The Institute of Statistical Mathematics

ACTIVITY REPORT

2005—2006

Tokyo, Japan

The Institute of Statistical Mathematics

Activity Report

2005 — 2006

Tokyo, Japan

October 2007
Center for Engineering and Technical Support
The Institute of Statistical Mathematics
Research Organization of Information and Systems
Inter-University Research Institute Corporation

Contents

Foreword

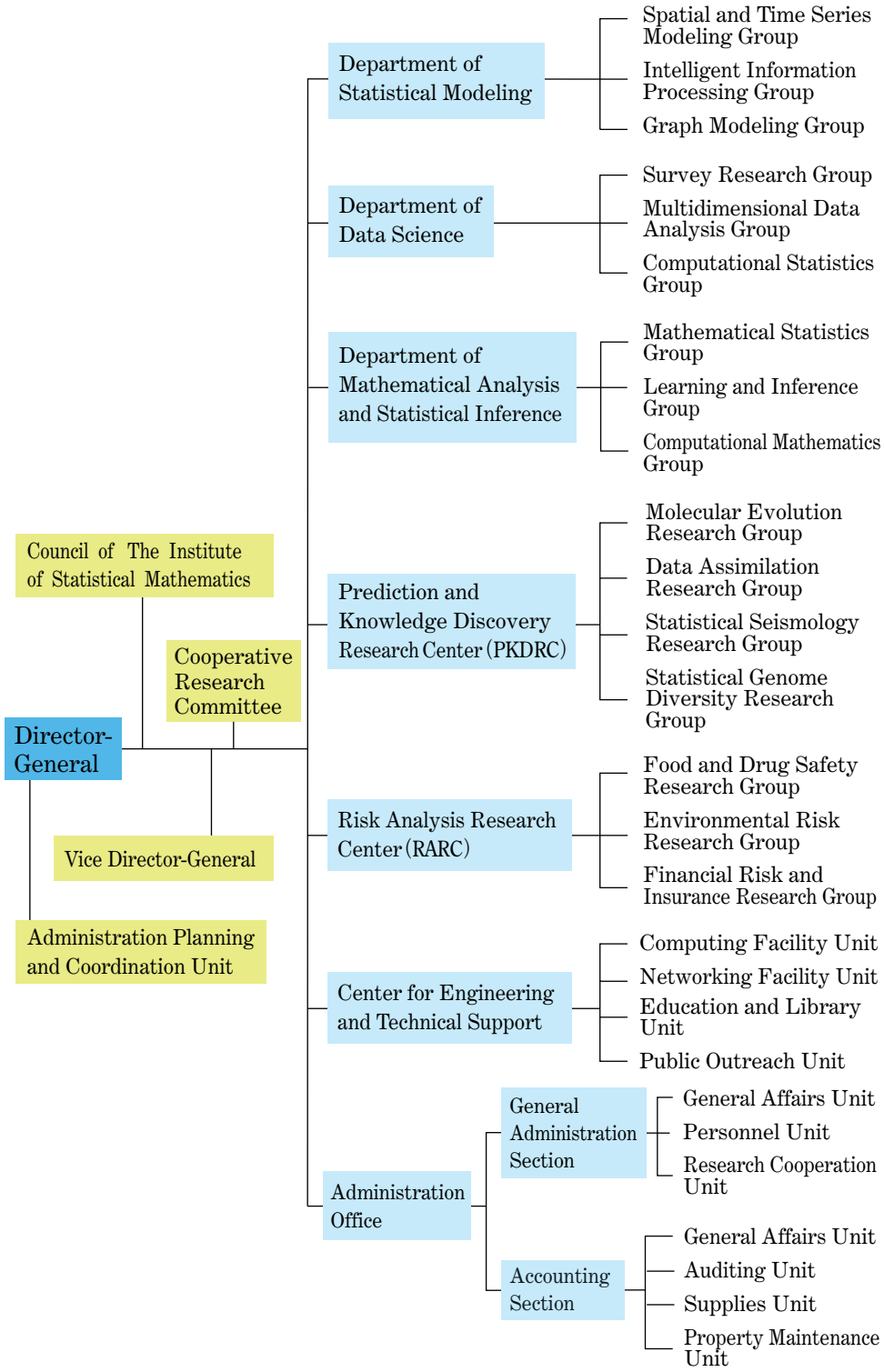
This annual report is intended to provide general information of the Institute of Statistical Mathematics (ISM) and the research activities of the institute in the past two years. During this period, ISM restructured its research organization to adapt to the changes in statistical science.

ISM was founded in 1944 as a national institute for statistical science and was reorganized as an Inter-University Research Institute in 1985. In 2004, ISM became an independent agency under the umbrella of Research Organization of Information and Systems. In April 2005, ISM restructured its research organization. In order to embody our basic principle of establishing new statistical methods through challenges to important scientific problems and social tasks, in designing the new organization ISM adopted a dual structure consisting of a basic research section and a strategic research section.

In the basic research section, we established three departments of Statistical Modeling, Data Science, and Mathematical Analysis and Statistical Inference. In the strategic research section, two research centers were established. The Prediction and Knowledge Discovery Research Center aims to develop methods and applications for prediction and knowledge discovery based on a huge data set for contribution in the coming post-IT era and knowledge society. In contrast, Risk Analysis Research Center aims to develop scientific methods to deal with increased uncertainty and risks caused by the globalization of society.

We believe that the role of statistical science will become more important with the rise of information and risk society. We hope for your understanding and support to our activities.

