The Institute of Statistical Mathematics

ACTIVITY REPORT

2009.4-2011.3

Tokyo, Japan

The Institute of Statistical Mathematics

Activity Report 2009.4 — 2011.3



Tokyo, Japan

October 2011 Center for Engineering and Technical Support The Institute of Statistical Mathematics Research Organization of Information and Systems Inter-University Research Institute Corporation

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Supplement		
Introduction to the Department of Statistical Science,		

School of Multidisciplinary Sciences, The Graduate University for Advanced Studies

Foreword

This activity report is intended to provide general information on the Institute of Statistical Mathematics (ISM) and its research activities in the past two years.

Within this period, ISM has considerably changed its research environment. In October 2009, ISM moved to the Tachikawa campus in Tokyo, thereby leaving the Minami-Azabu area of Minato-ku that was our base for more than half a century. In June 2010, we officially opened the Akaike Guest House, which will provide us facilities to host joint research projects involving the necessity to offer accommodation to partners.

In April 2010, ISM entered its second medium-term period since it was incorporated into the Research Organization of Information and Systems (ROIS). As the inter-University Research Institute Corporation, one of the important projects during this term for us is to establish the NOE (Network Of Excellence) for the following five specified research areas: risk analysis, survey science, next-generation simulation, statistical machine learning, and service science. The new campus has a large space for cooperative research programs, and the guesthouse facilitates such activities. In January 2011, ISM established the Survey Science Center and the Research and Development Center for Data Assimilation to promote the NOE project.

On March 11, 2011, the East Japan Great Earthquake struck Japan. Through this disaster, researchers recognized that it is difficult to control complicated systems and provide protection against disasters caused from those systems, and that we continuously need to bring together our wisdom to solve problems. When we attempt to understand and control complicated systems, it is also effective to evaluate the progress of the research and make necessary changes by using our ability to predict the phenomena on the assumption that information about an object is always incomplete. This approach has been demonstrated in statistics, and it has always contributed greatly to human prosperity on the earth. ISM will challenge to generate a new research filed necessary for minimizing the damage caused by disasters. We look forward to your continued understanding and support for our activities.

> Tomoyuki Higuchi Director General

> > October 2011





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Organization

Since its foundation as the one and only national institute for statistical science in Japan, the Institute of Statistical Mathematics has continued to exert a prominent influence on the study and research of statistical science. The ever-increasing needs for statistical methods and ideas in various fields of science and technology led the Institute to reorganize itself in 1985 as an inter-university research institute, which puts a major emphasis on research collaboration with all disciplines of science.

In April 2004, the Institute begun a new chapter as a member of the Research Organization of Information and Systems, Inter-University Research Institute Corporation, together with three other institutes, National Institute of Informatics, National Institute of Genetics and National Institute of Polar Research. The new Institute building, which is shared with National Institute of Polar Research and National Institute of Japanese Literature, was built in Tachikawa in March 2009. The institute moved to Tachikawa and started its activities in October 2009.

At present, the Institute consists of three departments, five research centers, a support center, an administration office, a council, and a committee. All Institute activity is guided by the leadership of the Director-General and three Vice Director-Generals. The Council of the Institute of Statistical Mathematics implements any necessary recommendations. The Cooperative Research Committee organizes and facilitates collaborative research projects developed between scholars at the Institute and scientists in other academic agencies.

Three research departments, the Department of Statistical Modeling, the Department of Data Science, and the Department of Mathematical Analysis and Statistical Inference, form the active core of the Institute with its 49 academic staff, carrying out research on either statistical theory or its application to other fields of science and industry. The Department of Statistical Modeling and its three groups study statistical modeling aspects on various fields. In the three groups of the Department of Data Science, efforts are concentrated on data collection and handling. The three group of the Department of Mathematical Analysis and Statistical Inference are specifically concerned with fundamental aspects of statistics.

The three strategic research centers, Prediction and Knowledge Discovery Research Center, Risk Analysis Research Center and Research Innovation Center were established in 2003, 2005 and 2008 respectively, and performed project research on specific topics. Prediction and Knowledge Discovery Research Center studies molecular evolution, data assimilation, statistical seismology and statistical genome diversity. Risk Analysis Research Center focuses on the study of food and drug safety, environmental risk and financial risk and insurance. Research Innovation Center started the research of social survey information, functional analytic inference, advanced Monte Carlo algorithm, and random number. In January 2011, two new research centers were established: Research and Development Center for Data Assimilation, and Survey Science Center.

More detailed descriptions of the objectives of each department and center are presented in the next chapter. The information covers research subjects and the interests of staff, which range from the physical sciences and life sciences to the social and cultural sciences.

The Center for Engineering and Technical Support was established in 2006 to help the activities of the Japanese statistical science community by providing adequate computational and informational resources. This center has 10 technical staff that work on special jobs including maintenance of computer systems, editing journals and bibliographical services. The Institute has two big supercomputer systems and a library of books and journals, not only in pure statistics, but also in fields of specific interest to researchers (e.g., physics, genetics and social sciences). Lastly, there is also a division of 13 officials who manage general affairs.

The Institute devotes itself to educating young statisticians as well. As a constituent of the Graduate University for Advanced Studies (Department

of Statistical Science, School of Multidisciplinary Sciences), the Institute offers graduate programs leading to a Ph.D. degree. (See Supplement on page 75.)

(The number of staff mentioned above refer to the full strength on April 1, 2011.)



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Departments, Centers and Research Staff

Department of Statistical Modeling

The Department of Statistical Modeling conducts research on the modeling of causally, temporally and/or spatially interrelated complex phenomena, including intelligent information processing systems. It also conducts researches on model-based statistical inference methodologies.

Spatial and Time Series Modeling Group The Spatial and Time Series Modeling Group works on modeling and inference for the statistical analysis of time series, spatial and space-time data, and their applications to prediction and control.

Staff

Masaharu TANEMURA, Vice Director-General, Prof. (-2010.3.31) Yosihiko OGATA, Prof. Tomoyuki HIGUCHI, Vice Director-General (-2010.3.31), Director (2010.4.1-2011.3.31), Prof. Yoshinori KAWASAKI, Assoc. Prof. Kenichiro SHIMATANI, Assist. Prof. Genta UENO, Assist. Prof. Fumikazu MIWAKEICHI, Assist. Prof. (2009.11.1-) Ryo YOSHIDA, Assist. Prof. Jiancang ZHUANG, Assist. Prof. Shin'ya NAKANO, Assist. Prof. (2009.10.1-)

Subjects

- Methods for prediction and knowledge discovery based on Bayesian model
- · Hidden variable modeling with smoothing prior
- · Statistical analysis and modeling of stochastic point process
- Study of spatial phenomena
- · Point process model and its applications to biosciences

- · Genome informatics with graphical modeling
- Community dynamics and diversity analysis based on long-term woods monitoring data
- Non-invasive brain activity measurement data and dynamical inversion problem solution
- · Construction of large scale Bayesian models
- · Estimation and application of regularized non-linear models
- Model integration by particle filter
- · Modeling and application of point location and/or spatial structure
- Application of gene point process model to plant community
- · Point process modeling of market data and its application
- · Development of data assimilation system in Earth science
- · Statistical seismology
- · Bio-logging and animal behavior modeling
- · Reproduction and group sustain mechanism of perennial herb

Intelligent Information Processing Group

The Intelligent Information Processing Group works on concepts and methods for the extraction, processing and transformation of information in intelligent systems, motivated by an active interest in practical problems in engineering and science.

Staff

Makio ISHIGURO, Director, Prof. (-2010.3.31) Tomoko MATSUI, Vice Director-General (2010.4.1-), Prof. Kenji FUKUMIZU, Prof. Masataka, GOTO, Visiting Prof. (-2010.3.31, 2010.7.1-2011.3.31) Yukito IBA, Assoc. Prof. Yumi TAKIZAWA, Assoc. Prof. Hiroshi SOMEYA, Assist. Prof.

Subjects

- · Conversation between macro and micro, or non-linear modeling
- Application of sampling methods for complicated distribution
- · Statistical analysis of data with geometric structure
- Mathematical schemes of multi-user receiver on Wideband Spectrum Spreading system
- · Acquisition and tracking method under multi-path environment for

public mobile communications

- · Study of perception mechanism of multimodal information
- · Stochastic optimization by developing evolutionary algorithms
- · Development of Monte Carlo algorithms
- Multivariate analysis of simulation data
- · Statistical inference on singular models
- Inductive learning machine
- Audio information processing
- Pattern recognition
- · Statistical, analysis by positive definite kernel
- · Nonparametric Bayesian methods
- · Large scale Bayesian inference

Graph Modeling Group

The Graph Modeling Group works on analyses of the data generated by systems with a graph structure and on the modeling required in order to reconstruct the original system.

