.	Osamu KOMORI

Computational Inference Group

Prof.	Yoshihiko MIYASATO	Prof.	Atsushi YOSHIMOTO	Prof.	Satoshi ITO
Project Assist. Prof.	Tadayoshi FUSHIKI				

Risk Analysis Research Center

Director Satoshi YAMASHITA Vice Director Masayuki HENMI

Prof.	Hiroe TSUBAKI	Prof.	Satoshi YAMASHITA	Prof.	Satoshi KURIKI
Prof.	Shinto EGUCHI	Prof.	Koji KANEFUJI	Prof.	Nobuhisa KASHIWAGI
Prof.	Atsushi YOSHIMOTO	Assoc. Prof.	Masayuki HENMI	Assoc. Prof.	Manabu KUROKI
Assoc. Prof.	Shuhei MANO	Assoc. Prof.	Fumikazu MIWAKEICHI	Assoc. Prof.	Yoshinori KAWASAKI
Assoc. Prof.	Yoichi NISHIYAMA	Assoc. Prof.	Jiancang ZHUANG	Assoc. Prof.	Hironori FUJISAWA
Assoc. Prof.	Jun ADACHI	Assist. Prof.	Takaaki SHIMURA	Assist. Prof.	Shogo KATO
Assist. Prof.	Hisashi NOMA	Project Assoc. Prof.	Takaki IWATA	Project Assist. Prof.	Takafumi KUBOTA
Visiting Prof.	Sadaaki MIYAMOTO	Visiting Prof.	Rinya TAKAHASHI	Visiting Prof.	Nakahiro YOSHIDA
Visiting Prof.	Manabu IWASAKI	Visiting Prof.	Toshiya SATO	Visiting Prof.	Yoichi KATO
Visiting Prof.	Masaaki MATSUURA	Visiting Prof.	Hirohisa KISHINO	Visiting Prof.	Tatsuhiko TSUNODA
Visiting Prof.	Kunio SHIMIZU	Visiting Prof.	Mihoko MINAMI	Visiting Prof.	Megu OTAKI
Visiting Prof.	Tetsuji IMANAKA	Visiting Prof.	Nobuo YOSHIDA	Visiting Prof.	Satoshi TAKIZAWA
Visiting Prof.	Tadashi KITAMURA	Visiting Prof.	Katsuhiko TAKATA	Visiting Prof.	Naoto KUNITOMO
Visiting Prof.	Toshio HONDA	Visiting Prof.	Hiroshi TSUDA	Visiting Prof.	Michiko MIYAMOTO
Visiting Prof.	Toshinao YOSHIBA	Visiting Prof.	Hidetoshi SHIMODAIRA	Visiting Prof.	Satoru ENDO
Visiting Prof.	Satoshi TERAMUKAI	Visiting Prof.	Shigeyuki MATSUI	Visiting Prof.	Hsien-kuei HWANG
Visiting Assoc. Prof.	Hideki KATAGIRI	Visiting Assoc. Prof.	Koji OKUHARA	Visiting Assoc. Prof.	Hisateru TACHIMORI

Staff

Risk Analysis Research Center

Visiting Assoc. Prof.	Makoto TOMITA	Visiting Assoc. Prof.	Toshikazu KITANO	Visiting Assoc. Prof.	Hisayuki HARA
Visiting Assoc. Prof.	Toshio ONISHI	Visiting Assoc. Prof.	Jun OHASHI	Visiting Assoc. Prof.	Toshihiro HORIGUCHI
Visiting Assoc. Prof.	Takashi KAMEYA	Visiting Assoc. Prof.	Yoshiyuki NINOMIYA	Visiting Assoc. Prof.	Kenichi KAMO
Visiting Assoc. Prof.	Masashi KONOSHIMA	Visiting Assoc. Prof.	Katsuya TANAKA	Visiting Assoc. Prof.	Masakazu ANDO
Visiting Assoc. Prof.	Yasutaka SHIMIZU	Visiting Assoc. Prof.	Masaaki FUKASAWA	Visiting Assoc. Prof.	Bogdan Dumitru ENESCU
Visiting Assoc. Prof.	Takahiro YONEZAWA	Visiting Assoc. Prof.	Seisho SATO	Project Researcher	Takao KUMAZAWA

