The Institute of Statistical Mathematics

ACTIVITY REPORT

2007.4 - 2009.3

Tokyo, Japan

The Institute of Statistical Mathematics

Activity Report 2007.4 — 2009.3



Tokyo, Japan

October 2009 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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School of Multidisciplinary Sciences, The Graduate University for Advanced Studies

Foreword

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

Within this period, ISM established the Research Innovation Center consisting of four research groups on social survey information, functional analytic inference, advanced Monte Carlo algorithm and random number. In the Risk Analysis Research Center, the research group for reliability and quality assurance of service and product was started as the fourth research group. Further, interdisciplinary researches, in particular cooperative research programs with other institutes in the Research Organization of Information and Systems (ROIS), have significantly progressed mainly as a part of activities at the Transdisciplinary Research Integration Center of the ROIS.

By October 2009, ISM will move to the Tachikawa campus. At the new campus, using large space for cooperative researches and guest house, we are planning to start new types of cooperative research programs such as the establishment of NOE (Network Of Excellence)'s for important research areas and cooperative research programs by staying at ISM.

By the development of information and communication technologies and by the advent of knowledge society, effective use of large-scale, massive heterogeneous data is crucially important in academic research areas and society. We believe that the role of statistical science became more important in this context. We sincerely hope your further understanding and support to our activities.

> Genshiro Kitagawa Director-General

> > July 2009



Organization Diagram (As of April 1, 2009)

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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, four centers, 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.

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 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 14 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 79.)

(The number of staff mentioned above refer to the full strength on April 1, 2009.)



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Departments, Centers and Research Staff

(as of March 31, 2009)

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 Tomoyuki HIGUCHI, Prof. (Vice Director-General) Yosihiko OGATA, Prof. Tohru OZAKI, Prof. (-2008.3.31) Masaharu TANEMURA, Prof. (Vice Director-General) Yoshinori KAWASAKI, Assoc. Prof. Kenichiro SHIMATANI, Assist. Prof. Genta UENO, Assist. Prof. Ryo YOSHIDA, Assist. Prof. Jiancang ZHUANG, Assist. Prof. (2007.7.1-)

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 such as statistical analysis of form
- · 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. Tomoko MATSUI, Prof. Atsushi FUKASAWA, Visiting Prof. (-2007.6.30) Toshio IRINO, Visiting Prof. (-2008.3.31) Kenji FUKUMIZU, Assoc. Prof. Yukito IBA, Assoc. Prof. Yumi TAKIZAWA, Assoc. Prof. Masataka, GOTO, Visiting Assoc. Prof. (2008.4.1-) Hiroshi SOMEYA, Assist. Prof.

Subjects

- Model evaluation by information criteria
- · 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

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), Prof. Ryozo YOSHINO, Prof. Ikuo NASU, Visiting Prof. (2008.4.1-) Tadahiko MAEDA, Assoc. Prof. Takahiro TSUCHIYA, Assoc. Prof. Hajime IHARA, Assoc. Prof. (-2007.6.30) and Visiting Assoc. Prof. (2008.4.1-) Takahiro HOSHINO, Visiting Assoc Prof. (2008.4.1-) Wataru MATSUMOTO, Assist. Prof.

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

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

Yasumasa BABA, Prof. (-2008.3.31) Toshiharu FUJITA, Prof. Nobuhisa KASHIWAGI, Prof. Hiroe TSUBAKI, Prof. (2007.12.1-) Masahiro MIZUTA, Visiting Prof. (-2008.3.31) Kunio SHIMIZU, Visiting Prof. (2008.4.1-) Shigeyuki MATSUI, Assoc. Prof. (2008.7.1-) Satoshi YAMASHITA, Assoc. Prof. Hajime IHARA, Visiting Assoc Prof. (2007.9.16-2008.3.31) Toshihiko KAWAMURA, Assist.Prof. Toshio OHNISHI, Assist. Prof. Sumie UEDA, 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

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 Junji NAKANO, Prof. Yoshiyasu TAMURA, Prof. (Vice Director-General) Yoshinari FUKUI, Visiting Prof. Makoto TAIJI, Visiting Prof. (-2008.3.31) Makoto MATSUMOTO, Visiting Prof. Yuichi MORI, Visiting Prof. (2008.4.1-) Michiko WATANABE, Visiting Prof. Koji KANEFUJI, Assoc. Prof. Naomasa MARUYAMA, Assoc. Prof. Seisho SATO, Assoc. Prof. Seisho SATO, Assoc. Prof. Takeshi KOSHIBA, Visiting Assoc. Prof. (-2008.3.31) Tohru ONODERA, Visiting Assoc. Prof. (-2008.3.31) Nobuo SHIMIZU, Assist. Prof.

Subjects

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

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

Katuomi HIRANO, Prof. (-2008.3.31) Satoshi KURIKI, Prof. Yoichi NISHIYAMA, Assoc. Prof. Takaaki SHIMURA, Assist. Prof. Kei KOBAYASHI, Assist. Prof. (2007.8.1-)

Subjects

- Statistical inference and statistical decisions
- · Analysis of multivariate data and contingency tables
- · Integral-geometric approach to random fields theory
- · Study on controlling the rate of false discoveries
- Statistical inference for stochastic processes
- Infinite-dimensional statistical models
- Statistical inference based on graphical models
- Probability distributions
- Statistical theory of reliability
- Additive processes
- Heavy-tailed distributions
- Limit theorems for stochastic processes
- · Statistical inference in genetic linkage analysis

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, Prof. Kunio SHIMIZU, Visiting Prof. (-2008.3.31) Hironori FUJISAWA, Assoc. Prof. Shiro IKEDA, Assoc. Prof. Mihoko MINAMI, Assoc. Prof. (-2009.3.31) Tadayoshi FUSHIKI, Assist. Prof. Masayuki HENMI, Assist. Prof. (2007.8.1-)

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 computational algorithms together with mathematical methodologies used for statistical modeling in the sciences.