Staff Jun ADACHI, Assoc. Prof. Ying CAO, Assist. Prof.

Subjects

- · Estimation of molecular dendrogram
- Modeling of molecular evolution
- · Comparison of genome structure
- · Theoretical study of life information science

Department of Data Science

The Department of Data Science aims to develop research methods for surveys, multidimensional data analyses and computational statistics.

Survey Research Group

The Survey Research Group focuses on research related to statistical data collection and data analysis.

Staff

Takashi NAKAMURA, Director (-2010.3.31), Vice Director-General (2010.4.1-2011.3.31), Prof.

Ryozo YOSHINO, Prof.

Ikuo NASU, Visiting Prof. (-2010.3.31)

Tadahiko MAEDA, Assoc. Prof.

Takahiro TSUCHIYA, Assoc. Prof.

Takahiro HOSHINO, Visiting Assoc. Prof. (-2010.3.31)

Wataru MATSUMOTO, Assist. Prof. (-2010.3.31), Visiting Assoc. Prof. (2010.4.1-2011.3.31)

Koken OZAKI, Assist. Prof. (2009.12.1-)

Subjects

- · Social research methods and data analysis
- · Cohort analysis of repeated social research data
- · Data science for Behaviormetric study of civilizations
- · Theory and applications of latent variable models
- Research on nonsampling errors in surveys
- · Analysis of longitudinal and repeated cross-sectional surveys
- · Statistical research on the Japanese national character
- Sampling theory and its applications
- Methodology of cross-national comparative survey
- · Cognitive science of social dynamics on individuals and group
- · Comparative study of survey modes
- · Cross-national comparison of sampling methodologies
- · Statistical survey research on organizations
- · Development of indirect questioning techniques
- · Development of statistical method on twin data

Multidimensional Data Analysis Group

The Multidimensional Data Analysis Group studies methods for analyzing phenomena grasped on multidimensional space and ways for collecting multidimensional data.

Staff

Toshiharu FUJITA, Prof. (-2011.2.15) Hiroe TSUBAKI, Vice Director-General (2010.4.1-), Prof. Nobuhisa KASHIWAGI, Prof. Shigeyuki MATSUI, Prof. Satoshi YAMASHITA, Assoc. Prof. Sumie UEDA, Assist. Prof. (-2010.3.31) Toshio OHNISHI, Assist. Prof. (-2010.3.31) Toshihiko KAWAMURA, Assist. Prof.

Subjects

- · Estimation of a high-dimensional parameter and its theory
- · Bayesian analysis of the generalized linear model
- Development of large-scale databases for benefit-risk evaluation of pharmaceutical drugs
- Ad hoc pharmacoepidemiological observational study on postmarketing drugs
- · A large-scale cohort study on women's health in Japan
- A controlled trial for suicide prevention in Japan
- · Linkage and effective use of micro-data
- Evaluation methodology for financial statistic models
- Construction of database for 'Nuzi personal names' and reconstruction of the family trees
- · Bayesian methods for analyzing multidimensional data
- Analysis of environmental data
- Receptor modeling
- · Valuation of market risk and credit risk
- · Behavior model and demand forecasting
- Statistical analysis in clinical trials of pharmaceutical drugs
- Statistical quality control and Taguchi's method
- Multivariate generalized linear models
- · Design and analysis of clinical studies for translational research

Computational Statistics Group

The Computational Statistics Group studies sophisticated uses of computers in statistical methodology such as computer-intensive data analyses, computational scientific methods and statistical systems.

Staff

Yoshiyasu TAMURA, Vice Director-General (-2010.3.31), Director (2010.4.1-2011.3.31), Prof. Junji NAKANO, Prof. Yutaka TANAKA, Adjunct Prof. (2010.9.1-) Michiko WATANABE, Visiting Prof. (-2010.3.31) Yuichi MORI, Visiting Prof. (-2011.3.31) Kazunori YAMAGUCHI, Visiting Prof. (2009.4.1-) Naomasa MARUYAMA, Assoc. Prof. Koji KANEFUJI, Assoc. Prof. Seisho SATO, Assoc. Prof. Norikazu IKOMA, Visiting Assoc. Prof. (2009.4.1-) Nobuo SHIMIZU, Assist. Prof.

Subjects

- Discretization method of nonlinear stochastic differential equations and its applications
- · Development of hardware random number generator
- Statistical data visualization
- On development of courseware of statistics
- · Information extraction from large scale economic time series
- · Parallel and distributed processing in statistical system
- Statistical data mining
- · Decoding of algebraic geometric codes
- · Functional principal points on functional data analysis
- · Reliability theory based on life-span models
- Symbolic data analysis
- Methodology for collecting and publishing information relating to statistical science

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, the theory of optimization, and the practice of statistics in science.

Mathematical Statistics Group

The Mathematical Statistics Group is concerned with aspects of statistical theory and probability theory that have statistical applications.

Staff Satoshi KURIKI, Prof. Yoichi NISHIYAMA, Assoc. Prof. Shuhei MANO, Assoc. Prof. (2010.4.1-) Takaaki SHIMURA, Assist. Prof. Kei KOBAYASHI, Assist. Prof. Shogo KATO, Assist. Prof. (2009.10.1-)

Subjects

- · Statistical inference and statistical decisions
- · Analysis of multivariate data and contingency tables
- · Integral-geometric approach to random field theory
- Multiple comparisons
- Statistical inference for stochastic processes
- Infinite-dimensional statistical models
- Limit theorems for stochastic processes
- Statistical inference in genetic linkage analysis
- Stochastic models in population genetics
- · Statistical inference based on graphical models
- Additive processes
- Heavy-tailed distributions

Learning and Inference Group

The Learning and Inference Group develops statistical methodologies that enable researchers to learn from data sets and to properly extract information through appropriate inference procedures.

Staff

Shinto EGUCHI, Director (-2011.3.31), Prof. Hironori FUJISAWA, Assoc. Prof. Shiro IKEDA, Assoc. Prof. Tadayoshi FUSHIKI, Assist. Prof. Masayuki HENMI, Assist. Prof. Shinsuke KOYAMA, Assist. Prof. (2010.5.1-)

Subjects

- Statistical learning theory
- Information geometry
- Robust inference
- · Statistical inference for observational studies
- · Theory of multivariate distributions and its application
- Bioinformatics

- Stochastic inference
- Genome statistics

Computational Mathematics Group

The Computational Mathematics Group studies optimization and other mathematical methodologies used for statistical modeling and analysis.

Staff

Takashi TSUCHIYA, Prof. (-2010.3.31) Yoshihiko MIYASATO, Prof. Atsushi YOSHIMOTO, Prof. Satoshi ITO, Assoc. Prof.

Subjects

- Algorithms for computational inference
- Optimization modeling in computational inference
- Systems design under uncertainty
- · Nonlinear H control based on inverse optimality
- · Adaptive gain-scheduled control
- Mathematics and computational complexity analysis of convex programming
- · Theory and computational methods of optimization
- Iterative learning control
- · Computational algorithms for state-space modeling

Prediction and Knowledge Discovery Research Center

The Prediction and Knowledge Discovery Research Center studies the statistical modeling and inference algorithms that can be used to extract useful information from the huge amount of data which complex systems produce, and thus attempts to solve real-world problems in many different scientific domains, especially genomics, earth and space sciences.

Molecular Evolution Research Group

The Molecular Evolution Research Group researches the area of molecular phylogenetics, and seeks to develop statistical methods for inferring evolutionary trees of life using DNA and protein sequences. Staff Masami HASEGAWA, Adjunct Prof. Jun ADACHI, Assoc. Prof. Ying CAO, Assist. Prof.

Subjects

- Modeling of biodiversity and evolution
- Inferring molecular phylogenies
- Bioinformatics of genome evolution

Date Assimilation Research Group (-2010.12.31)

The Data Assimilation Research Group aims at developing new, advanced data assimilation techniques to combine different information from dynamical simulation and observation data.

Staff

Tomoyuki HIGUCHI, Prof. Yoichi MOTOMURA, Visiting Prof. (2010.10.1-) Hiromichi NAGAO, Project Assoc. Prof. (2010.12.1-) Genta UENO, Assist. Prof. Ryo YOSHIDA, Assist. Prof.