Research and Development Center for Data Assimilation

Director Tomoyuki HIGUCHI Vice Director Yoshiyasu TAMURA

Prof.	Tomoyuki HIGUCHI	Prof.	Yoshiyasu TAMURA	Prof.	Junji NAKANO
Assoc. Prof.	Genta UENO	Assoc. Prof.	Ryo YOSHIDA	Assoc. Prof.	Yukito IBA
Assist. Prof.	Shinya NAKANO	Project Assoc. Prof.	Hiromichi NAGAO	Project Assist. Prof.	Christopher Andrew ZAPART
Project Assist. Prof.	Masaya SAITO	Project Assist. Prof.	Terumasa TOKUNAGA	Visiting Prof.	Takashi WASHIO
Visiting Assoc. Prof.	Kazuyuki NAKAMURA	Project Researcher	Kazue SUZUKI		

Survey Science Center

Director Ryozo YOSHINO

Prof.	Ryozo YOSHINO	Prof.	Takashi NAKAMURA	Assoc. Prof.	Tadahiko MAEDA
Assoc. Prof.	Takahiro TSUCHIYA	Assist. Prof.	Yoo Sung PARK	Visiting Prof.	Yoshimichi SATO
Visiting Prof.	Hidekazu CHAYAMA	Visiting Prof.	Fumi HAYASHI	Visiting Prof.	Masato YONEDA
Visiting Assoc. Prof.	Toru KIKKAWA	Visiting Assoc. Prof.	Takahito ABE	Visiting Assoc. Prof.	Wataru MATSUMOTO
Visiting Assoc. Prof.	Koken OZAKI	Project Researcher	Kosuke NIKAIDO	Project Researcher	Kiyohisa SHIBAI
Project Researcher	Ryoji MATSUOKA				

Research Center for Statistical Machine Learning

Director Kenji FUKUMIZU Vice Director Tomoko MATSUI

Prof.	Kenji FUKUMIZU	Prof.	Tomoko MATSUI	Prof.	Shinto EGUCHI
Prof.	Yoshihiko MIYASATO	Prof.	Satoshi ITO	Assoc. Prof.	Shiro IKEDA
Assoc. Prof.	Daichi MOCHIHASHI	Assist. Prof.	Kei KOBAYASHI	Assist. Prof.	Shinsuke KOYAMA
Project Assist. Prof.	Yu NISHIYAMA	Visiting. Prof.	Atsuko IKEGAMI	Visiting. Prof.	Takashi TSUCHIYA
Visiting. Prof.	Tadashi WADAYAMA	Visiting. Prof.	Masataka GOTO	Visiting. Prof.	Koji TSUDA
Visiting Assoc. Prof.	Yuji SHINANO	Visiting Assoc. Prof.	Ido NEVAT	Visiting Assoc. Prof.	Arthur GRETTON

Service Science Research Center

Director Hiroshi MARUYAMA

Prof.	Hiroshi MARUYAMA	Prof.	Tomoyuki HIGUCHI	Prof.	Hiroe TSUBAKI
Prof.	Tomoko MATSUI	Prof.	Junji NAKANO	Assoc. Prof.	Manabu KUROKI
Assist. Prof.	Toshihiko KAWAMURA	Assist. Prof.	Nobuo SHIMIZU	Visiting Prof.	Yoichi MOTOMURA
Visiting Prof.	Shusaku TSUMOTO	Visiting Prof.	Nobuhiko TERUI	Visiting Prof.	Yoshiki YAMAGATA

Service Science Research Center

Visiting Assoc. Prof.	Tsukasa ISHIGAKI	Visiting Assoc. Prof.	Tadahiko SATO	Visiting Assoc. Prof.	Yukihiko OKADA
Visiting Assoc. Prof.	Haruhisa FUKUDA	Project Researcher	Hisanao TAKAHASHI		

School of Statistical Thinking

Director Junji NAKANO Vice Director Yoshinori KAWASAKI

Prof.	Hiroshi MARUYAMA	Prof.	Satoshi ITO	Assoc. Prof.	Yukito IBA
Assoc. Prof.	Naomasa MARUYAMA	Adjunct Professor	Masami HASEGAWA	Adjunct Professor	Yasumasa BABA
Adjunct Professor	Makio ISHIGURO	Project Assist. Prof.	Kei TAKAHASHI	Project Assist. Prof.	Keiichi FUKAYA
Project Researcher	Shigeru FUJITA				