Staff

Yoshihiko MIYASATO, Prof. Takashi TSUCHIYA, Prof. Atsushi YOSHIMOTO, Prof. (2008.5.1-) 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 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. (2008.4.1-) Jun ADACHI, Assoc. Prof. Ying CAO, Assist. Prof.

Subjects

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

Data Assimilation Research Group

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 (Vice Director-General), Prof. Takashi, WASHIO, Visiting Prof. (-2008.3.31) 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. Shinji TODA, Visiting Prof. Jiancang ZHUANG, Assist. Prof. (2007.7.1-)

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. Hirofumi WAKAKI, Visiting Prof. (-2008.3.31) Hironori FUJISAWA, Assoc. Prof. Shiro IKEDA, Assoc. Prof. Mihoko MINAMI, Assoc. Prof. (-2009.3.31) Kanta NAITO, Visiting Assoc. Prof. (2008.4.1-) Tadayoshi FUSHIKI, Assist. Prof.

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
Hiroe TSUBAKI, Director, Prof. (2007.12.1-) Visiting Prof. (-2007.11.30)
Toshiharu FUJITA, Leader, Prof.
Kunihiko HAYASHI, Visiting Prof.
Manabu IWASAKI, Visiting Prof.
Tosiya SATO, Visiting Prof.
Shusaku TSUMOTO, Visiting Prof. (2007.10.1-2008.3.31)
Shigeyuki MATSUI, Assoc.Prof. (2008.7.1-)
Satoshi AOKI, Visiting Assoc. Prof.
Toshimitsu HAMASAKI, Visiting Assoc. Prof.
Yoshimitsu HIEJIMA, Visiting Assoc. Prof.
Takaaki SHIMURA, Assist. Prof.
Masayuki HENMI, Assist. Prof. (2007.8.1-)

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. (2008.5.1-) Yukio MATSUMOTO, Visiting Prof. Yoshiro ONO, Visiting Prof. Hideshige TAKADA, Visiting Prof. Kazuo YAMAMOTO, Visiting Prof. Koji KANEFUJI, Leader Assoc. Prof. Hirokazu TAKANASHI, Visiting Assoc. Prof. Tomohiro TASAKI, Visiting Assoc. Prof. Toshihiko KAWAMURA, Assist. Prof. (2008.3.31)

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

Michimori INORI, Visiting Prof. (2008.4.1-) Naoto KUNITOMO, Visiting Prof. Hiroshi TSUDA, Visiting Prof. Yoshinori KAWASAKI, Assoc. Prof. Yoichi NISHIYAMA, Assoc. Prof. (2008.12.1-) Seisho SATO, Assoc. Prof. Satoshi YAMASHITA, Assoc. Prof. Toshinao YOSHIBA, Visiting Assoc. Prof.

Research Group for Reliability and Quality Assurance of Service and Product

The research group aims to achieve safe products and sevices 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, Prof. Kakuro AMASAKA, Visiting Prof. (2008.4.1-) Kosei IWASE, Visiting Prof. (2008.4.1-) Kazuo TATEBAYASHI, Visiting Prof. (2008.4.1-) Shusaku TSUMOTO, Visiting Prof. (2008.4.1-) 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

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. Wataru MATSUMOTO, Assist. Prof.

Functional Analytic Inference Research Group This group aims to develop the nonparameric 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, Assoc. Prof. Kei KOBAYASHI, Assist. Prof.

Advanced Monte Carlo Algorithm Research Group The Environmental Risk 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. (2008.12.1-) Yukito IBA, Assoc. Prof.

Random Number Research Group

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. (Vice Director-General) Yoshinari FUKUI, Visiting Prof. (2008.7.1-) Makoto MATSUMOTO, Visiting Prof. (2008.4.1-) Takeshi KOSHIBA, Visiting Assoc. Prof. (2008.4.1-) Toru ONODERA, Visiting Assoc. Prof. (2008.9.4-) Sumie UEDA, Assist. Prof.

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. (2008.4.1-) Satoshi YAMASHITA, Vice Director, 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

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 three centers have invited foreign and Japanese professors from universities and institutes as shown in the list below.