Subjects

- · Advanced data assimilation and adaptive simulation methods
- · Automatic identification of the large-scale field aligned current system
- Information fusion of large-scale heterogeneous data with Bayesian approach
- Methodology for estimating a gene network with graphical models
- · Data assimilation system in systems biology
- · Knowledge discovery system for genome information analysis

Statistical Seismology Research Group

The Statistical Seismology Research Group is concerned with the evaluation of seismicity anomalies, detection of crustal stress changes, their modeling, and the probability forecasting of large aftershocks and earthquakes.

Staff Yosihiko OGATA, Prof. Mitsuhiro MATSU'URA, Project Prof. (-2010.3.31) Shinji TODA, Visiting Prof. Jiancang ZHUANG, Assist. Prof.

Subjects

- Diagnostic analysis of sequences of regional earthquakes and aftershocks
- Detection and evaluation of seismicity anomalies and crustal stress changes by statistical models
- · Probability forecasting of large aftershocks and earthquakes

Statistical Genome Diversity Research Group

The Statistical Genome Diversity Research Group aims to construct novel methodologies for learning and inference from a variety of data sets in the rapidly growing area of bioinformatics.

Staff Shinto EGUCHI, Director, Prof. Satoshi KURIKI, Prof. Masaaki MATSUURA, Visiting Prof. (2010.4.1-) Shiro IKEDA, Assoc. Prof. Hironori FUJISAWA, Assoc. Prof. Kanta NAITO, Visiting Assoc. Prof. (-2010.3.31) Tadayoshi FUSHIKI, Assist. Prof. Shogo KATO, Assist. Prof. (2009.10.1-)

Subjects

- Statistical methods for gene expression analysis
- Statistical methods for SNP analysis
- · Statistical methods for proteomic analysis
- Statistical confirmation of evidence under improperly superfluous information

Risk Analysis Research Center

The Risk Analysis Research Center is pursuing a scientific approach to the study of the increased uncertainty and risk associated with the increasing globalization of society and the economy. The center is also constructing a network for risk analysis in order to contribute to the creation of a reliable and safe society.

Food and Drug Safety Research Group The Food and Drug Safety Research Group aims to develop the statistical framework and methodology of quantitative risk evaluation for substances ingested by the human body.

Staff

Toshiharu FUJITA, Leader (-2010.3.31), Vice Director(-2011.2.15), Prof. (-2011.2.15) Hiroe TSUBAKI, Director, Prof. Shigeyuki MATSUI, Leader (2010.4.1-), Prof. Yoichi KATO, Visiting Prof. (2010.8.1-) Manabu IWASAKI, Visiting Prof. Tosiya SATO, Visiting Prof. Yoshimitsu HIEJIMA, Visiting Prof. (-2011.3.31) Toshio OHNISHI, Visiting Assoc. Prof. (2010.4.1-) Makoto TOMITA, Visiting Assoc. Prof. (2010.4.1-) Satoshi AOKI, Visiting Assoc. Prof. (-2011.3.31) Takaaki SHIMURA, Assist. Prof. Masayuki HENMI, Assist. Prof. Takafumi KUBOTA, Project Assist. Prof. (2010.8.1-)

Environmental Risk Research Group

The Environmental Risk Research Group studies the statistical methodologies related to environmental risk and environmental monitoring.

Staff

Nobuhisa KASHIWAGI, Prof. Atsushi YOSHIMOTO, Prof. Yukio MATSUMOTO, Visiting Prof. (-2011.3.31) Kunio SHIMIZU, Visiting Prof. (2009.4.1-) Hidetoshi KONNO, Visiting Prof. (2009.4.1-) Kazuo YAMAMOTO, Visiting Prof. Yoshiro ONO, Visiting Prof. Mihoko MINAMI, Visiting Prof. (2010.4.1-) Hideshige TAKADA, Visiting Prof. (2009.4.1-2010.3.31) Koji KANEFUJI, Leader, Assoc. Prof. Hirokazu TAKANASHI, Visiting Assoc. Prof. (-2011.3.31) Koji OKUHARA, Visiting Assoc. Prof. (2010.4.1-2011.3.31) Tomohiro TASAKI, Visiting Assoc. Prof. (-2011.3.31)

Financial Risk and Insurance Research Group The Financial Risk and Insurance Research Group explores the use of statistical modeling methods to quantify the risks involved with financial instruments and insurance products.

Staff

Naoto KUNITOMO, Visiting Prof. Hiroshi TSUDA, Visiting Prof. Michiko MIYAMOTO, Visiting Prof. (2010.8.1-) Satoshi YAMASHITA, Assoc. Prof. Seisho SATO, Assoc. Prof. Yoshinori KAWASAKI, Leader (-2011.3.31), Assoc. Prof. Yoichi NISHIYAMA, Assoc. Prof. Toshinao YOSHIBA, Visiting Assoc. Prof. Masakazu ANDO, Visiting Assoc. Prof. (2010.8.1-)

Research Group for Reliability and Quality Assurance of Service and Product

The research group aims to achieve safe products and services by developing statistical methods that contribute to qualify assurance and reliability, and by promoting the adoption of these methods in the industrial world.

Staff

Hiroe TSUBAKI, Director, Prof.
Kakuro AMASAKA, Visiting Prof.
Kosei IWASE, Visiting Prof. (-2010.3.31)
Kazuo TATEBAYASHI, Visiting Prof.
Sadaaki MIYAMOTO, Visiting Prof. (2009.4.1-)
Shusaku TSUMOTO, Visiting Prof.
Yoichi KATO, Visiting Prof. (2009.7.1-2010.3.31)
Manabu KUROKI, Visiting Assoc. Prof. (2010.5.1-)
Takahiro HOSHINO, Visiting Assoc. Prof. (2010.5.1-2011.3.31)
Yukihiko OKADA, Visiting Assoc. Prof. (2010.5.1-)

Hideki KATAGIRI, Visiting Assoc. Prof. (2010.8.1-) Toshihiko KAWAMURA, Leader, Assist. Prof.

Research Innovation Center

The purpose of this center is to establish innovative research fields in statistical mathematics in accordance with new trends of the real and academic world. The center makes progress of research projects, including in an initial stage, which are based on original ideas of researchers.

Social Survey Information Research Group (-2010.12.31) The Social Survey Information Research Group collects several social survey results from the viewpoint of assembling them for the purpose of developing a statistical methodology to describe the social world.

Staff Takashi NAKAMURA, Prof. Ryozo YOSHINO, Prof. Tadahiko MAEDA, Assoc. Prof. Takahiro TSUCHIYA, Assoc. Prof. Toru KIKKAWA, Visiting Assoc. Prof. (2010.8.1-2011.3.31) Wataru MATSUMOTO, Assist. Prof. (-2010.3.31)

Functional Analytic Inference Research Group This group aims to develop the nonparametric methodology for statistical inference using reproducing kernel Hilbert spaces given by positive definite kernels, and applies it to causal inference problems.

Staff Kenji FUKUMIZU, Director, Prof. Kei KOBAYASHI, Assist. Prof.

Advanced Monte Carlo Algorithm Research Group Advanced Monte Carlo Algorithm Research Group aims to develop Markov Chain Monte Carlo and Sequential Monte Carlo algorithms and study their applications. Staff

Arnaud DOUCET Project Prof. (-2009.11.30) Makoto KIKUCHI, Visiting Prof. (2009.6.1-2010.3.31, 2010.5.1-2011.3.31) Yukito IBA, Assoc. Prof. Koji HUKUSHIMA, Visiting Assoc. Prof. (2009.6.1-2010.3.31, 2010.5.1-2011.3.31)

Random Number Research Group (-2010.12.31) This group carries out research into random number generation, physical random number and testing random number with methods of time series analysis.

Staff Yoshiyasu TAMURA, Prof. Toru ONODERA, Visiting Assoc. Prof. Sumie UEDA, Assist. Prof. (-2010.3.31) Christopher Andrew ZAPART, Project Assist. Prof. (2010.10.1-)

Speech and Music Information Research Group (2010.8.1-) The Speech and Music Information Research Group investigates novel information retrieval methods using machine learning from time series data, including speech, music, and brain data.

Staff Tomoko MATSUI, Prof. Shinsuke KOYAMA, Assist. Prof. (2010.5.1-)

Optimization-based Inference Research Group (2010.8.1-) Optimization-based Inference Research Group focuses on optimization methodology as a fundamental tool for computational inference and aims to develop new inference techniques in statistical applications.