Project Researchers

Project Assoc. Prof.	Kazuhiro MINAMI	Project Assoc. Prof.	Roberto Sebastian LEGASPI	Project Assist. Prof.	Kazuhiko SHIBUYA
Project Researcher	Motoi OKAMOTO	Project Researcher	Satoko SAITA	Project Researcher	Xiaoling DOU

Center for Engineering and Technical Support

Director Junji NAKANO Vice Director Yoshinori KAWASAKI
Deputy Manager Yuriko WATANABE Senior Specialist Saeko TANAKA

Head of Computing Facilities Unit	Kazuhiro NAKAMURA	Head of Information Resources Unit	Saeko TANAKA
Head of Media Development Unit	Akiko NAGASHIMA		

Library

Head Junji NAKANO

Administration Planning and Coordination Section

Director Tomoyuki HIGUCHI

Head of Planning Unit	Hiroe TSUBAKI	Head of Evaluation Unit	Yoshiyasu TAMURA
Head of Information and Public Relations Unit	Hiroshi MARUYAMA	Head of Intellectual Property Unit	Hiroshi MARUYAMA
Head of NOE Promotion Unit	Hiroe TSUBAKI	Visiting Prof.	Takashi NAMESHIDA

Staff

NIPR/ISM Joint Administration Office

Director of NIPR/ISM Joint Administration Office Tsugio TOKUTA　　Director of General Service Center Tomoyoshi SHIBUSAWA

Planning Section (ISM)

Head of Planning Section Kenichi TADA

Deputy Head	Mitsuaki OGAWA	Deputy Head	Kazuhiko GOTO	Specialist	Fumio SUTO
Team Leader	Mitsuo ENDO	Team Leader	Hiroaki ARAI	Team Leader	Tomoko ODA

Planning Section (NIPR)

Head of Planning Section Michiaki NAKANO

Deputy Head	Yasuyuki EDURE	Team Leader	Kazuhisa OSHITA	Team Leader	Norihito SETO
Team Leader	Yoji ISHII	Specialist	Hiroyasu KUMAGAI	Specialist	Tomoya MORITA

General Service Center

Deputy Head	Koji SAKAMOTO	Deputy Head	Takashi KUBOTA	Deputy Head	Tomohiko MIYAUCHI
Team Leader	Yumiko OKAWA	Team Leader	Kazuyoshi ASO	Team Leader	Kenichi SHIOBARA
Specialist	Yoshihiro YAMADA	Specialist	Michihito SAKURAI		

Council of The Institute of Statistical Mathematics (As of April 1, 2013)

Yasushi AKIYAMA	Professor, Graduate School of Information Science and Engineering , Tokyo Institute of Technology
Masanori IYE	Professor, Optical and Inferred Astronomy Division, National Astronomical Observatory of Japan, National Institutes of Natural Sciences
Koji KURIHARA	Professor, Okayama University Executive Vice Director / The Graduate School of Environmental and Life Science
Kunio SHIMIZU	Professor, Faculty of Science and Technology, Keio University
Nobuhiko TERUI	Professor, Graduate School of Economics and Management, Tohoku University
Ryuei NISHII	Professor, Institute of Mathematics for Industry, Kyushu University
Yoshihiro YAJIMA	Professor, Graduate School of Economics, The University of Tokyo
Shoichi YOKOYAMA	Professor, Department of Linguistic Theory and Structure, National Institute for Japanese Language and Linguistics
Takashi WASHIO	Professor, The Institute for Scientific and Industrial Research, Osaka University
Michiko WATANABE	Professor, The Graduate School of Health Management, Keio University
Hiroe TSUBAKI	Professor (Vice Director-General, ISM)
Yoshiyasu TAMURA	Professor (Vice Director-General, ISM)
Hiroshi MARUYAMA	Professor (Vice Director-General, ISM)
Tomoko MATSUI	Professor (Director of Department of Statistical Modeling, ISM)
Takashi NAKAMURA	Professor (Director of Department of Data Science, ISM)
Satoshi KURIKI	Professor (Director of Department of Mathematical Analysis and Statistical Inference, ISM)
Junji NAKANO	Professor (Director of Center for Engineering and Technical Support, ISM)
Shinto EGUCHI	Professor (Department of Mathematical Analysis and Statistical Inference, ISM)
Kenji FUKUMIZU	Professor (Department of Mathematical Analysis and Statistical Inference, ISM)
Nobuhisa KASHIWAGI	Professor (Department of Statistical Modeling, ISM)
Ryozo YOSHINO	Professor (Department of Data Science, ISM)