Genshiro Kitagawa
Director-General


Council of The Institute of Statistical Mathematics
Cooperative Research Committee
Director-General
Vice Director-General
Administration Planning and Coordination Unit
Department of Statistical Modeling
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Department of Data Science
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Statistical Seismology Research Group
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Computing Facility Unit
Networking Facility Unit
Education and Library Unit
Public Outreach Unit
Administration Office
General Administration Section
General Affairs Unit
Personnel Unit
Research Cooperation Unit
Accounting Section
General Affairs Unit
Auditing Unit
Supplies Unit
Property Maintenance Unit

1 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.

At present, the Institute consists of three departments, three 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 48 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 two strategic research centers, Prediction and Knowledge Discovery

Research Center and Risk Analysis Research Center were established in 2003 and 2005, 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.

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 11 technical staff that work on special jobs including maintenance of computer systems, editing journals and bibliographical services. The Institute has two super-computer 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 16 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, 2007.)

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Departments, Centers and Research Staff

(As of August 1, 2007)

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 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* —

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

— *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
- Improve of nonlinear prediction and control of power plant
- 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
- Non-linear prediction and optimum control of financial system
- 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.
Toshio IRINO, Visiting Prof.
Yukito IBA, Assoc. Prof.
Yumi TAKIZAWA, Assoc. Prof.
Tomoko MATSUI, Assoc. Prof.
Kenji FUKUMIZU, Assoc. Prof.
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
- Study of information theory and digital signal processing
- Study of digital signal processing for information communication
- Study of perception mechanism of multimodal information
- Design and applications of evolutionary computation

- Study of ways to formulate subjective information
- 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* —

Masami HASEGAWA, Prof. (-2007.3.31)
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 analyses.

— *Staff* —

Takashi NAKAMURA, Director, Prof.
Ryozo YOSHINO, Prof.
Yoshiyuki SAKAMOTO, Prof. (-2007.3.31)

Tadahiko MAEDA, Assoc. Prof. Takahiro TSUCHIYA, Assoc. Prof.
Hajime IHARA, Assoc. Prof. (-2007.6.30)
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
- Analyses of cancer incidence and mortality
- 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
- Statistical survey research on organizations

■ 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. Toshiharu FUJITA, Prof.
Takemi YANAGIMOTO, Prof. (-2007.3.31)
Masahiro MIZUTA, Visiting Prof. Nobuhisa KASHIWAGI, Assoc. Prof.
Satoshi YAMASHITA, Assoc. Prof. Sumie UEDA, Assist. Prof.
Toshio OHNISHI, Assist. Prof. Toshihiko KAWAMURA, Assist. Prof.

— *Subjects* —

- Estimation of a high-dimensional parameter and its theory
- Bayesian analysis of the generalized linear model
- Analysis of structure of time dependent multidimensional system
- 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
- Nonparametric data analysis
- 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

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

— *Subjects* —

- Discretization method of nonlinear stochastic differential equations and its applications
- Development of Physical random number generator
- Statistical data visualization
- Parallel computation of Monte Carlo filter
- 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"
- Application of Internet survey
- Functional principal points on functional data analysis
- Reliability theory based on life-span models
- Statistical system for analyzing geographic information
- 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 has statistical applications.

— *Staff* —

Katuomi HIRANO, Director, Prof.
Satoshi KURIKI, Prof.
Tadashi MATSUNAWA, Prof. (-2006.3.31)
Takaaki SHIMURA, Assist. Prof.　Yoichi NISHIYAMA, Assist. Prof.
Kei KOBAYASHI, Assist. Prof.

— *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
- Statistical learning theory
- Model selection and prediction theory

■ 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, Prof.
Kunio SHIMIZU, Visiting Prof.
Mihoko MINAMI, Assoc. Prof.
Shiro IKEDA, Assoc. Prof.
Hironori FUJISAWA, Assoc. Prof.
Tadayoshi FUSHIKI, Assist. Prof.
Masayuki HENMI, Assist. Prof.

— *Subjects* —

- Statistical learning theory
- Information geometry
- Robust inference
- Statistical inference for observational studies
- Theory of multivariate distributions and its application
- Bioinformatics
- Statistical prediction
- Stochastic inference
- Genome statistics
- Biostatistics

■ Computational Mathematics Group

The Computational Mathematics Group studies computational algorithms together with mathematical methodologies used for statistical modeling in the sciences.

— *Staff* —

Takashi TSUCHIYA, Prof. Takashi OKASAKI, Prof. (-2006.3.31)
Yoshiaki ITOH, Prof. (-2007.3.31) Satoshi ITO, Assoc. Prof.
Yoshihiko MIYASATO, 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, Prof. (-2007.3.31)
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

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. (Vice Director-General)
Takashi WASHIO, Visiting Prof. Genta UENO, Assist. Prof.
Ryo YOSHIDA, Assist. Prof.
Yoshinori TAMADA, Assist. Prof. (-2006.6.30)

— *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.

— *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.
Mihoko MINAMI, Assoc. Prof. Shiro IKEDA, Assoc. Prof.
Hironori FUJISAWA, Assoc. Prof. 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* —

Toshiharu FUJITA, Prof.
Takemi YANAGIMOTO, Prof. (-2007.3.31)
Hiroe TSUBAKI, Director, Visiting Prof.
Manabu IWASAKI, Visiting Prof. Tosiya SATO, Visiting Prof.
Kunihiko HAYASHI, Visiting Prof. Satoshi AOKI, Visiting Assoc. Prof.

Toshimitsu HAMASAKI, Visiting Assoc. Prof.
Yoshimitsu HIEJIMA, Visiting Assoc. Prof.
Takaaki SHIMURA, Assist. Prof. Masayuki HENMI, Assist. Prof.