Staff Atsuko IKEGAMI, Visiting. Prof. (2010.10.1-) Takashi TSUCHIYA, Visiting. Prof. (2010.10.1-) Tadashi WADAYAMA, Visiting. Prof. (2010.10.1-) Satoshi ITO, Assoc. Prof. Shiro IKEDA, Assoc. Prof. Genta UENO, Assoc. Prof. Yuji SHINANO, Visiting Assoc. Prof. (2010.10.1-)

Research and Development Center for Data Assimilation (2011.1.1-)

Data assimilation is a fundamental technique that constructs precise and predictable models by combining numerical simulations and observational/ experimental data. Research and Development Center for Data Assimilation studies foundations of the data assimilation based on Bayesian statistics, implements numerical algorithms on high-performance computer systems in order to deal with large-scale problems, and promotes the data assimilation to various fields of sciences.

Staff

Tomoyuki HIGUCHI, Director-General, Director, Prof. Yoshiyasu TAMURA, Vice Director-General, Vice Director, Prof. Junji NAKANO, Prof. Yoichi MOTOMURA, Visiting Prof. (2010.10.1-) Seisho SATO, Assoc. Prof. Genta UENO, Assoc. Prof. Hiromichi NAGAO, Project Assoc. Prof. (2010.12.1-) Toru ONODERA, Visiting Assoc. Prof. Ryo YOSHIDA, Assist. Prof. Shin'ya NAKANO, Assist. Prof. (2009.10.1-) Christopher Andrew ZAPART, Project Assist. Prof. (2010.10.1-)

Subjects

- Research of sequential Monte Carlo methods, nonlinear filtering and visualization of ultrahigh dimensional data
- Development of new algorithms that generates random numbers with ultrahigh speed and quality by combining pseudo and hardware random numbers
- Application of data assimilation to practical probrems in various fields of sciences such as space, earth and life sciences
- Development of next-generation industrial science geared towards highly-accurate simulations and highly-sensitive sensors
- Implementation of statistical analysis systems in high performance computing and cloud computing environments

• Establishment of a cooperative network that consists of institutes and universities associated with numerical simulations

Survey Science Center (2011.1.1-)

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).

Staff

Ryozo YOSHINO, Director, Prof. Takashi NAKAMURA, Prof. Tadahiko MAEDA, Assoc. Prof. Takahiro TSUCHIYA, Assoc. Prof. Koken OZAKI, Assist. Prof. (2009.12.1-) Toru KIKKAWA, Visiting Assoc. Prof. (2010.8.1-2011.3.31) Wataru MATSUMOTO, Visiting Assoc. Prof. (2010.4.1-2011.3.31) Takahiro HOSHINO, Visiting Assoc. Prof. (2010.5.1-2011.3.31)

The Study of the Japanese National Character (JNC) The longitudinal nationwide survey has been carried out since 1953 every 5 years with the purpose of clarifying the Japanese national character. This study shows some stable aspects such as human relationships in Japan, as well as some other aspects changing over years with the changes of economic, political and social conditions.

The Cross-National Studies of the National Character The JNC survey has been developed into the cross-national comparative surveys which cover the people with Japanese ancestry overseas since 1971. This study attempts to understand the Japanese people and their culture in the comparative context as well as the global configuration of psychological distances of many countries (a sort of cultural manifold).

The Project on Accumulating Information on Social Research Many data sets of our past surveys in various fields have been accumulated. These are being organized as a database open to researchers in the ISM collaboration studies, and to public eventually.

The Project on Collaborative Experimental Survey Research In collaborations with universities or institutes, we carry out experimental survey research on various topics. We expect many young researchers to experience practical surveys through our efforts, including statistical sampling, data-cleaning and data analyses.

The Project on Utilizing Information on Social Research Under our paradigm "Science of Data", we study practical and scientific ways to utilize survey data and develop new statistical methods and techniques to collect and analyze survey data.

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.

Staff
Junji NAKANO, Director, Prof.
Yasumasa BABA, Adjunct Prof.
Makio ISHIGURO, Adjunct Prof. (2010.7.1-)
Michiko WATANABE, Visiting Prof. (2010.4.1-2011.3.31)
Yoshihiko KONNO, Visiting Prof. (2010.5.1-2011.3.31)
Satoshi YAMASHITA, Vice Director (-2011.3.31), Assoc. Prof.

Computing Facility Unit

The Computing Facility Unit is in charge of the management of computer facilities, software and networking infrastructure used for research and is responsible for network security. Information Resources Unit

The Information Resources Unit is in charge of the management of the system for popularizing research results and an extensive library and is responsible for planning statistical education courses.

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

Visiting Professors

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To push forward the frontiers of interaction between statistics and other fields of science, the Institute provides positions for visiting professors.

Each of the Institute's three departments and five centers have invited foreign and Japanese professors from universities and institutes as shown in the list below.

 Foreign Visiting Professors —		
Harte, David Shamus	(New Zealand)	2009. 6. 8 - 2009. 8.28
Rubenthaler, Sylvain Claude	(France)	2009. 9. 1 - 2009. 9.30
Peng, Hui	(China)	$2009.11. \ 1 \ - \ 2010. \ 1.31$
ibd.		$2010. \ 8. \ 1 \ - \ 2010. \ 9.30$
Negri, Ilia	(Italy)	$2009.11.30\ -\ 2009.12.28$
ibd.		$2010.11.15\ -\ 2010.12.24$
Jimenez, Sobrino Juan Carlos	(Cuba)	$2009.12.21\ -\ 2010.\ 3.19$
Dolbilin, Nikolay Petrovich	(Russia)	$2010. \ 2. \ 1 \ - \ 2010. \ 3.31$
Chen, Su-Yun	(Taiwan)	2010. 3. 5 – 2010. 4. 4
Doucet, Arnaud	(Canada)	$2010. \ 6.21 \ - \ 2010. \ 8.30$
Myrvoll, Tor Andre	(Norway)	$2010. \ 7. \ 3 \ - \ 2010. \ 8.28$
Parsons, Thomas Edward	(U.S.A.)	$2010.12.17\ -\ 2011.\ 1.18$
Zhong, Yang	(China)	$2010.12.21\ -\ 2011.\ 2.18$
Console, Rodolfo	(Italy)	$2011. \ 1.11 \ - \ 2011. \ 3. \ 9$
Ribeiro, Nuno Manuel Cabral De Almeida	(Portugal)	$2011. \ 1.17 \ - \ 2011. \ 2.16$
Surový, Peter	(Portugal)	$2011. \ 1.17 \ - \ 2011. \ 2.16$
Chen, Chun-Houh	(China)	$2011.\ 2.\ 1\ -\ 2011.\ 3.31$