Cooperative Research Committee (As of April 1, 2013)

Masayuki UCHIDA	Professor, Graduate School of Engineering Science, Osaka University
Yoshinori FUJII	Professor, Faculty of Education and Culture, University of Miyazaki
Shigeyuki MATSUI	Professor, Graduate School of Medicine, Nagoya University
Hiroshi YADOHISA	Professor, Faculty of Culture and Information Science, Doshisha University
Kazue YAMAOKA	Professor, Graduate School of Public Health, Teikyo University
Tomoko MATSUI	Professor (Director of Department of Statistical Modeling, ISM)
Satoshi YAMASHITA	Professor (Department of Data Science, ISM)
Satoshi ITO	Professor (Department of Mathematical Analysis and Statistical Inference, ISM)
Yoshihiko MIYASATO	Professor (Department of Mathematical Analysis and Statistical Inference, ISM)

Research Ethics Review Committee (As of April 1, 2013)

Specialist on epidemiology and social research	Kazuo SEIYAMA	Professor, Kwansei Gakuin University
Specialist on epidemiology and social research	Keiko SATO	Associate professor, Kyoto Unit Center Japan Environment & Children's Study, Graduate School of Medicine, Kyoto University
Specialist in the field of ethics and law	Hitomi NAKAYAMA	Lawyer, Kasumigaseki-Sogo Law Offices
Person in citizen's position	Yutaka KURIKI	Principal, Tachikawa City Daiichi Elementary School
Research education staff of ISM	Takashi NAKAMURA	Professor (Director of Department of Data Science, ISM)
Research education staff of ISM	Hiroe TSUBAKI	Professor (Vice Director-General, ISM)
Research education staff of ISM	Shuhei MANO	Associate Professor (Department of Mathematical Analysis and Statistical Inference, ISM)
Research education staff of ISM	Tadahiko MAEDA	Associate Professor (Department of Data Science, ISM)

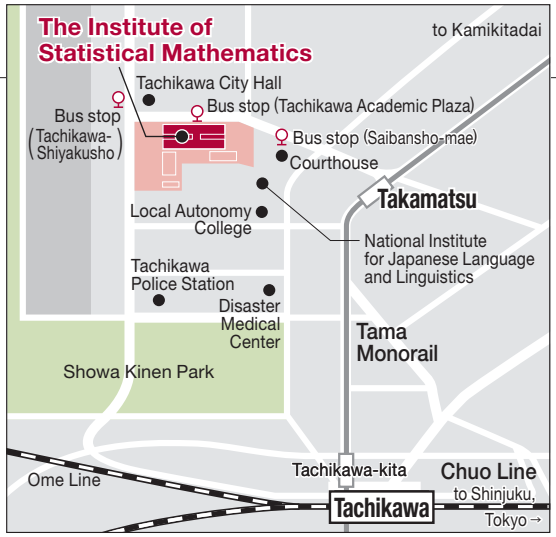
Professor Emeritus (As of April 1, 2013)

Kameo MATUSITA	Sigeki NISIHIRA	Tatsuzo SUZUKI
Giitiro SUZUKI	Ryoichi SHIMIZU	Noboru OHSUMI
Masakatsu MURAKAMI	Kunio TANABE	Tadashi MATSUNAWA
Masami HASEGAWA	Yoshiyuki SAKAMOTO	Takemi YANAGIMOTO
Yoshiaki ITOH	Yasumasa BABA	Katsuomi HIRANO
Masaharu TANEMURA	Makio ISHIGURO	Yosihiko OGATA