 Foreign Visiting Professors —		
Synodinos, Nicolaos Emmanuel	(U.S.A.)	2007. 4. 1 – 2007. 5.31
Doucet, Arnaud	(Canada)	$2007.\ 7.26\ -\ 2007.\ 8.24$
Vert, Jean-Philippe	(France)	2007.9.28-2007.10.25
Faybusovich, Leonid	(U.S.A.)	$2007.10. \ 1 \ - \ 2007.11.30$
Chen, Su-Yun	(Taiwan)	$2007.10.16\ -\ 2007.11.15$
Jimenez-Sobrino, Juan Carlos	(Cuba)	2008. 1. 7 – 2008. 3. 6
Dolbilin, Nikolai Petrovich	(Russia)	$2008. \ 1.16 \ - \ 2008. \ 3.14$
McGuire, Jeffrey Joseph	(U.S.A.)	2008. 2. 1 – 2008. 3.24
Fujita, Shigeji	(U.S.A.)	2008. 2. 4 - 2008. 3.31
Subba, Rao Tata	(U.K.)	2008. 2. 4 - 2008. 3.31
Synodinos, Nicolaos Emmanuel	(U.S.A.)	$2008. \ 6. \ 1 \ - \ 2008. \ 7.31$
Vere-Jones, David	(U.K.)	$2008.\ 6.16\ -\ 2008.\ 8.15$
Vert, Jean-Philippe	(France)	$2008.\ 6.23\ -\ 2008.\ 8.\ 1$
Gretton, Arthur Lindsey	(Australia)	2008. 8. 1 – 2008. 9. 5
Chang, Yuan-Chin Ivan	(Taiwan)	$2008. \ 9.11 \ - \ 2008.10.10$
Jarre, Florian	(Germany)	$2008.10.14\ -\ 2008.11.17$
Negri, Ilia	(Italy)	$2008.12.\ 1\ -\ 2008.12.26$
Dolbilin, Nikolai Petrovich	(Russia)	$2009. \ 1.30 \ - \ 2009. \ 3.27$

- Japanese Visiting Professors -

Aoki, Satoshi 2007.4.1-200	9.3.31 Tasaki, Tomohiro	2007.4.1-2009.3.31
Fukasawa, Atsushi 2007.4.1-200	7.6.30 Toda, Shinji	2007.4.1-2009.3.31
Fukui, Yoshinari 2007.4.1-200	9.3.31 Tsubaki, Hiroe	2007.4.1-2007.11.30
Hamasaki, Toshimitsu 2007.4.1-200	9.3.31 Tsuda, Hiroshi	2007.4.1-2009.3.31

Hayashi, Kunihiko	2007.4.1-2009.3.31	Tsumoto, Shusaku	2007.10.1-2009.3.31
Hiejima, Yoshimitsu	2007.4.1-2009.3.31	Wakaki, Hirofumi	2007.4.1-2008.3.31
Irino, Toshio	2007.4.1-2008.3.31	Washio, Takashi	2007.4.1-2008.3.31
Iwasaki, Manabu	2007.4.1-2009.3.31	Watanabe, Michiko	2007.4.1-2009.3.31
Koshiba, Takeshi	2007.4.1-2009.3.31	Yamamoto, Kazuo	2007.4.1-2009.3.31
Kunitomo, Naoto	2007.4.1-2009.3.31	Yoshiba, Toshinao	2007.4.1-2009.3.31
Matsumoto, Makoto	2007.4.1-2009.3.31	Ihara, Hajime	2007.9.16-2009.3.31
Matsumoto, Yukio	2007.4.1-2009.3.31	Amasaka, Kakuro	2008.4.1-2009.3.31
Mizuta, Masahiro	2007.4.1-2008.3.31	Goto, Masataka	2008.4.1-2009.3.31
Ono, Yoshiro	2007.4.1-2009.3.31	Hoshino, Takahiro	2008.4.1-2009.3.31
Onodera, Tohru	2007.4.1-2009.3.31	Inori, Michimori	2008. 4.1-2009.3.31
Sato, Tosiya	2007.4.1-2009.3.31	Iwase, Kousei	2008.4.1-2009.3.31
Shimizu, Kunio	2007.4.1-2009.3.31	Mori, Yuichi	2008.4.1-2009.3.31
Taiji, Makoto	2007.4.1-2008.3.31	Naito, Kanta	2008.4.1-2009.3.31
Takada, Hideshige	2007.4.1-2009.3.31	Nasu, Ikuo	2008.4.1-2009.3.31
Takanashi, Hirokazu	2007.4.1-2009.3.31	Tatebayashi, Kazuo	2008.4.1-2009.3.31

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 2007 to March 2009.

The list does not show all of the visiting fellows from abroad. Foreign visiting research fellows are listed under "Foreign Visitors" on page 25.

— Project researchers —

Iwata, Takaki
Tsuda, Yoshiyuki
Tanokura, Yoko
Shibayama, Kazuhiro
Tomosada, Mitsuhiro
Kawarasaki, Satoko
Alexandre, Termier
Siew, Hai Yen
Kato, Shogo

Fujii, Yosuke Tanaka, Ushio Henmi, Masayuki Matsui, Atsushi Kawai, Ken-ichi Sakaguchi, Takayuki Fukasawa, Atsushi Dou, Xiaoling Kageyama, Masayuki Sugimoto, Teruhisa Ando, Masakazu Miyamoto, Michiko Okabe, Masahiro Kumon, Masayuki Md Nurul Haque Mollah Jasra, Ajay Shiraishi, Yuichi Konoshima, Masashi