■ Environmental Risk Research Group

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

— *Staff* —

Yukio MATSUMOTO, Visiting Prof.
Kazuo YAMAMOTO, Visiting Prof. Yoshiro ONO, Visiting Prof.
Nobuhisa KASHIWAGI, Assoc. Prof.
Koji KANEFUJI, Assoc. Prof. Hideshige TAKADA, Visiting Assoc. Prof.
Hirokazu TAKANASHI, Visiting Assoc. Prof.
Tomohiro TASAKI, Visiting Assoc. Prof.
Toshihiko KAWAMURA, Assist. Prof.

■ 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.
Satoshi YAMASHITA, Assoc. Prof. Seisho SATO, Assoc. Prof.
Yoshinori KAWASAKI, Assoc. Prof.
Toshinao YOSHIBA, Visiting Assoc. 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.

Takashi OKASAKI, Prof. (Vice Director) (-2006.3.31)
Satoshi YAMASHITA, Assoc. Prof. (Vice Director)
Yoshinori TAMADA, Assist. Prof. (-2006.6.30)

■ Computing Facility Unit
The Computing Facility Unit is in charge of the management of computer facilities and software for research.

■ Networking Facility Unit
The Networking Facility Unit is in charge of the management of networking infrastructure used for research and is responsible for network security.

■ Education and Library Unit
The Education and Library Unit is in charge of planning statistical education courses to popularize research results and is responsible for maintaining an extensive library.

■ Public Outreach Unit
The Public Outreach 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 two centers have invited foreign and Japanese professors from universities and institutes as shown in the list below.

— Foreign Visiting Professors —

Bosch-Bayard, Jorge Francisco	(Cuba)	2005. 6.13 –2005. 8.12
Myrvoll, Tor Andre	(Norway)	2005. 7. 1 –2005. 8.31
Jimenez-Sobrino, Juan Carlos	(Cuba)	2005. 9.28 –2005.12.27
Peterson, A. Spencer	(U.S.A.)	2005.10. 1 –2005.10.29
Shi, Lei	(China)	2005.10.20 –2005.11.17
Galka, Andreas	(Germany)	2005.11. 1 –2006. 3.31
Zhong, Yang	(China)	2005.11.28 –2006. 2.13

Dolbilin, Nikolai Petrovich	(Russia)	2006. 1. 1–2006. 3.31
Dutour Sikiric, Mathieu	(France)	2006. 1. 4–2006. 3.30
Copas, John Brian	(U.K.)	2006. 5. 9–2006. 6. 8
Hyvärinen, Aapo Johannes	(Finland)	2006. 5. 9–2006. 6. 9
Harte, David Shamus	(New Zealand)	2006. 7.24–2006. 9.22
Synodinos, Nicolaos Emmanuel	(U.S.A.)	2006. 8. 1–2006. 9.30
Doucet, Arnaud	(France)	2006. 8.14–2006.10.13
Biscay, Lirio Rolando Jose	(Cuba)	2006. 8.28–2006.10.27
Iacus, Stefano Maria	(Italy)	2006. 9. 4–2006.11. 2
Bosch-Bayard, Jorge Francisco	(Cuba)	2006.10. 1–2006.11.30
Dolbilin, Nikolai Petrovich	(Russia)	2007. 1.10–2007. 3. 9
Edler, Lutz	(Germany)	2007. 1.15–2007. 3.14

— *Japanese Visiting Professors* —

Aoki, Satoshi	2005. 8-2007. 3	Tsubaki, Hiroe	2005. 4-2007. 3
Fukasawa, Atsushi	2005. 4-2007. 3	Tsuda, Hiroshi	2005. 4-2007. 3
Hashimoto, Tetsuo	2005. 4-2007. 3	Washio, Takashi	2005. 4-2007. 3
Irino, Toshio	2005. 4-2007. 3	Yoshiba, Toshinao	2006. 1-2007. 3
Kamachi, Masafumi	2005. 4-2007. 3	Zheng, Yuejun	2005. 4-2006. 3
Kunitomo, Naoto	2005. 4-2007. 3	Fukui, Yoshinari	2006. 4-2007. 3
Matsubara, Nozomu	2005. 4-2007. 3	Hamasaki, Toshimitsu	2006. 6-2007. 3
Matsumoto, Yukio	2005. 4-2007. 3	Hayashi, Kunihiko	2006. 6-2007. 3
Miura, Ryozo	2005.11-2007. 3	Hiejima, Yoshimitsu	2006. 6-2007. 3
Mizuta, Masahiro	2005. 4-2007. 3	Koshiba, Takeshi	2006. 4-2007. 3
Nagafuchi, Osamu	2005. 4-2006. 3	Matsumoto, Makoto	2006. 4-2007. 3
Nishii, Ryuei	2005. 4-2006. 3	Shimizu, Kunio	2006. 4-2007. 3
Ono, Yoshiro	2005. 4-2007. 3	Takanashi, Hirokazu	2006. 4-2007. 3
Onodera, Tohru	2005. 4-2007. 3	Takada, Hideshige	2006. 4-2007. 3
Sato, Tosiya	2005. 8-2007. 3	Wakaki, Hirofumi	2006. 4-2007. 3
Taiji, Makoto	2005. 4-2007. 3	Yamamoto, Kazuo	2006. 4-2007. 3
Toda, Shinji	2005. 4-2007. 3		

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 2005 to March 2007.

(The list does not show all of the visiting fellows from abroad. Foreign visiting research fellows are listed under "Foreign Visitors" on page 21.)