—	Japanese Visiting Pro	fessors —		
	AMASAKA, Kakuro	2009. 4. 1-2011. 3.31	AOKI, Satoshi	2009. 4. 1-2011. 3.31
	GOTO, Masataka	2009. 4. 1-2010. 3.31	ibd.	2010. 7. 1-2011. 3.31
	HIEJIMA, Yoshimitsu	2009. 4. 1-2011. 3.31	HOSHINO, Takahiro	2009. 4. 1-2010. 3.31
	ibd.	2010. 5. 1-2011. 3.31	IKOMA, Norikazu	2009. 4. 1-2011. 3.31
	IWASAKI, Manabu	2009. 4. 1-2011. 3.31	IWASE, Kosei	2009. 4. 1-2010. 3.31
	KONNO, Hidetoshi	2009. 4. 1-2011. 3.31	KUNITOMO, Naoto	2009. 4. 1-2011. 3.31
	MATSUMOTO, Yukio	2009. 4. 1-2011. 3.31	MIYAMOTO, Sadaaki	2009. 4. 1-2011. 3.31
	MORI, Yuichi	2009. 4. 1-2011. 3.31	NAITO, Kanta	2009. 4. 1-2010. 3.31
	NASU, Ikuo	2009. 4. 1-2010. 3.31	ONO, Yoshiro	2009. 4. 1-2011. 3.31
	ONODERA, Toru	2009. 4. 1-2011. 3.31	SATO, Tosiya	2009. 4. 1-2011. 3.31
	SHIMIZU, Kunio	2009. 4. 1-2011. 3.31	TAKADA, Hideshige	2009. 4. 1-2010. 3.31
	TAKANASHI, Hirokazu	2009. 4. 1-2011. 3.31	TASAKI, Tomohiro	2009. 4. 1-2011. 3.31
	TATEBAYASHI, Kazuo	2009. 4. 1-2011. 3.31	TODA, Shinji	2009. 4. 1-2011. 3.31
	TSUDA, Hiroshi	2009. 4. 1-2011. 3.31	TSUMOTO, Shusaku	2009. 4. 1-2011. 3.31
	WATANABE, Michiko	2009. 4. 1-2011. 3.31	YAMAGUCHI, Kazunori	2009. 4. 1-2011. 3.31
	YAMAMOTO, Kazuo	2009. 4. 1-2011. 3.31	YOSHIBA, Toshinao	2009. 4. 1-2011. 3.31
	HUKUSHIMA, Koji	2009. 6. 1-2010. 3.31	ibd.	2010. 5. 1-2011. 3.31
	KIKUCHI, Makoto	2009. 6. 1-2010. 3.31	ibd.	2010. 5. 1-2011. 3.31
	KATO, Yoichi	2009. 7. 1-2010. 3.31	ibd.	2010. 8. 1-2011. 3.31
	MATSUMOTO, Wataru	2010. 4. 1-2011. 3.31	MATSUURA, Masaaki	2010. 4. 1-2011. 3.31
	MINAMI, Mihoko	2010. 4. 1-2011. 3.31	OHNISHI, Toshio	2010. 4. 1-2011. 3.31
	OKUHARA, Koji	2010. 4. 1-2011. 3.31	TOMITA, Makoto	2010. 4. 1-2011. 3.31
	KONNO, Yoshihiko	2010. 5. 1-2011. 3.31	KUROKI, Manabu	2010. 5. 1-2011. 3.31
	OKADA, Yukihiko	2010. 5. 1-2011. 3.31	NAMESHIDA, Takashi	2010. 7. 1-2011. 3.31
	ANDO, Masakazu	2010. 8. 1-2011. 3.31	KATAGIRI, Hideki	2010. 8. 1-2011. 3.31
	KIKKAWA, Toru	2010. 8. 1-2011. 3.31	MIYAMOTO, Michiko	2010. 8. 1-2011. 3.31
	IKEGAMI, Atsuko	2010.10. 1-2011. 3.31	MOTOMURA, Yoichi	2010.10. 1-2011. 3.31
	SHINANO, Yuji	2010.10. 1-2011. 3.31	TSUCHIYA, Takashi	2010.10. 1-2011. 3.31
	WADAYAMA, Tadashi	2010.10. 1-2011. 3.31		

Visiting Research Fellows

In addition to visiting professors, the Institute provides research fellowships to researchers in Japan and abroad, from companies as well as from universities. The Institute also provides support for those who are appointed as staff of programs by the Japan Society for the Promotion of Science (JSPS). A list follows showing research fellows received during the period April 2009 to March 2011.

(The list does not show all of the visiting fellows from abroad. Foreign visiting research fellows are listed under "Foreign Visitors" on page 29.

- Project researchers -

Abe, Toshihiro	Akashi, Kentaro	Ando, Masakazu
Chan, Hei	Chu, Ann Anning	Dou, Xiaoling
Fujii, Takayuki	Fujii, Yosuke	Fukasawa, Atsushi
Hayashi, Keisuke	Imoto, Tomoko	Ishikawa, Ken
Kageyama, Masayuki	Kato, Shogo	Komori, Osamu
Kumon, Masayuki	Miwa, Hidetsugu	Mollah, Md Nurul Haque
Motoyama, Hitoshi	Nagao, Hiromichi	Nakano, Shin'ya
Okamoto, Motoi	Okuda, Masaki	Pritchard, Mari
Saita, Satoko	Saito, Masaya	Sakota, Takahiro
Sano, Natsuki	Shibai, Kiyohisa	Siew, Hai Yen
Sugaya, Katsunori	Sugimoto, Teruhisa	Takahashi, Hayato
Tanaka, Eiki	Tanaka, Ushio	Tanokura, Yoko
Ueki, Masao	Yamaguchi, Kazunori	Yamashita, Jun
Zapart, Christopher Andrew		

- Japanese visiting research fellows -

Ando, Masakazu	Amano, Tomoyuki	Baba, Yasumasa
Fujii, Takayuki	Fujino, Tomokazu	Fukasawa, Atsushi
Furuzumi, Hiroki	Hagiuda, Nobuko	Hamada, Masatoshi
Hara, Hiroaki	Hasegawa, Masami	Hayashi, Keisuke
Hidaka, Tetsuji	Inagaki, Takefumi	Ishigaki, Tsukasa
Ishiguro, Chieko	Ishiguro, Makio	Itagaki, Masao
Kawai, Shigeharu	Komiyama, Osamu	Kumon, Masayuki
Matsui, Atsushi	Miyamoto, Michiko	Murata, Yasuaki
Naito, Kanta	Nakano, Masahiro	Nameshida, Takashi
Nishihara, Hidenori	Nishimura, Kazuma	Orihashi, Yasushi
Saito, Masaya	Sakai, Hironori	Sano, Natsuki
Sasaki, Takeshi	Shibayama, Kazuhiro	Takahashi, Hayato
Takai, Tsutomu	Takenouchi, Takashi	Tanaka, Ushio
Tanaka, Yutaka	Tanuma, Iwao	Terakawa, Toshiko
Tohmiya, Hideo	Tomita, Makoto	Tomosada, Mitsuhiro
Ukyo, Yoshifumi	Watanabe, Yusuke	Yamamoto, Yoshikazu
Yamauchi, Takashi	Yonezawa, Takahiro	

— Students from graduate school — Hirose, Kei Kakihra, Satoshi Romanov, Anton Shirasuna, Miyori

3

Research Collaboration

The Institute runs a unique system to promote collaborative research activities between statisticians and scientists in related fields, such as the social sciences, the humanities, life sciences, earth and space sciences and engineering. The system was initiated in 1985 with a special intention, which has much to do with the past experience of the Institute. Since the very beginning of the history of the Institute, one of the basic principles has been to attach great importance to applications. The principle came from appreciating that innovative methodologies and theories of statistics are frequently developed in an effort to solve real problems.

In past decades the Institute has maintained research collaborations between universities, government offices, private companies and various organizations. During this time, much useful work, both in theory and application, has been produced. This tradition of open collaboration with scientists outside the Institute has created a progressive and liberal academic atmosphere which, we believe, has contributed to developing new interdisciplinary research fields in related sciences.

The cooperative research activity was maintained through various research fields at different levels with various types of collaboration, long before the Institute was reorganized into an inter-university research institute. Many remarkable results have been produced through collaborative research in the last decades. To our regret, however, when joint work is organized by researchers at the individual level, the fruit of the collaborative research tends to be received by the general public as a successful contribution to the science where the solved problems arose, even when our statisticians played the most essential role. Obviously this tendency comes from the inherently abstract nature of statistics. The statistician's contribution, although essential, is not as easy to explain to the general public as explaining the problem itself in applied science. Accordingly, it seemed that the value and the raison d'être of the statisticians and the Institute was not appreciated as much as other scientists and research institutes in the applied sciences.

Our cooperative research system was initiated on the basis of two understandings. Firstly, this kind of collaborative research activity is beneficial to both statistics and other related sciences. Secondly, statisticians working in such circumstances need recognition, support and encouragement. We hope that the present system will play a role similar to the one that hospitals play in the medical sciences. Without constant stimuli from patients in the hospital, little development in medical sciences would be expected.

Since 1985 the system has been run by the Cooperative Research Committee, half of whose members are scientists from outside the Institute. Cooperative research projects between statisticians and scientists in related scientific fields are called for each year. More than a hundred projects in applied sciences and statistics are supported each year (see the figure below). In 1998, in hopes of enlarging the area of collaboration, the Institute relaxed a condition of application for projects which had stipulated that at least one member of the research project should belong to the Institute. The system of cooperation is open to projects that are to be planned and accomplished through international cooperation.

Our cooperative research projects are classified into several categories: cooperative use registration, general cooperative research 1, general cooperative research 2, cooperative research for exploratory study or young researchers, specially promoted research and cooperative research symposium.



Number of collaborative research projects

4

International Research Exchange

Historically, statistical science has developed in response to the need for statistical ideas and methods to be exploited in other fields of science and industry. Therefore the Institute has established a systematic way to promote cross-disciplinary research projects either at a domestic or an international scale (see the previous chapter).

The Institute has also pushed forward research collaboration with a wide variety of foreign institutions including universities and governmental agencies.