Nakamura, Kazuyuki	U
Tomita, Makoto	Ol

Ueki, Masao Okuda, Masaki Fujii, Takayuki

— Japanese visiting research fellows —

Nakano, Shin'ya	Kobayashi, Kei	Shimizu, Shohei
Fujisaki, Yoh	Kitahara, Tomonari	Togu, Hideo
Uesaka, Hiroyuki	Sakai, Hironori	Komiyama, Osamu
Ishiguro, Chieko	Inazu, Daisuke	Nakamura, Kazuyuki
Nishihara, Hidenori	Miwa, Hidetsugu	Wakaura, Masatsugu
Tanokura, Yoko	Ishigaki, Tsukasa	Hamada, Masatoshi
Takahashi, Hayato	Inagaki,Takefumi	Hidaka,Tetsuji
Takai, Tsutomu	Matsui, Atsushi	Amano, Tomoyuki
Baba, Yasumasa	Hasegawa, Masami	Orihashi,Yasushi
Matsuo, Tomoko	Saitou, Masaya	Ishibe, Takeo
Miyamoto, Michiko	Kanaya, Shin	

- Students from graduate school -

Kitahara, Tomonari Nagata, Shuichi Shirasuna, Miyori Shinkai, Kimiaki Kakihara, Satoshi Saito, Nenn Kitajima, Akimasa

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.





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-

The Institute has also been active in organizing international conferences and workshops. In April 2007-March 2009, 9 international symposia were held under the auspices of the Institute;

• The 5th International Workshop on Statistical Seismology: Physical and Stochastic Modelling of Earthquake Occurrence and Forecasting,

May 31-June 6, 2007

- The International Workshop on Data-Mining and Statistical Science (DMSS2007), October 5-6, 2007
- The 2nd Workshop on Machine Learning and Optimization, October 12, 2007
- First joint meeting between Institute of Statistical Science, Academia Sinica, Taiwan(ISSAS) and the Institute of Statistical Mathematics, November 29-30, 2007
- ISM Symposium : Contributions of Statistical Science to Environmental Risk Assessment Researches - Challenges to Understandings and Control of Environmental Risks by Models -, January 21, 2008
- ISM Symposium : Stochastic Models and Discrete Geometry, March 10-11, 2008
- International Conference: The IASC (International Association for Statistical Computing), December 5-8, 2008
- ISM Symposium : Stochastic Models and Discrete Geometry, February 19-20, 2009
- ISM Symposium : Statistical analysis for risk and adaptability of ecosystem management and its current state, March 9, 2009

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 60 visitors from 17 different countries. Of these researchers, 39 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 2007-March 2009)

 The asterisk * before a visitor's professor or a visiting research for Date in the list refers to the period 	name indicates that he is a visiting ellow.
fellowship or the date of colloqui	um.
From A	ustralia ———
Nedda Cecchiano 07.5.22	Jian Quing Shi08.12.11
*Gretton Arthur Lindsey 08.8.1-08.9.5	
From 2	Austria ———
Marek Makowski 07.10.30	
From (Canada ———
*Oleg Bogoyavlenskij 07.6.21	Shizuhiko Nishisato07.11.6
*Arnaud Doucet 07.7.26-07.8.24	
From	China
Mike P. K. So 08.12.9	
From	Cuba
*Juan Carlos Jimenez-Sobrino 08.1.7-08.3.6	
From D	Denmark
Ulrik Dam Nielsen 09.1.15	
From	France
*Jean-Philippe Vert 07.9.28-07.10.25	*Deza Michel-Marie 08.3.10-08.3.22
*ibd	*ibd
*Dutour Sikiric, Mathieu 08.3.4-08.3.17	*Nicolas LeBihan 09.3.21-09.3.28
<i>From</i> G	ermany
Friedrich Leisch 07.12.6	*Xiaohai Sun 08.8.7-08.9.11
Lutz Edler 08.1.31	*Florian Jarre 08.10.14-08.11.17
*Uwe Andreas Ziegenhagen 08.3.2-08.4.30	*Sebastian Hainzl 09.2.27-09.3.13
<i>From</i>	Italy
*Ilia Negri 07.12.1-07.12.28	*ibd

*ibd *Marco Cuturi		*Elisa Varini 08.9.30-08.12.13 Rodolfo Console
		Koraa
Myoungshic 3	Jhun 07.6.26	Korea
	From the I	Netherlands ———
*August A. B	alkema 07.9.10-07.9.28	
	From Net	v Zealand
Richard Arno	old 07.8.21	
	From .	Russia ———
*Nikolai Petrovicl	h Dolbilin 08.1.16-08.3.14	*Alexey Igorevich Garber 09.3.18-09.3.31
*ibd		
		Taiapara
*Chen Chun-h	ouh	*Yuan-Chin Ivan Chang
*Chang Yuan-Ch	in Ivan 08.9.11-08.10.10	* Ming Tien Tsai 08.10.27-08.10.31
		<i>U.K.</i>
*Wong Kin Foo	on Kevin07.4.1-08.3.31	*David Vere-Jones 08.6.16-08.8.15
*ibd		*Alexander J. McNeil 08.9.10-08.9.22
Sandy Steacy	v 07.5.10	John B. Copas
Hugo Maruri	-Aguilar 07.11.5	Shin Kanaya09.3.5
*Tata Subba l	Rao 08.2.4-08.3.31	*Thomas Flury 09.3.28-09.4.26
	From	U.S.A
*Nicolaos Emmanue	el Synodinos 07.4.1-07.5.31	Wotao Yin08.1.7
*ibd		*Cleridy E. Lennert-Cody 08.1.7-08.1.18
*ibd		*Andrea L. Llenos 08.2.12-08.3.28
*ibd		*Jeffrey Joseph McGuire08.2.1-08.3.24
*ibd		Ross Stein
*Leonid Faybu	sovich 07.10.1-07.11.30	Shinsuke Koyama08.7.22
Luke Tierney		*Anthony J. Hayter 08.11.16-09.1.2
*Shigeji Fujita	a 08.2.4-08.3.31	Marco Cuturi 09.2.9-09.5.8
B. H. (Fred)	Juang 08.3.4	