— Projects researcher —

Nishimoto, Yuriko	Tanokura, Yoko	Tomosada, Mitsuhiro
Iwata, Takaki	Kumon, Masayuki	Kawai, Ken-ichi
Cuturi, Marco	Sugimoto, Teruhisa	Maruyama, Yosihito
Tsuda, Yoshiyuki	Kawakita, Masanori	Nanjo, Kazuyoshi
Nishihara, Hidenori	Sato, Yuki	Miwa, Hidetsugu
Fujii, Yosuke	Myrvoll, tor Andre	Mollah Md Nural Haque
Watanabe, Shin-ichi	Kawarasaki, Satoko	Termier, Alexandre
Okabe, Masahiro		

— Research fellow upon JSPS program —

Nanjo, Kazuyoshi	Nikaido, Masato	Sugimoto, Teruhisa
Kobayashi, Kei	Shimizu, Shohei	Zhuang, Jiancang
Xia, Yu		

— Japanese visiting research fellows —

Hayashi, Koji	Nakano, Shin'ya	Mitsui, Hideya
Iwaki, Hiroko	Fujisaki, Yoh	Abe, Mitsuhiro
Ohtani, Shin-ichi	Togu, Hideo	Uesaka, Hiroyuki
Sakai, Hironori	Komiyama, Osamu	Kitahara, Tomonari

— Students from graduate school —

Maruyama, Yosihito	Matsuura, Naomi

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.

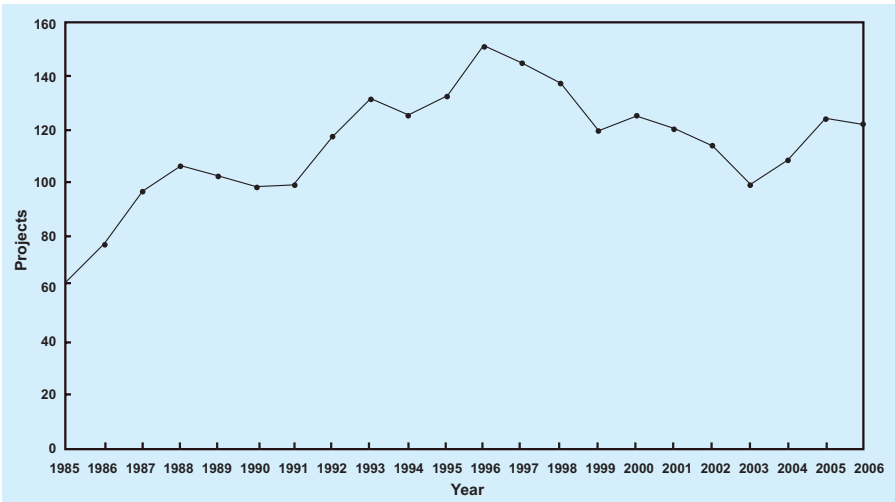
The cooperative research activity was maintained through various research fields at different levels with various types of collaboration, long before the Institute was reorganized into an inter-university research institute. Many remarkable results have been produced through collaborative research in 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 Associates Ltd., New Zealand, 2001-2006
- 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-

The Institute has also been active in organizing international conferences and workshops. In January 2005-March 2007, 9 international symposia were held under the auspices of the Institute;

- International Symposium: The Art of Statistical Mataware, March 14-16, 2005

- International Conference: Nonparametric and Semiparametric Statistics, March 26-27, 2005
- ISM Symposium: A Bridge between Environmental and Statistical Sciences –Challenge to new development–, September 22, 2005
- International Symposium: 2nd International Symposium on Information Geometry and Its Applications, December 12-16, 2005
- International Workshop: The 4th International Workshop on Statistical Seismology (Statsei 4), January 9-13, 2006
- International Workshop: Time Series Analysis and Its Related Topics, January 23-25, 2006 (Joint Auspices)
- ISM Symposium: Packing and Random Packing, March 1-3, 2006
- ISM Symposium: Contributions of Statistical Science to Global Environmental Researches –Challenges to the Uncertainties in the Global Environmental Changes–, January 24, 2007
- ISM Symposium: Stochastic Models and Discrete Geometry, February 26-28, 2007

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 83 visitors from 26 different countries. Of these researchers, 58 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 (January 2005–March 2007)

- The asterisk * before a visitor's name indicates that he is a visiting professor or a visiting research fellow.
- Date in the list refers to the period of visiting professorship/research-fellowship or the date of colloquium.

From Bangladesh

*Mollah Md Nurul Haque 06.11.20-07.3.31

From Canada

Nishisato, S. 06. 2.20
Tian, Y. 05. 2.21

From China

*Ma, L. 06. 1. 8-06. 1.22
*Shi, L. 05.10.20-05.11.17
*Wang, T. 06. 3.22-06. 4.21
*Xia, Y. 04.11.24-06.11.23
*Zhong, Y. 05.11.28-06. 2.13
*Zhuang, J. 04. 4.12-06. 4.11
* *ibd.* 07. 1. 4-07. 1.27

From Croatia

*Dutour S., Maja 06. 1. 1-06. 3.31

From Cuba

*Biscay-Lirio, R. J. 06. 8.28-06.10.27
*Bosch-Bayard, J. F. .. 05. 6.13-05. 8.12
* *ibd.* 05. 8.15-05. 9. 7
* *ibd.* 06. 8.26-06.11.30
*Jimenez, J. C. 05. 3. 7-05. 3.31
* *ibd.* 05. 7. 1-05. 7. 8
* *ibd.* 05. 9.28-05.12.27
*Riera, J. 04. 7.29-05. 8. 4