History

1944	June	Based on a proposal submitted at an academic study conference in December 1943, the organization was founded as an institute under the direct control of the Ministry of Education. This proposal aimed to provide supervision for studies looking into the mathematical principles of probability and their application, and was also intended to facilitate, unify and promote the publication of research results.
1947	April	The affiliated statistical specialists' school was opened.
	May	The Institute was divided into the 1st Research Dept. (fundamental theories), the 2nd Research Dept. (statistical theories for the natural sciences), and the 3rd Research Dept. (statistical theories for the social sciences).
1949	June	The Institute was placed under the control of the Ministry of Education because of the enforcement of the Ministry of Education Establishment Law.
1955	September	Reorganized into the 1st Research Dept. (fundamental theories), the 2nd Research Dept. (natural and social science theories), and the 3rd Research Dept. (operations, research, statistical analysis theories). The laboratory system, comprising 9 laboratories and the research guidance promotion room, was adopted.
1969	October	A new office building was constructed in Minato Ward.
1971	April	The 4th Research Dept. (informatics theories) was instituted.
1973	April	The 5th Research Dept. (prediction and control theories) was instituted.
1975	October	The 6th Research Dept. (statistical theories of human behavior) was instituted.
1979	November	The Information Research Building was constructed.
1985	April	Repositioned as an Inter-University Research Institute due to the regulation change. The new mission includes providing facilities and skills to other universities, in addition to conducting cutting-edge research on statistical mathematics. Accordingly, the institute was reorganized into our basic research departments (Fundamental Statistical Theory, Statistical Methodology, Prediction & Control, and Interdisciplinary Statistics) and two strategic centers (Statistical Data Analysis Center and Statistical Education & Information Center). The Statistical Technical Training Center was terminated.
1988	October	The Dept. of Statistical Science was instituted in the School of Mathematical and Physical Science, part of the Graduate University for Advanced Studies (SOKENDAI).
1989	June	The Institute was reorganized as an Inter-University Research Institute based on the National School Establishment Law.
1993	April	The Planning Coordination Chief System was instituted.
1997	April	The affiliated Statistical Data Analysis Center was reorganized into the Center for Development of Statistical Computing, and the Statistical Education and Information Center was reorganized into the Center for Information on Statistical Sciences.
2003	September	The Prediction and Knowledge Discovery Research Center was instituted.
2004	April	The Institute was reorganized into the Institute of Statistical Mathematics, part of the Research Organization of Information and Systems of the Inter-University Research Institute based on the National University Corporation Law. The Planning Coordination Chief System was abolished and the position of Vice Director-General was instituted instead. The Dept. of Statistical Science in the School of Mathematical and Physical Science, SOKENDAI, was reorganized. In addition, the Dept. of Statistical Science and the School of Multidisciplinary Sciences were instituted.
2005	April	The research organization was reorganized into three research departments (the Department of Statistical Modeling, the Department of Data Science, and the Department of Mathematical Analysis and Statistical Inference). The affiliated Center for Development of Statistical Computing, the Center for Information on Statistical Sciences, and the Engineering and Technical Services Section were integrated into the Center for Engineering and Technical Support. The Risk Analysis Research Center was instituted.
2008	April	The Research Innovation Center was instituted. The Intellectual Property Unit was instituted.
2009	October	The Institute was moved to 10-3 Midori-cho, Tachikawa, Tokyo.
2010	June	Officially opened the Akaike Guest House.
	July	Reorganized the Administration Office to create the NIPR/ISM Joint Administration Office and launch the General Service Center. The NOE Forwarding Unit (now we call "NOE Promotion Unit") was instituted within the Administration Planning and Coordination Section.
2011	January	Research and Development Center for Data Assimilation was instituted. Survey Science Center was instituted.
2012	January	Research Center for Statistical Machine Learning, Service Science Research Center and School of Statistical Thinking were instituted.

The Institute of Statistical Mathematics



Access to the ISM

◎ Tama Monorail
— 10 min walk from Takamatsu Sta.

◎ Tachikawa Bus
— Tachikawa Academic Plaza bus stop
— 5 min walk from Saibansho-mae or Tachikawa-Shiyakusho bus stop

Research Organization of Information and Systems
The Institute of Statistical Mathematics
10-3 Midori-cho, Tachikawa, Tokyo 190-8562, Japan
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http://www.ism.ac.jp/