Colloquia by Foreign Visitors (2007.4-2009.3)

Speaker (Country)	Title	Date
Sandy Steacy (U.K.)	Coulomb Stress, Earthquake Probabilities, and Seismic Rates	2007. 5.10
Nedda Cecchiano (Australia)	Verification of bootstrapping properties for long-memory processes by Edgeworth expansions	2007. 5.22
Oleg Bogoyavlenskij (Canada)	Integrability in the broad sense	2007. 6.21
Myoungshic Jhun (Korea)	Missing Value Imputation using Adaptive Nearest Neighbors	2007. 6.26
Richard Arnold (New Zealand)	Using earthquakes to measure stress in the earth's crust	2007. 8.21
August A. Balkema (the Netherlands)	Bad asymptotic behaviour of averages, Extremes under monotone transformations and power norming	2007. 9.19
Marek Makowski (Austria)	Supporting robust decision-making for environmental problems- Experience and open research problems in effective coping with uncertainty -	2007.10.30
Hugo Maruri-Aguilar (U.K.)	Algebraic techniques in design of experiments	2007.11. 5
Nishisato Shizuhiko (Canada)	Another look at the current practice of data analysis in the behavioral sciences	2007.11. 6 s
Friedrich Leisch (Germany)	Finite Mixtures of Generalized Linear Regression Models	2007.12. 6
Luke Tierney (U.S.A.)	MRI Tissue Classification Using Bayesian Hidden Markov Normal Mixture Models	2007.12. 6
Wotao Yin (U.S.A.)	Recent L1-Related Minimization Algorithms for Sparse Solutions	2008. 1. 7

Speaker (Country)	Title	Dat	e
Cleridy E. Lennert-Cody (U.S.A.)	Statistical Learning Procedures for Moni toring Regulatory Compliance: An Application to Fisheries Data	2008.	1. 9
Lutz Edler (Germany)	Statistical Issues of Design, Analysis, and Quality when Genomic Data are used for Classification and Prediction in Clinical Pharmaceutical Research	2008.	1.31
Nikolai Dolbilin (Russia)	Local Sources of Global Order in Discrete Structure	2008.	2. 1
Andrea Llenos (joint with and McGuire, J.J.) (U.S.A.)	Detecting Aseismic Fault Slip and Magmatic Intrusion From Seismicity Data	2008.	2.14
Ross Stein (U.S.A.)	The debate on what triggers earthquakes: Static or dynamic stresses	2008.	2.14
Nikolai Dolbilin (Russia)	Local sources of global order in discrete structures (Second Lecture)	2008.	2.15
Nikolai Dolbilin (Russia)	Local sources of global order in discrete structures (Third Lecture)	2008.	2.29
B. H. (Fred) Juang (U.S.A.)	Machine Learning for Intelligent Classification of Information	2008.	3. 4
Shinsuke Koyama (U.S.A.)	State-space methods for real-time cortical control of neuroprosthetic devices	2008.	7.22
Jean-Philippe Vert (France)	Inference of biological networks with supervised machine learning	2008.	7.28
Chun-houh Chen (Taiwan)	New generation of EDA for high dimensional categorical data: Matrix visualization with Categorical GAP and Cartography GAP	2008.	8. 5
Yuan-Chin Ivan Chang (Taiwan)	Comparison of diagnostic powers of biomarkers using sequential optimal estimates of partial area under ROC curve	2008.1	10. 2

Speaker (Country)	Title	Date
Ming Tien Tsai (Taiwan)	The optimal rank tests for model directions on spheres	2008.10.30
Mike P. K. So (China)	A threshold factor multivariate stochastic volatility model	2008.12. 9
Rodolfo Console (Italy)	Co-seismic stress transfer and its implications on short- and long-term earthquake hazard assessment	2008.12.11
Jian Quing Shi (Australia)	Gaussian process functional regression model for curve prediction and clustering	2008.12.11
John B. Copas (U.K.)	Confidence intervals for models which fit the data	2008.12.11
Ulrik Dam Nielsen (Denmark)	Risk based guidance decision support systems for ships on board wave estimation s and guidance	2009. 1.15
Shin Kanaya (U.K.)	Non-parametric specification testing for continuous-time Markov processes Do the processes follow diffusions?	2009. 3. 5
Nikolai Dolbilin (Russia)	Voronoi Parallelohedra and their duals - Delone cells for integer point lattices (some new results) -	2009. 3. 6 s
Sebastian Hainzl (Germany)	Modeling and testing the static stress triggering mechanism for aftershock sequences taking uncertainties into account	2009. 3. 9
Nikolai Dolbilin (Russia)	Delone tilings for Clifford torus and their link to continued fractions	2009. 3.13
Nicolas Le Bihan (France)	Decompounding on compact Lie groups : Application to heterogeneity and anisotropy measurement in random media	2009. 3.23
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 communications among statisticians and research workers who have the common purpose of advancing human knowledge through the development of the 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 sup-

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.

ported by real data.