From Czech

*Vlach, M. 04. 9. 1-05. 3.31

From Finland

*Hyvärinen, A. J. 06. 5. 9-06. 6. 9

From France

*Cuturi, M. 04. 7. 1-05. 3.31
* *ibd.* 05. 5.11-05. 6. 3
* *ibd.* 05.11.22-07. 3.31
*Deza, M. 04. 4. 1-05. 9.30
* *ibd.* 06. 2.17-06. 3.19
* *ibd.* 07. 2.14-07. 2.28
*Doucet, A. 06. 8.14-06.10.13
*Dutour S., Mathieu 05. 3.11-05. 3.30
* *ibd.* 06. 1. 4-06. 3.30
ibd. 07. 1.26
*Senecal, S. 05.12. 5-07. 3.31
*Termier, A. 06. 4. 1-07. 3.31

From Germany

*Edler, L. 07. 1.15-07. 3.14
*Galka, A. 05. 7.14-06. 6. 8
* *ibd.* 07. 2.28-07. 3.29
Gaul, W. 06. 2.21
*Hainzl, S. 05. 2.13-05. 2.26
*Heise, M. 05. 2.18-05. 2.27
*Herrmann, J. M. 06. 2.13-06. 2.28
Laub, J. 05. 4.14
*Unwin, A. 06. 2.19-06. 2.23
*Ziegenhagen, U. A.. 06. 2.19-06. 3.11

From Hungary

Katona, G. 06. 3.22

From India

Mukherjee, S. P. 05. 7.21
*Sultana, N. 04. 4. 5-05. 3.31
* *ibd.* 05. 5.11-05. 9.30

From Israel

Inselberg, A. 05. 8. 2

From Italy

*Adelfio, G. 07. 2.13-07. 3.30
*Iacus, S. M. 06. 9. 4-07. 1. 3
*Negri, I. 06. 9. 4-07. 1. 3
Pistone, G. 05.12. 8

From Korea

Kim, J.-K. 06.12.27
*Lee, J. J. 04.12. 6-05. 3. 5
Lee, Y. 07. 2. 9
*Moon, Y. H. 06. 2.19-06. 2.22
Park, B. U. 05. 3.26
Sung, J. 05. 1.20

From Madagascar

*Rakotondraparany, F.. 06. 2.24-06. 3.25

From the Netherlands

Guta, M. 06. 2.28

From New Zealand

*Harte, D. S. 06. 7.24-06. 9.22

From Norway

*Birkenes, O. 05. 3. 1-05.12. 1
ibd. 06. 8.24
*Myrvoll, Tor A. 05. 7. 1-05. 8.31
* *ibd.* 06. 7.24-06. 8.31

From Russia

*Deza, E. 04. 9.15-05. 3.31
* *ibd.* 05. 6.20-05. 7. 3
*Dolbilin, N. 05. 1. 1-05. 3.31
* *ibd.* 06. 1. 1-06. 3.31
* *ibd.* ..... 07. 1.10-07. 3 .9
*Andreev, N. 07. 2.25-07. 3.10
*Malkova, T. 07. 1.10-07. 2.10
*Pavlovich, P. A. 05. 3. 7-05. 3.31

From Singapore

*Zhao, G. Y. 06. 9.23-06.10. 2

From Spain

*Oliveras, K. G. 06. 2.16-06. 2.21

From Sweden

von Hofsten, C. 05. 7.22
Schon, T. 05. 2.18

From Switzerland

*Künsch, H. R. 06.12.28-07. 1.27

From Taiwan

*Chen, C.-H. 06. 2.17-06. 2.25

From U.K.

Anderson, C. W. 06. 9.22
*Copas, J. B. 06. 5. 9-06. 6. 8
*Jasra, A. 06. 8.28-06. 9.10
Steinberg, D. 05. 8. 1
Tong, H. 06. 1.25
*Vere-Jones, D. 06. 1. 8-06. 1.25
Wynn, H. 05. 8.25
*Wong, K. F. K. 06. 4. 1-06.12.31

From U.S.A.

*Faybusovich, L. 05. 7.18-05. 7.26
Haughton, D. 06. 7. 6
*Hayter, A. J. 05.12. 9-05.12.23
Hoyle, S. 06. 1.12
*Lennert-Cody, C. E. 06. 1. 8-06. 1.22
*Monteiro, R. D. C. ... 06. 9.23-06.10. 6
Murakami, J. 05. 6.23
*Peterson, A. S. 05.10. 1-05.10.29
*Schoenberg, F. P. ... 06. 2. 1-06. 2.28
*Shedlock, A. M. 06. 2.20-06. 3. 9
*Synodinos, N. E. 06. 8. 1-07. 3.31
Yoshida, R. 06. 5.29
Yu, B. 07. 3.12
Zhang, J. 06. 2.21
ibd. 06. 3.20

Colloquia by Foreign Visitors

(2005.1-2007.3)

Speaker (Country)	Title	Date
Sung, J. (Korea)	Learning discrete latent variable models: U-likelihood and U-updates.	2005. 1.20
Dolbilin, N. (Russia)	Old problems and new results on unfoldings of convex polytopes and polyhedral surfaces.	2005. 2.14
Schon, T. (Sweden)	Nonlinear estimation and selected applications within signal processing and automatic control.	2005. 2.18
Tian, Y. (Canada)	How to characterize relations between estimators for general linear regression models by the matrix rank method.	2005. 2.21
Hainzl, S. (Germany)	Estimating background activity in seismicity data through statistical earthquake modeling and interevent-time statistics.	2005. 2.23
Park, B. U. (Korea)	Large sample approximation of the distribution for convex-hull estimators of boundaries.	2005. 3.26
Laub, J. (Germany)	Analyzing non-Euclidean pairwise data.	2005. 4.14
Cuturi, M. (France)	Semigroup kernels on measures.	2005. 5.27
Murakami, J. (U.S.A.)	Parameter estimate of a hidden Markov chain.	2005. 6.23
Bosch-Bayard, J. (Cuba)	Spatial temporal modeling of fMRI data and the visualization tools–(1), (2), (3), (4).	2005. 7. 4-8
Mukherjee, S. P. (India)	Stochastic programming–Applications in statistics and operational research.	2005. 7.21