Since 1988, the Institute has entered into special relationship with the following institutes to conduct programs on academic exchange and facilitate joint research projects;

- The Statistical Research Division of the U.S. Bureau of Census, U.S.A., 1988-
- Stichting Mathematisch Centrum, The Netherlands, 1989-
- Statistical Research Center for Complex Systems, Seoul National University, Korea, 2002-
- Institute for Statistics and Econometrics, Humboldt University of Berlin, Germany, 2004-
- · Institute of Statistical Science, Academia Sinica, Taiwan, 2005-
- The Steklov Mathematical Institute, Russia, 2005-
- Central South University, China, 2005-
- Soongsil University, Korea, 2006-
- · Department of Statistics, University of Warwick, U.K., 2007-
- Indian Statistical Institute, India, 2007-
- Department of Empirical Inference, Max Planck Institute for Biological Cybernetics, Germany, 2010-

The Institute has also been active in organizing international conferences and workshops. In April 2009-March 2011, 10 international symposia were held under the auspices of the Institute;

- Large-scale Data Linkage, Data Mining and Statistical Methods, October 8-9, 2009
- Ever-expanding Mathematics the expectations of the society, February 22-23, 2010
- ISM Symposium : Stochastic Models and Discrete Geometry, March 1-2, 2010
- International Workshop on Statistical Seismology, May 31, 2010
- International Conference on Managing Forest Resources for Multiple Ecosystem Services under Robust and Fragile Environments, August 9-10, 2010
- 7th ACES International Workshop, October 3-8, 2010
- The 13th Workshop on Information-Based Induction Sciences (IBIS2010), November 4-6, 2010
- International Workshop on Information Systems for Social Innovation 2010 - Evidence-based Decision Making by Data-centric Human and Social Informatics, February 28, 2011
- Commemorative Symposium of Research and Development Center for Data Assimilation, March 11, 2011
- FORMATH SAPPORO 2011, May 20-21, 2011

The Institute actively encourages researchers to come to talk or give lectures and also to stay for collaboration with the staff. As shown in the list below, the Institute has received 55 visitors from 20 different countries. Of these researchers, 41 entered into a visiting research fellowship including a visiting professorship. Another list follows showing all the colloquia that were given by foreign visitors.

Foreign Visitors (April 2009-March 2011)

 The asterisk * before a visitor's professor or a visiting research f Date in the list refers to the perifellowship or the date of colloqui 	name indicates that he is a visiting ellow. and of visiting professorship/research- um.
From A	ustralia
*Peters, Gareth William 09.5.25-09.6.15	Manton, Jonathan H 10.2.1-10.2.2
<i>From</i> (Canada ———
Bogoyavlenskij, Oleg I 09.4.27	Tatsuno, Masami
*Doucet, Arnaud 10.6.21-10.8.30	Massam, Helene10.6.26
<i>From</i>	China
*Peng, Hui 09.11.1-10.1.31	*ibd 10.8.1-10.9.30
*Zhou, Shiyong 09.10.29-09.11.5	*Wang, Rui 09.10.29-09.12.15
*Zhong, Yang 10.12.21-11.2.18	*Chen, Chun-Houh 11.2.1-11.3.31
<i>From</i>	Croatia —
*Sikiric, Mathieu Dutour 10.2.6-10.3.6	
<i>From</i>	Carba
*Jimenez Sobrino, Juan Carlos 09.12.21-10.3.19	Cubu
<i>From</i>	France ———
Vert, Jean-Philippe 09.8.5	*Rubenthaler, Sylvain Claude09.9.1-09.9.30
*Deza, Michel Marie 10.3.1-10.3.8	
<i>From</i> G	ermany
Terakawa, Toshiko 10.1.29	v
From	India —
*Bansal, Abhey Ram 10.6.9-11.4.7	SenGupta, Ashis10.9.21
From	Israel —
Inselberg, Alfred 10.2.26	
From	Italy —
*Negri, Ilia 09.11.30-09.12.28	*ibd 10.11.15-11.1.7
*Dinuzzo, Francesco 10.11.7-11.3.31	*Console, Rodolfo 11.1.11-11.3.9

Falcone, Giuseppe 11.2.17

From New	v Zealand
*Harte, David Shamus 09.6.8-09.8.28 *Vere-Jones, David 10.6.23-10.7.2	*ibd 10.2.26-10.3.30
From I	Norway
Birkenes, Oystein 10.1.7	*Myrvoll, Tor Andre 10.7.3-10.8.28
From F	Panama
*Torres, Rafael 10.3.3-10.3.31	
From F	Portugal
* Cabral De Almeida Ribeiro, Nuno Manuel 11.1.17-11.3.15	*Surový, Peter 11.1.17-11.3.15
From J	Russia
*Dolbilin, Nikolai Petrovich10.2.1-10.3.31	
<i>From</i>	Spain
*Pewsey, Arthur 09.11.24	*ibd 11.2.26-11.3.11
	itzerland —
*Kuensch, Hans Rudolf 10.4.1-10.6.15	*Jasa, Tomislav 09.10.15-10.1.15
From 2	Taiwan
*Chen, Su-Yun 10.3.5-10.4.4	Chen, Kate 11.1.28
<i>From</i>	<i>U.K.</i>
*Flury, Thomas 09.3.28-09.4.26	*Subba Rao, Tata 09.5.11-09.5.29
*Whiteley, Nick Paul 09.6.3-09.6.19	*Copas, John Brian 10.11.1-10.11.14
From	U.S.A
*Cuturi, Marco	*Wong, Kin Foon Kevin 09.4.1-10.3.31
Wiggins, Chris 09.4.20	*Llenos, Andrea L 09.5.27-09.6.17
*Synodinos, Nicolaos Emmanuel 09.6.8-09.8.7	* Sriperumbudur Vangeepuram, Bharath Kumar 09.10.2-09.12.3
*Chu, Ann Anning 09.10.9-09.10.31	*Chi, Pi-jen(Peter) 09.11.10-09.11.16
*ibd 10.6.28-10.7.5	*Wang, Qi 10.1.21-10.3.4
*Hayter, Anthony J 10.3.10-10.3.16	Wainwright, Martin 10.5.27
Yamagishi, Toshio 10.6.28	*Findley, David Francis 10.12.6-10.12.7
*Parsons, Thomas Edward 10.12.17-11.1.18	
Colloquia by Foreign Visitors (2009.4-2011.3)

Speaker (Country)	Title	Date
Wiggins, Chris (U.S.A.)	Inferring and Encoding Graph Partitions	2009. 4.20
Bogoyavlenskij, Oleg I. (Canada)	Integrable generalizations of the periodic Toda lattice connected	2009. 4.27
Llenos, Andrea L. (U.S.A.)	Detecting stressing rate transients in space and time from seismicity data	2009. 6.10
Harte, David Shamus (New Zealand)	Using R for Modelling Marked Point Processes Indexed by Time	2009. 7. 3
Vert, Jean-Philippe (France)	Including prior knowledge in shrinkage classifiers for genomic data	2009. 8. 5
Zhou, Shiyong (China)	Was the Ms 8.0 Long Men Shan (Wenchuan) Earthquake in 2008 induced by the Zipingpu Reservoir?	2009.10.30
Pewsey, Arthur (Spain)	An Introduction to the Sinh-arcsinh Transformation and Distributions Arising from It	2009.11.24
Birkenes, Oystein (Norway)	Speech classification using penalized logistic regression with hidden Markov model log-likelihood regressors	2010. 1. 7
Terakawa, Toshiko (Germany)	Identification of the high fluid pressure source driving the 2009 L'Aquila earthquake sequence	2010. 1.29
Manton, Jonathan H. (Australia)	A Unified Approach to Optimisation on Manifolds	2010. 2. 1
Manton, Jonathan H. (Australia)	Reverse-engineering the Brain-an international grand challenge	2010. 2. 2
Wang, Qi (U.S.A.)	An optimized five-year large earthquake forecast in California based on smoothed seismicity	2010. 2.19

Speaker (Country)	Title	Date
Inselberg, Alfred (Israel)	Parallel coordinates and its applications	2010. 2.26
Dolbilin, Nikolai Petrovich (Russia)	The Delone Peak	2010. 3. 5
Dolbilin, Nikolai Petrovich (Russia)	Remarkable high dimensional polyhedra: cyclic polyhedra, permutahedra, and parallelohedra	2010. 3.12
Kuensch, Hans Rudolf (Switzerland)	Particle and Ensemble Kalman filtering	2010. 4. 9
Wainwright, Martin (U.S.A.)	Graphical model selection in high dimensions: Practical and information- theoretic limits	2010. 5.27
Massam, Helene (Canada)	A review of prior distributions for covariance/precision matrices	2010. 6.26
Vere-Jones, David (New Zealand)	The Evolution of Statistical Seismology	2010. 6.30
Bansal, Abhey Ram (India)	Statistical seismology of Sumatra: before and after the mega-earthquake of 26 December 2004	2010. 7.16
SenGupta, Ashis (India)	Circular statistics for modeling linear and non-linear data on 3-smooth manife	2010. 9.21 olds
Findley, David Francis (U.S.A.)	Selection Between Models Through Multi-Step-Ahead Forecasting	2010.12. 6
Chen, Kate (Taiwan)	Triggering effect of small to large earthquakes on earthquake cycle of small repeating events	2011. 1.28
Falcone, Giuseppe (Italy)	Earthquake occurrence models and their validatio	2011. 2.17

Publications

One of the driving forces behind the rapid progress of modern science has undoubtedly stemmed from the broad communication of research findings through international journals and reports. For the sake of publicizing its activities throughout academic and industrial circles, the Institute launched *the Annals of the Institute of Statistical Mathematics* (AISM) in 1949 shortly after its foundation. Today AISM has a worldwide reputation and is listed in citation review journals. The aims of AISM are shown in the excerpt below. Information for submitting papers can be found at http://www.ism.ac.jp/.