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

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of papers can be found at the following web sites: http://www.ism.ac.jp/editsec/aism/contents.html 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
- 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 2007 to March 2009 follows.



(Research Memorandum)

Technical Reports

Cooperative Research Reports

(Reports, in Japanese and English, on the achievements emerging from collaborative) research projects in the Institute.

- No.206: Kashiwagi, N., Theory and Practice of Environmental Data Analysis. (March 2008)
- No.207: Ohno, Y., The Hospital and Ward Administration From the Viewpoint of Global Medical Supply Chain. (March 2008)
- No.208: Iwaki, S., The 21st's Diagnosis Engineering and Applications (6). (March 2008)
- No.209: Tanaka, M., Econophysics and its Applications (4). (March 2008)
- No.210: Konno, H., Applied Characterization of Random Number Generators and Related Topics. (March 2008)
- No.211: Imoto, S., Seismicity Models and Earthquake Probabilities. (March 2008)
- No.212: Takahashi, R., Extreme Value Theory and Applications (5). (February 2008)
- No.213: Yamamuro, K., Infinitely divisible processes and related topics (12). (February 2008)
- No.214: Iyeiri, Y., Linguistic and Stylistic Studies on Spoken Professional American English (March 2008)
- No.215: Ishikawa, S, Statistical Approaches to Evaluation of L2 Learner's Essays. (March 2008)
- No.216: Koyama, Y., Statistical Measurement of ESP Corpora Based on Vocabulary Frequency and Difficulty (March 2008)
- No.217: Takagi, H., Informatics of Dynamical Systems (7). (November-December 2007)
- No.218: Mitsuya, R., Statistical Research of Seating Comfort (2). (March 2008)
- No.219: Shimatani, K., Application of Stochastic Models Life History Studies of Plant Species. (*February 2008*)
- No.220: Katano, Y., The Gap between Legal and Behavioral Norms: A Metaanalysis of Survey Studies ? A Report on Social Survey in 2007. (May 2008)
- No.221: Tsuchiya, T., Optimization Modeling and algorithms— 21. (October 2007)
- No.222: Morimoto, T., Summer Seminar on Statistics. (August 2008)

- No.223: Sugita, Y., Informatics of Dynamical Systems (8). (March 2009)
- No.224: Takahashi, R., Extreme Value Theory and Applications (6). (February 2009)
- No.225: Takaaki, S., Infinitely divisible processes and related topics (13). (February 2009)
- No.226: Tanaka, M., Econophysics and its Applications (5). (March 2009)
- No.227: Kishida, K., Inverse Problems and Applications. (March 2009)
- No.228: Terada, D., Estimation of the Pure Loss of Stability of Ships based on Time Series Analysis. (March 2009)
- No.229: Tsuchiya, T., Optimization —Modeling and algorithms— 22. (March 2009)
- No.230: Watanabe, M., Studies on Educational Practice for Statistics Education No.1. (March 2009)
- No.231: Tabata, T.,., Multivariate Approaches to Texts. (March 2009)
- No.232: Ishikawa, S., An Overview of Statistical Methods for Corpus Linguistics. (March 2009)
- No.233: Koyama, Y., Statistical Analysis of ESP Corpora And Applications for Education. (March 2009)
- No.234: Ohno, Y., How to Verify the Completeness of Cancer Registry. (March 2009)

Research Report

(Technical reports, mostly in Japanese, on the methodology of survey and analysis of measured data.)

- No.96: Tsuchiya, Takahiro, Maeda, T., Nakamura T. and Sakamoto, Y., A survey using self-administered questionnaires that were dropped into mailboxes selected by area sampling —A comparative study using a mail survey—. (August 2007)
- No.97: Matsumoto, W. and Maeda, T., Cross-national comparison of political participation and social contribution : Japan survey report —Japanese edition—. (March, 2008)
- No.98: Matsumoto, W. and Maeda, T., Cross-national comparison of political participation and social contribution : Japan survey report —English edition—. (December, 2008)

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/.

No.34: Tanaka, U., Ogata, Y. and Katsura, K., Simulation and estimation of the Neyman-Scott type spatial cluster models. (March 2008)

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.1030: Araki, K., Shimatani, I. K. and Ohara, M., Demographic-genetic studies of a clonal plant Convallaria keiskei: spatial structure and growth pattern of ramets and genets. (April 11, 2007)
- No.1031: Henmi, M., Yoshida, R. and Eguchi, S., Importance sampling method with the estimated sampler. (April 11, 2007)
- No.1032: Tsuchiya, Takahiro, Maeda, T., Nakamura, T. and Sakamoto, Y., An arbitrary convenience respondent selection method applied to households by using self-administered questionnaires dropped into mailboxes. (April 16, 2007/)
- No.1033: Tsuchiya, Takahiro, Effects of anonymity on RDD survey responses. (April 18, 2007)
- No.1034: Siew, H.-Y. and Shimizu, K., Generalized Laplace distributions on spheres by conditioning normal mixtures. (April 25, 2007)
- No.1035: Siew, H.-Y., Kato, S. and Shimizu, K., Asymmetric t-type distribution on circles. (April 25, 2007)
- No.1036: Inoue, K. and Aki, S., Distributions of runs and scans on higher order Markov trees. (May 8, 2007)
- No.1037: Fushiki, T., Bayesian bootstrap prediction. (June 18, 2007)
- No.1038: Shimatani, I. K., Size distribution changes associated with gapforming processes —the two-dimensional inhomogeneous Poisson process with Bayesian nonparametric smoothing—. (June 25, 2007)
- No.1039: Yamashita, T. and Ozaki, T., Empirirical analysis for estimating timevaring volatility with mixtured system noise model. (July 19, 2007)
- No.1040: Yamashita, T., Dynamic modeling and estimation for analyzing investment style of Japanese equity mutual funds considering individual stock selection ability. (July 19, 2007)
- No.1041: Tsuchiya, Takahiro, Ono, S. and Hirai, Y., Response times in the

item count technique. (July 20, 2007)