Speaker (Country)	Title	Date
von Hofsten, C. (Sweden)	An action approach to infant development.	2005. 7.22
Steinberg, D. (U.K.)	Default models based on "Small" data sets: Leveraging multi-tree methods for reliable risk models.	2005. 8. 1
Inselberg, A. (Israel)	Multidimensional visualization and it's applications.	2005. 8. 2
Inselberg, A. (Israel)	Multidimensional detective: visual & automatic knowledge discovery in high dimensional data.	2005. 8. 2
Bosch-Bayard, J. (Cuba)	Statistical modeling of fMRI-EEG data and designing toolboxes for their computations–part 1-25.	2005. 8.15 -19, 22-26, 29-31
Wynn, H. (U.K.)	A review of abstract tubes, with applications.	2005. 8.25
Myrvoll, Tor A. (Norway)	Greedy training for dPLRM with applications to ASR.	2005. 8.26
Birkenes, O. (Norway)	Probabilistic isolated-word speech recognition via maximum penalized logistic regression likelihood.	2005.11. 9
Pistone, G. (Italy)	Differential vs algebraic geometry in statistics.	2005.12. 8
Hoyle, S. (U.S.A.)	Population dynamics modeling for fisheries bycatch.	2006. 1.12
Lennert-Cody, C. E. (U.S.A.)	Species association in purse-seine catch-bycatch in the eastern Pacific Ocean.	2006. 1.13
Dutour S., Mathieu (France)	Equivariant L-types and lattice coverings, part I.	2006. 1.13
Dolbilin, N. (Russia)	Tilings whose all the tiles have arbitrarily large number of faces.	2006. 1.19
Dutour S., Mathieu (France)	Equivalent L-types and lattice coverings, part II.	2006. 1.23

Speaker (Country)	Title	Date
Tong, H. (U.K.)	Some recent developments in threshold moving average models.	2006. 1.25
Dutour S., Mathieu (France)	Equivariant L-type and the covering problem, part Ⅲ.	2006. 1.26
Schoenberg, F. P. (U.S.A.)	Prototypes, separability, and K-functions, and their use in earthquake and wildfire risk assessment.	2006. 2. 8
Dutour S., Mathieu (France)	C-types, a generalization of L-types.	2006. 2.10
Nishisato, S. (Canada)	Date analysis through dimension reduction, An example of what is not what in data mining.	2006. 2.20
Gaul, W. (Germany)	Challenges concerning web data mining.	2006. 2.21
Zhang, J. (U.S.A.)	On classical information geometry in infinite dimension.	2006. 2.21
Herrmann, J. M. (Germany)	Criticality of avalanche dynamics in recurrent networks.	2006. 2.23
Guta, M. (the Netherlands)	An introduction to quantum statistics.	2006. 2.28
Zhang, J. (U.S.A.)	Change detection with identification: A Bayesian algorithm for sequential analysis.	2006. 3.20
Katona, G. (Hungary)	Random model for databases.	2006. 3.22
Hyvärinen, A. (Finland)	Computationally simple and statistically optimal estimation of non-normalized statistical models.	2006. 5.15
Copas, J. B. (U.K.)	Statistical sensitivity analysis–making the best of the impossible.	2006. 5.24
Yoshida, R. (U.S.A.)	Barvinok's enumeration algorithm and its applications to statistics.	2006. 5.29

Speaker (Country)	Title	Date
Haughton, D. (U.S.A.)	Bayesian analysis of poverty rates: the case of Vietnamese provinces.	2006. 7. 6
Harte, D. (New Zealand)	Discrete time hidden Markov models.	2006. 8. 7
Birkenes, O. (Norway)	Automatic speech recognition with penalized logistic regression machines.	2006. 8.24
Jasra, A. (U.K.)	Markov chain Monte Carlo for Bayesian mixture models.	2006. 9. 4
Bosch-Bayard, J. (Cuba)	Spatial temporal modeling of fMRI data and the visualization tools –(1)-(11).	2006. 9.11 -15, 19-22, 25-29
Iacus, S. (Italy)	Iterated function systems and their application to statistics.	2006. 9.20
Anderson, C. W. (U.K.)	Continuous time extremes from discrete-time observations.	2006. 9.22
Wong, K.F.K. (U.K.)	Akaike causality in state space (I), (II), (III), (IV).	2006.12. 8-9, 11-12
Negri, I. (Italy)	Efficient estimation for ergodic diffusion processes.	2006.12.20
Kim, J.-k. (Korea)	Variance estimation with imputed data in survey sampling.	2006.12.27
Künsch, H. R. (Switzerland)	A bridge between particle and ensemble filters.	2007. 1.12
Dolbilin, N. (Russia)	The Minkowskii theorem on polyhedra and beyond.	2007. 1.19
Dutour S., Mathieu (France)	The recursive adjacency decomposition method.	2007. 1.26
Lee, Y. (Korea)	Confidence intervals on variance components: Modified large sample approach.	2007. 2. 9
Yu, B. (U.S.A.)	Lasso: algorithm, theory, and extension.	2007. 3.12

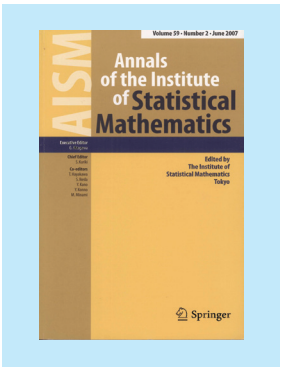
5

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 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-Verlag. Titles, abstracts, and

full texts 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). For titles of those papers, refer to the following: 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 January 2005 to March 2007 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.173: Matani, A., The 21st's diagnosis engineering and applications (3). *(March 2005)*