Aims and Scope of AISM

The journal aims to provide an international forum for open communication among statisticians and research workers who have the common purpose of advancing human knowledge through the development of the



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science and technology of statistics.

AISM will publish the broadest possible coverage of statistical papers of the highest quality. Emphasis will be placed on the publication of papers relating to (a) establishment of new areas of application, (b) development of new procedures and algorithms, (c) development of unifying theories, (d) analysis and improvement of existing procedures and theories, and (e) communication of empirical findings supported by real data.

The objective of AISM is to contribute to the advancement of statistics as a science for human handling of information to cope with uncertainties. Special emphasis will thus be placed on the publication of papers that will eventually lead to significant improvements in the practice of statistics. In addition to papers by professional statisticians, contributions from authors in various fields of application will be welcomed.

AISM is presently distributed by Springer. Titles, abstracts, and full texts

of papers can be found at http://www.ism.ac.jp/editsec/aism/ and http:// springerlink.com/.

The Institute publishes another periodical, *Proceedings of the Institute* of Statistical Mathematics. The periodical made its first appearance in 1953 and now carries scientific papers and articles on topics of research (in Japanese with abstracts in English). Refer to the following for titles, abstracts and full texts of those papers: http://www.ism.ac.jp/.

In addition to the two journals mentioned above, the Institute issues six technical reports:

- Cooperative Research Reports
- ISM Survey Research Report
- Computer Science Monographs
- Research Memorandum
- ISM Report on Research and Education
- ISM Reports on Statistical Computing

Research Memorandum, though named memorandum, has almost the content of full research papers, and fulfills the important mission of giving immediate publicity to research findings. Research Memorandum enables Institute staff to announce achievements with minimal delay.

A list of the six reports released from April 2009 to March 2011 follows.



(Research Memorandum)

Technical Reports

Cooperative Research Reports

(Reports, in Japanese and English, on the achievements emerging from collaborative)

- No.235: Yaguchi, H., Research of new nonrecursive pseudo-random number generator and its applications. (March 2010)
- No.236: Carreira, J. M., Motivation for Learning English among Elementary School Students. (March 2010)
- No.237: Hotta, S., A Statistical Study of Language Use in Trials under the Lay Judge System. (March 2010)
- No.238: Ishikawa, S., An Overview of Statistical Methods for Corpus Studies. (March 2010)
- No.239: Koyama, Y., Extraction of Domain-Specific Expressions from ESP Corpora. (March 2010)
- No.240: Horihata, S., Inverse Problems and Applications on Medical Science and Engineering. (March 2010)
- No.241: Tanaka, M., Econophysics and its Applications(6). (March 2010)
- No.242: Konno, H., New Development of Statistics for Medical Applications. (March 2010)
- No.243: Watanabe, M., Research on best practice in teaching statistics Vol.2. (March 2010)
- No.244: Shibayama, T., A Statistical Study of Scoring Design and Reliability Evaluation in Essay-Type Tests. (March 2010)
- No.245: Tabata, T., Statistical Approaches to Text Analysis. (March 2010)
- No.246: Takahashi, R., Extreme Value Theory and Applications(7). (February 2010)
- No.247: Shimura, T., Infinitely divisible processes and related topics(14). (February 2010)
- No.248: Matsumoto, W., Quantitative Analysis of Political Participation and Social Contribution. (March 2010)
- No.249: Hashimoto, N., Design and development of educational plug-in package using R and Rcmdr. (March 2010)
- No.250: Ando, H., Informatics of Dynamical Systems(9) Control of nonlinear systems with many degrees of freedom: From the viewpoint of biological phenomena. (*March 2010*)
- No.251: Inokuchi, M., Teaching materials study about the statistical analysis for registered dietitians. (March 2010)

No.252: Tsuchiya, T., Optimization–Modeling and algorithms–23. (March 2010)

- No.253: Katano, Y., Globalization and Environmental Politics in Japanese Context: An Application of the Text Mining Method. (March 2010)
- No.254: Koyama, Y., Extraction and Application of Domain-Specific Expressions from Science & Technology Corpora. (March 2011)
- No.255: Cho, K., Statistical Analyses of Semantic Structures between Japanese Learners of English and Native Speakers of English from a Perspective of Cognitive Linguistics. (March 2011)
- No.256: Ishikawa, S., Statistics and Corpus-based Description of Languages. (March 2011)
- No.257: Konno, H., New Development of Statistics for Medical Applications II. (March 2011)
- No.258: Horihata, S., Inverse Problems and Applications on Medical Science and Engineering(2). (March 2011)
- No.259: Tanaka, M., Econophysics and its Applications(7). (March 2011)
- No.260: Watanabe, M., Research on best practice in teaching statistics Vol.3. (March 2011)
- No.261: Takahashi, R., Extreme Value Theory and Applications(8). (February 2011)
- No.262: Shimura, T., Infinitely divisible processes and related topics(15). (February 2011)
- No.263: Shimatani, K., Biodiversity of Ecological Communities and Statistical Mathematics. (February 2011)
- No.264: Tabata, T., Statistical Approaches to Text Analysis–Part II–. (March 2011)
- No.265: Carreira, J. M., A Corpus Analysis of Korean Educational Broadcasting System(EBS) Comparison of Tok Tok English and Nonstop English. (March 2011)
- No.266: Hotta, S., A Corpus-based Approach to Language in the Courtroom. (March 2011)
- No.267: Tsuchiya, T., Optimization–Modeling and algorithms–24. (March 2011)

ISM Survey Research Report

Technical reports, mostly in Japanese, on the methodology of survey and analysis of measured data. Formerly published as Research Report (No.1-101).

No.99: Research Committee on the Study of the Japanese National Character, A study of the Japanese national character — The twelfth nationwide survey —. (August, 2009)

- No.100: Matsumoto, W. and Nikaido, K., Cross-national comparison of political participation and social contribution: USA survey report — English edition—. (*February*, 2010)
- No.101: Matsumoto, W. and Yoshino, R., Cross-national comparison of political participation and social contribution: South Korea survey report. (March, 2010)
- No.102: Nakamura, T., Maeda, T., Tsuchiya, T., Matsumoto, W. and Nikaido, K., A Study of the Japanese national character: The twelfth nationwide survey(2008)—English edition—. (February, 2011)

Computer Science Monographs

Technical reports in English on Computer programs and software for statistical science. Full text and supplementary materials of No.31 onwards can be downloaded from http://www.ism.ac.jp/. Not issued during the period April 2009 to March 2011.

Research Memorandum

Technical Reports, mostly in English, that give immediate publicity to research findings. The full content of some of them can be downloaded from http://www.ism.ac.jp/.

- No.1092: Yamashita, S. and Yoshiba, T., Expected loss with a negative correlation between hazard and recovery: Analytical evaluation with a square-root hazard process. (April 18, 2009)
- No.1093: Nishiyama, Y., Parametric estimation for volatility of ergodic diffusion process with unspecified drift. (May 13, 2009)
- No.1094: Nishiyama, Y., Nonparametric goodness of fit tests for ergodic diffusion processes by discrete observations. (May 19, 2009)
- No.1095: Nishiyama, Y., Two sample test for counting processes with a nonlinear covariate based on smoothed empirical processes. (May 20, 2009)
- No.1096: Negri, I. and Nishiyama, Y., Goodness of fit test for ergodic diffusions by tick time sample scheme. (May 21, 2009)
- No.1097: Nishiyama, Y., Estimation for the invariant distribution of an ergodic diffusion process based on high frequency data. (May 24, 2009)
- No.1098: Nishiyama, Y., Estimation for the invariant density of an ergodic diffusion process based on high frequency data. (May 31, 2009)
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Many of the achievements made by the staff of the Institute consist of scientific papers and monographs. Each of the staff has selected works worthy of note out of his/her papers and books published in the period April 2009, to March 2011, to complete the following list. Also included are works by visiting professors and students.