- No.1042: Takeuchi, K., Kumon, M. and Takemura, A., A new formulation of asset trading games in continuous time with essential forcing of variation exponent. (August 7, 2007)
- No.1043: Kuriki, S. and Takemura, A., The volume of tubes and the distribution of the maximum of a Gaussian random field. (August 22, 2007)
- No.1044: Kuriki, S., Adjusting for the multiplicity of tests in the QTL analysis
 Approximations to the distribution of the maximum of LOD scores. (August 22, 2007)
- No.1045: Ikeda, S. and Sakaguchi, Y., Motor planning as an optimization of command representation. (September 12, 2007)
- No.1046: Shimizu, S., Hoyer, P. and Hyvarinen, A., Learning linear nongaussian acyclic models for latent factors. (September 19, 2007)
- No.1047: Inoue, K. and Aki, S., Bivariate Fibonacci polynomials of order k with statistical applications. (October 23, 2007)
- No.1048: Kuriki, S. and Takemura, A., The tube method for the moment index in projection pursuit. (November 26, 2007)
- No.1049: Yamashita, T. and Ozaki, T., An estimation scheme of time-varying volatility using the stochastic volatility model by local linearization technique. (November 26, 2007)
- No.1050: Shiraishi, Y. and Fukumizu, K., Game theoretical analysis of combining binary classifiers for multi-class classification problems. (November 27, 2007)
- No.1051: Shimatani, I. K., A clustering spatial point process that has a converging second-order moment when dispersal around mothers is repeated over generations. (November 27, 2007)
- No.1052: Ozaki, T., Innovation approach to the modeling of spatial time series with application to fMRI connectivity studies. (December 18, 2007)
- No.1053: Nishiyama, Y., Nonparametric inference in multiplicative intensity model by discrete observation. (December 21, 2007)
- No.1054: Negri, I. and Nishiyama, Y., Goodness of fit test for small diffusions by discrete observations. (December 26, 2007)
- No.1055: Ohara, A. and Tsuchiya, Takashi, An information geometric approach to polynomial-time interior-point algorithms —Complex bound via curvature integral—. (December 28, 2007)
- No.1056: Sugimoto, T. and Ogawa, T., Properties of nodes in pentagonal tilings. (January 7, 2008)

- No.1057: Huang, S.Y., Yeh, Y.R. and Eguchi, S., Robust kernel principal component analysis by minimum Psi-principle. (*February 22, 2008*)
- No.1058: Kawarasaki, S., Aikawa, S., Kato, M., Suzuki, K., Suzuki, J., Hara, T., Hori, Y. and Shimatani, I. K., A forest herb, Pertya rigidula, lives more than 200 years: inference from 11-year monitoring and growth model. (*February 26, 2008*)
- No.1059: Takeuchi, K., Kumon, M. and Takemura, A., Multistep Bayesian strategy in coin-tossing games and its application to asset trading games in continuous time. (March 4, 2008)
- No.1060: Komori, O. and Eguchi, S., Flexible combinations of markers by boosting the area under the ROC curve. (March 5, 2008)
- No.1061: Aki, S. and Hirano, K., Exact distributions on discrete patterns in some kinds of exchangeable sequences. (March 6, 2008)
- No.1062: Eguchi, S., Information divergence geometry and the application to statistical machine learning. (March 11, 2008)
- No.1063: Fushiki, T., Estimation of positive semidefinite correlation matrices by using convex quadratic SDP. (March 14, 2008)
- No.1064: Kuriki, S., Distributions of the largest singular values of skewsymmetric random matrices and their applications to paired comparisons. (April 4, 2008)
- No.1065: Fujisawa, H., A simple selection of smoothing parameter in penalized spline regression. (April 11, 2008)
- No.1066: Kitahara, T. and Tsuchiya, Takashi, An analysis of weighted least squares method and layered least squares method with the basis lower triangular matrix form. (June 2, 2008)
- No.1067: Hayashi, T. and Yoshida, N., Nonsynchronous covariance estimator and limit theorem II. (June 16, 2008)
- No.1068: Nishiyama, Y., Donsker's theorem for discretized data. (July 17, 2008)
- No.1069: Masuda, H., Negri, I. and Nishiyama, Y., Goodness of fit test for ergodic diffusions by discrete time observations: an innovation martingale approach. (July 27, 2008)
- No.1070: Nishiyama, Y., Goodness of fit test for a non-linear time series. (August 23, 2008)
- No.1071: Nishiyama, Y., Two sample test for counting processes with a nonlinear covariate. (September 11, 2008)
- No.1072: Miura, K., Yamashita, S. and Eguchi, S., AUC maximazation method in credit scoring. (September 25, 2008)