No.174: Takahashi, R., Extreme value theory and applications (2). *(March 2005)*

No.175: Hiraba, S., Infinitely divisible processes and related topics (9). *(March 2005)*

No.176: Ohno, Y., The development of indices for the health care status in the 21st century (3). *(March 2005)*

No.177: Tanaka, M., Econophysics and its applications. *(March 2005)*

No.178: Tsuchiya, Takashi, Optimization —Modeling and algorithms— 18. *(March 2005)*

No.179: Sagae, M., Nonparametric and semiparametric statistics. *(March 2005)*

No.180: Minami, M., Independent component analysis theory and its applications. *(March 2005)*

No.181: Fujimoto, K., Informatics of dynamical systems (4) Signal transduction and communication. *(October 2004)*

No.182: Ninomiya, Y., Summer seminar on statistics. *(August 2005)*

No.183: Takahashi, R., Extreme value theory and applications (3). *(March 2006)*

No.184: Hiraba, S., Infinitely divisible processes and related topics (10). *(March 2006)*

No.185: Ohno, Y., Investigation on the production management of the medical care supply in hospital wards: Based on the time motion study. *(March 2006)*

No.186: Konno, H., The 21st's diagnosis engineering and applications (4). *(March 2006)*

No.187: Tanaka, M., Econophysics and its applications (2). *(March 2006)*

No.188: Hirata, Y., Convenient photo-measurement and analysis on the evaluation of mophogenetic characters in plant breeding. *(March 2006)*

No.189: Mitsuya, R., Statistical research of seating comfort. *(March 2006)*

No.190: Ishikawa, S., Statistics for English collocation studies. *(March 2006)*

No.191: Tsuchiya, Takashi, Optimization —Modeling and algorithms— 19. *(March 2006)*

No.192: Fujimoto, K., Informatics of dynamical systems (5). Ecology and behavior of microorganisms. *(January, 2006)*

No.193: Ohara, M., Spatial analysis about reproduction and genetic structure for clonal plants. *(October, 2006)*

No.194: Takahashi, R., Extreme value theory and applications (4). *(February 2007)*

No.195: Yamamuro, K., Infinitely divisible processes and related topics (11). *(March 2007)*

No.196: Kashiwagi, N., Theory and practice of environmental data analysis. *(March 2007)*

No.197: Iwaki, S., The 21st's diagnosis engineering and applications (5). *(March 2007)*

No.198: Tanaka, M., Econophysics and its applications (3). *(March 2007)*

No.199: Ishikawa, S., Statistical approaches to selecting basic words in Japanese and English. *(March 2007)*

No.200: Koyama, Y., Research on statistical methods for determining distinctive vocabulary from ESP corpus and its application for language testing. *(March 2007)*

No.201: Tabata, T., Multivariate approaches to linguistic variations across texts. *(March 2007)*

No.202: Ohno, Y., The hospital and ward administration from the viewpoint of global medical supply chain. *(March 2007)*

No.203: Tsuchiya, Takashi, Optimization —Modeling and algorithms— 20. *(March 2007)*

No.204: Tsujitani, M., Survival analysis using machine learning. *(March 2007)*

No.205: Fujimoto, K., Informatics of dynamical systems (6). *(February 2007)*

Research Report

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

No.94: Sakamoto, Y., Tsuchiya, Takahiro, Nakamura, Takashi and Maeda, T., A study of the Japanese national character: The eleventh nationwide survey (2003) —English edition—. *(January, 2007)*

No.95: Yoshino, R. and Matsumoto, W. (eds.), The Asia-Pacific value survey —South Korea 2006 survey—. *(March, 2007)*

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.31: Waddell, P. J., Mine, H. and Hasegawa, M., INTEROGATE 1.0. Exploration and testing of stationarity, reversibility and clock-likeness in sequence data. *(March 2005)*

No.32: Ogata, Y., Katsura, K. and Zhuang, J., TIMSAC84: Statistical analysis of series of events (TIMSAC84-SASE) version 2. *(April 2006)*

No.33: Ogata, Y., Statistical Analysis of Seismicity —Updated version (SASeis2006). *(April 2006)*

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.931: Sato, H., Parameter estimation of state space models by recursive grid search for Monte Carlo filter. *(January 18, 2005)*

No.932: Deza, E. and Deza, M., Lengths measures, scales and exotic distances. *(January 26, 2005)*

No.933: Cuturi, M., Fukumizu, K. and Vert, J.-P., Semigroup kernels on measures. *(January 28, 2005)*

No.934: Deza, E. and Deza, M., Distances in cosmology, astronomy and geography. *(January 28, 2005)*

No.935: Aki, S. and Hirano, K., Waiting time distributions for a run with additional constraints. *(March 3, 2005)*

No.936: Shimatani, K., Kawarasaki, S. and Manabe, T., Describing size-dependent mortality and size distribution by nonparametric models and selection by Akaike Bayesian Information Criterion. *(March 3, 2005)*

No.937: Dolbilin, N. and Tanemura, M., How many facets on average can a tile have in a tiling? *(March 30, 2005)*

No.938: Okabe, M. and Tanemrua, M., Bayesian estimation of soft-core interaction potential models for spatial point patterns. *(April 19, 2005)*

No.939: Wan, X., Iwata, K., Riera, J., Ozaki, T., Kitamura, M. and Kawashima, R., Artifact reduction for EEG/fMRI recording part 1: Nonlinear reduction of ballistocardiogram artifact. *(May 10, 2005)*