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7

Tutorial Programs and Consultation

Tutorial courses on statistical science are held 13 times a year for the benefit of researchers, students, and the general public. The first course is presented at a beginner's level and the others at an advanced level. Those offered during April 2009-March 2011 are as follows:

— in 2009 —

- Data Assimilation Methodology in Practice
- · Introduction to Sampling Methods and Survey Data Analysis
- Introduction to Multivariate Descriptive Data Analysis by R
- Statistical Data Visualization
- Introduction to Pharmacoepidemiology
- Data Analysis for Marketing
- Akaike Information Criterion and Statistical Modeling: Introduction from Field Biological Data
- Introduction to Statistics
- Regularization and Estimation LASSO and Related Topics, Basic Theory and Applications –
- Elementary of Multivariate Analysis
- Statistics Literacy for the Law Court For the Base on the Rational Discussion –
- Introduction to Text Mining with R
- · Markov Chain Monte Carlo: Basics and Examples / 2010

— in 2010 —

- Introductory Time Series Analysis with R
- Robust Inference
- · Analysis of Sample Surveys with R
- Introduction to Multivariate Analysis
- Statistics of Extremes
- · Statistical Mathematics for Diversity: Current Topics in Biodiversity

of Ecological Communities

- Introduction to Statistical Quality Control
- Mathematical Optimization and Its Application
- · Bayesian Designs in Clinical Trials: Principles and Applications
- Statistical Data Analysis with Positive Definite Kernels Basics and Advances of Kernel Method
- · Introduction to High Performance Computing by Using R
- Introduction to Statistics
- · Markov Chain Monte Carlo: Basics and Examples / 2011

In addition, once a year the Institute holds a special lecture to inform the public of various topics that have emerged out of research and study.

The Institute also endeavours, chiefly through the Center for Engineering and Technical Support, to acquaint the public with the statistical methodology developed in the course of research, and to offer services for consultancy.

The Institute accepts graduate students, technicians, and researchers from universities and private institutions for non-degree programs of continuing education. Since 1989 the Institute has accepted students for education and research in doctoral programs.

In 2006, the Institute adopted a five-year system, offering either a fiveyear education and research program, or a three-year education and research program starting from the third year of study. 8

Software Products

The creation of new theories and new methods of analysis generally accompany testing procedures, which are often fulfilled through complicated calculations run by elaborate computer programs. The Institute believes that programs and software completed in the course of research should be delivered as quickly as possible to the relevant fields of science and business. Therefore the Center for Engineering and Technical Support is engaged in cataloguing and storing in a library the software products developed at the Institute. Detailed information on the library, named ISMLIB, is available through: kks@ism.ac.jp (e-mail), http://www.ism.ac.jp/ (URL). Some programs in the library can be downloaded from the Internet site. The following is a partial list of programs developed in the Institute. Most of the programs are coded in Fortran, C, C++, Java, S and R.

TIMSAC (TIMe Series Analysis and Control)	 Main features — Package of programs for analysis, prediction and control of time series. <i>Typical examples of application</i> — Analysis of channel records of brain wave Analysis of economic data Optimal control of plants Implementation of ship's autopilot Analysis of seismological data
BAYSEA	 Main features —
BAYesian	Computer program for realizing a decomposition of
SEasonal	a time series into trend, seasonal and irregular
Adjustment	components. Typical examples of application — Seasonal adjustment of economic time series

CATDAP (CATegorical Data Analysis and CATDAP for Windows	 Main features — A program for the selection of variables that explain well the structure of categorical data. Typical examples of application — Analysis of multi-dimensional contingency tables
NOLLS1 (NonLinear Least Square method 1	 Main features — A program for nonlinear least square methods. <i>Typical examples of application</i> — Analysis of materials for a nuclear reactor Design of plats Pharmacokinetics for a new drug Analysis of the respiratory organ by using sonic echo Spectrum analysis in X-ray spectroscopy
QUANT (QUANTifi- cation theory)	 Main features — Programs for the quantification theories of type I, II, III. Typical examples of application — Survey of behavior of the younger generation Analysis of clinical data Prediction of elections Effect of advertisement Data analysis in educational psychology
DALL DAvidon's algorithm for Log Likeli- hood maxi- mization	 Main features — Davidon's variance algorithm subroutine custom- ized for maximum likelihood. <i>Typical examples of application</i> — Analysis of medical data Analysis of multi-dimensional non-stationary data

	 Main features — A dialogue system for system analysis. Typical examples of application — Analysis of industrial plants System analysis Analysis of chemical processes in human bodies
STATS (STate-space Analysis of Time series	 Main features — Programs for time series with various characteristics (non-stationarity, non-Gauss, non-linearity, missing values and outliers, etc.) with the aid of state space models. Typical examples of application — Seasonal adjustment of economic data Interpolation of missing values Estimation of non-stationary spectrum Non-Gaussian smoothing
TIMSAC for Windows	 Main features — TIMSAC programs implemented on MS-Windows. Typical examples of application — Analysis of brain wave Prediction of sales Prediction of stock price Analysis of seismological data
DLL and Shared Librar- ies of TIMSAC	 Main features — TIMSAC programs implemented on MS-Windows. Typical examples of application — Analysis of brain wave Prediction of sales Prediction of stock price Analysis of seismological data

DECOMP, WebDECOMP, eDECOMP	 Main features — A program of TIMSAC84 for time series decomposition (seasonal adjustment). WebDECOMP can be used through our Webpage and eDECOMP is an add-in software for Excel. Typical examples of application —
Jasp <i>Java based</i> <i>Statistical</i> <i>Processor</i>	 Main features — An experimental statistical analysis system written in Java language. <i>Typical examples of application</i> — Explanatory data analysis Developing new computational statistical methodology
$Jasplot \\ \begin{pmatrix} Java \ statistical \\ plot \end{pmatrix}$	 Main features — Statistical graphics library in Java language. Typical examples of application — Data visualization



(Supercomputer-1)



7

(Supercomputer-2)

Supplement

Introduction to the Department of Statistical Science, School of Multidisciplinary Sciences, The Graduate University for Advanced Studies

"In Japan, inter-university research institutes have been established in various research fields as centers of advanced studies and large-scale joint researches since 1971 when National Laboratory for High Energy Physics was built as the first one. A novel idea of applying the excellent academic staff and facilities of inter-university research institutes to postgraduate education had been extensively discussed since 1982. Consequently it was decided to establish the Graduate University for Advanced Studies as a new postgraduate education system operated under close contact and tight cooperation with inter-university research institutes ("parent institutes"). The main purposes of the University are to cultivate young scientists of rich originality backed with wider vision and an international sense and also to promote fundamental research in the direction of opening up new scientific disciplines."

(from the President's Statement)

The Graduate University for Advanced Studies was thus established in October 1988 with seven institutes as parents. As of April 2011, the University has grown to have 18 parent institutes and 1445 Ph.D. students. The organization is composed of 6 schools that comprise 21 departments and a center.

In the Department of Statistical Science, research and educational activities focus on the effective use of data for the realization of rational inferences or predictions, in the same way as in the construction and confirmation of scientific hypotheses. The subject area covers the theory and application of statistical science, such as fundamental statistical theory, statistical methodologies, and the theory of prediction and control.

Since its establishment, 93 Doctors of Philosophy have been conferred by the Department. As of April 2011, the Department has 29 students. (The regular number is 19 students. (In total five school year))



The Institute of to Kamikitadai Statistical Mathematics Tachikawa City Hall O Bus stop (Tachikawa Academic Plaza) Bus stop (Tachikawa-Shiyakusho) Q Bus stop (Saibansho-mae) <u></u> - - Courthouse Takamatsu Local Autonomy College National Institute for Japanese Language Tachikawa and Linguistics Police Station Disaster Medical Tama Center Monorail Showa Kinen Park Tachikawa-kita **Chuo Line** Ome Line to Shinjuku, Tachikawa Tokyo →

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

Location of the Institute

Inter-University Research Institute Corporation Research Organization of Information and Systems THE INSTITUTE OF STATISTICAL MATHEMATICS

including the

DEPARTMENT OF STATISTICAL SCIENCE, SCHOOL OF MULTIDISCIPLINARY SCIENCES, THE GRADUATE UNIVERSITY FOR ADVANCED STUDIES

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