- No.1073: Ogata, Y., Seismicity shadows in space-time aftershock activity. (September 29, 2008)
- No.1074: Nishiyama, Y., Asymptotic theory of semiparametric Z-estimators for stochastic processes, with applications to ergodic diffusions and time series. (September 30, 2008)
- No.1075: Yanagimoto, T. and Ohnishi, T., Bayesian prediction of a density function in terms of e-mixture. (October 1, 2008)
- No.1076: Ikeda, S. and Manton, J., Capacity of a single neuron channel. (October 24, 2008)
- No.1077: Hamada, M. and Ikeda, S., Channel estimation and code word inference for mobile digital satellite broadcasting reception. (October 28, 2008)
- No.1078: Ninomiya, Y., Yanagihara, H. and Yuan, K.H., Selecting the number of factors in exploratory factor analysis via locally conic parameterization. (November 17, 2008)
- No.1079: Kitagawa G. and Konishi, S., Bias and variance reduction techniques for bootstrap information criteria. (November 17, 2008)
- No.1080: Tomosada, M., Kanefuji, K., Matsumoto, Y. and Tsubaki, H., Method for evaluating the equivalent and total error associated with the retrieval of CO2 column abundance from the GOSAT satellite. (December 5, 2008)
- No.1081: Nishiyama, Y. and Shimura, T., A sufficient condition for observation noise not to affect the extreme value distribution. (December 8, 2008)
- No.1082: Tsuchiya, Takahiro and Yoshioka, K., Estimators of growth rates under rotation sampling. (December 16, 2008)
- No.1083: Fushiki, T., Estimation of prediction error by using K-fold crossvalidation. (December 17, 2008)
- No.1084: Nishiyama, Y., Moment convergence of M-estimators. (January 5, 2009)
- No.1086: Kato, S., A Markov process for circular data. (January 30, 2009)
- No.1087: Nishiyama, Y., Impossibility of weak convergence of kernel density estimators to a tight non-degenerate law in $L_2(\mathbb{R}^d)$. (January 31, 2009)
- No.1088: Inoue, K. and Aki, S., On the conditional and unconditional distributions of the number of success runs on a circle with applications. (February 19, 2009)
- No.1089: Nishiyama, Y., Semiparametric estimation for ergodic diffusion

processes. (February 26, 2009)

- No.1090: Nishiyama, Y., Two sample test for diffusion processes with a nonlinear covariate. (March 6, 2009)
- No.1091: Nishiyama, Y., On Z-estimation by rounded data. (March 13, 2009)

ISM Report on Research and Education

(Reports and documents concerned with education and research.)

- No.25: Arimura, H., Higuchi, T., Hirano, S., Inokuchi, A., Matsui, T., Minami, H., Washio, T. and Yamaguchi, R., The International Workshop on Data-Mining and Statistical Science (DMSS2007), (October 2007)"
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- RSC-037: Tanaka, S., Katsura, K. and Hiruta, T. (eds.), Report of study results obtained by using the supercomputer system, 2006. (September 2007)
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- RSC-039: Tanaka, S., Matsuno, H. and Nakamura, M., Designing the homepage with Web standards "XHTML + CSS" Part2. (September 2008)
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Published Papers and Books

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 2007, to March 2009, to complete the following list. Also included are works by visiting professors and students.

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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 2007-March 2009 are as follows:

— in 2007 —

- · Introduction to Quantitative Methods for Social Sciences
- Introduction to Sampling Methods and Sample Surveys
- · Elementary Course on Time Series Analysis
- Introduction to Statistics
- Statistics of Extremes
- Introduction to Statistical Data Analysis focused on Multivariate Analysis
- · Quantification Methods for Qualitative Data
- Recent Topics on International Standardization of Statistical Methods

 Standardization of Sampling Inspection and Statistical Process Management –
- Statistical Quality Control
- Taguchi Methods for Robust Design
- Geometical Structures Underlying Information Quantities: Mathematics of Kullback-Leibler Information
- Statistical Causal Analysis by Structural Equation Modeling
- · Regression Models for Count Data and Their Extension

— in 2008 —

- · Data Analysis and Simulation with R
- · The Grammar of Science and Descriptive Statistical Methods
- Introduction to Statistics
- Spatial point pattern analysis Introduction from biological examples
- Statistics of Extremes

- · An Introduction to Statistical Analysis by the Theory of Martingales
- · Analysis of Sample Surveys with R
- Introduction to multivariate analysis
- · Data assimilation: State space model and simulation
- · Quality control, Quality engineering (Taguchi method)
- · Introduction to Pharmacoepidemiology
- · Understanding of Evolutionary Computation: Statistical Viewpoint
- · Markov Chain Monte Carlo : Basics and Examples

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 five-year education and research program, or a three-year education and research program starting from the third year of study.

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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), +81-42-527-9302 (facsimile), 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 2009, the University has grown to have 18 parent institutes and 1265 Ph.D. students. The organization is composed of 6 schools that comprise 24 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, 81 Doctors of Philosophy have been conferred by the Department. As of April 2009, the Department has 28 students (normally regulated to 17 students per year).



Location of the Institute



Access to the ISM • Tama Monorail, Takamatsu Sta. About 7 min on foot • Tachikawa Bus, Saibansho-mae About 3 min on foot • JR Chuo Line, Tachikawa Sta. About 25 min on foot

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

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