No.940: Kuriki, S. and Takemura, A., Euler characteristic heuristic for approximating the distribution of the largest eigenvalue of an orthogonally invariant random matrix. *(May 16, 2005)*

No.941: Zhuang, J., Multi-dimensional second-order residual analysis of space-time point processes and its applications in modelling earthquake data. *(May 30, 2005)*

No.942: Fukumizu, K., Bach, F. R. and Gretton, A., Consistency of kernel canonical correlation analysis. *(June 2, 2005)*

No.943: Sugimoto, T. and Ogawa, T., Properties of tilings by convex pentagons. *(June 10, 2005)*

No.944: Tsuchiya, Takahiro, On the assumption required for the domain estimators for the item count technique. *(June 16, 2005)*

No.945: Deza, E. and Deza, M., Distance metrics: main notions and generalizations. *(June 30, 2005)*

No.946: Deza, E. and Deza, M., Distances on graphs and networks. *(July 1, 2005)*

No.947: Fujisawa, H. and Eguchi, S., A new approach to robust parameter estimation against heavy contamination. *(July 15, 2005)*

No.948: Inoue, K. and Aki, S., Joint distributions associated with compound patterns in a sequence of Markov dependent multistate trials. *(July 20, 2005)*

No.949: Inoue, K. and Aki, S., On generating functions of waiting times and numbers of occurrences of compound patterns in a sequence of multistate trials. *(July 20, 2005)*

No.950: Ohara, A. and Eguchi, S., Geometry on positive definite matrices and V-potential function. *(July 27, 2005)*

No.951: Kumon, M. and Takemura, A., On a simple strategy weakly forcing the strong law of large numbers in the bounded forecasting game. *(August 8, 2005)*

No.952: Araki, K., Shimatani, K. and Ohara, M., Floral distribution, clonal structure, and their effects on pollination success in a self-incompatible *convallaria keiskei* population in northern Japan. *(August 8, 2005)*

No.953: Hagiwara, K. and Fukumizu, K., A probabilistic upper bound for the degree of over-fitting to noise in neural network regression. *(August 9, 2005)*

No.954: Wong, K. F., Galka, A., Yamashita, O. and Ozaki, T., Modelling non-stationary variance in EEG time series by state space GARCH

model. *(August 26, 2005)*

No.955: Nishiyama, Y., On tightness of l^{∞}-valued local martingales with infinitely many jumps: metric and partitioning entropy approach. *(August 31, 2005)*

No.956: Mollah, M. N. H., Sultana, N., Minami, M. and Eguchi, S., Exploring local PCA structure for dimensionality reduction by minimizing β-divergence. *(September 29, 2005)*

No.957: Jimenez, J. C., Biscay, R. and Ozaki, T., Inference methods for discretely observed continuous-time stochastic volatility models: A commented overview. *(September 29, 2005)*

No.958: Monteiro, R. D. C. and Tsuchiya, Takashi, A strong bound on the integral of the central path curvature and its relationship with the iteration complexity of primal-dual path-following LP algorithms. *(September 30, 2005)*

No.959: Minami, M., Multivariate inverse Gaussian distribution as a limit of multivariate waiting time distributions. *(October 3, 2005)*

No.960: Nishiyama, Y., Nonparametric inference for Lévy processes by continuous observation: a martingale approach. *(October 7, 2005)*

No.961: Kumon, M., Studies of information quantities and information geometry of higher order cumulant spaces. *(October 24, 2005)*

No.962: Ikeda, S., Sparse representation and piece-wise linear kernel. *(October 28, 2005)*

No.963: Kumon, M., Takemura, A. and Takeuchi, K., Capital process and optimality properties of Bayesian Skeptic in the fair and biased coin games. *(November 4, 2005)*

No.964: Riera, J. J., Jimenez, J. C., Wan, X., Kawashima, R. and Ozaki, T., Nonlinear local electro-vascular coupling. Part II: From data to neuronal masses. *(November 16, 2005)*

No.965: Iwata, T. and Katao, H., The correlation between the phase of the moon and the occurrences of microearthquakes in the Tamba region through point-process modeling. *(December 16, 2005)*

No.966: Zhuang, J., Second-order residual analysis of spatio-temporal point processes and applications in model evolution. *(December 19, 2005)*

No.967: Zhuang, J. and Ogata, Y., Properties of the probability distribution associated with the largest event in an earthquake cluster and their implications to foreshocks. *(December 19, 2005)*

No.968: Ishida, M., Sato, T., Suzuki, K., Shimada, S. and Kawase, T., Random number generator using a diode noise. *(December 20, 2005)*

No.969: Niki, N., Machine generation of random numbers. *(December 20, 2005)*

No.970: Niki, N., Physical random number generator for personal computers. *(December 20, 2005)*

No.971: Hayashi, T. and Yoshida, N., Asymptotic normality of nonsynchronous covariance estimators for diffusion processes. *(December 22, 2005)*

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6 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 January 2005, to March 2007, 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 13-15 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 January 2005-March 2007 are as follows:

— in 2005 —

- Introduction to Statistics
- A Junction of Informatics –Chordal Graph and its Applications–
- Analysis of Qualitative Data by Quantification Methods
- Nonlinear Time Series Analysis of Financial Data
- Introductory Data Analysis with R
- Data Processing and LSI Design for Information and Telecommunications with the Latest Technologies
- Introduction to Sampling Methods and Sampling Surveys
- Introduction to Reliability Theory and Survival Data Analysis with R
- Theory and Practice Inferring Molecular Phylogenies
- Introduction to Probabilistic Evaluation of Risk
- Non-Poisson Regression Models for Count Data
- Packing and Random Packing
- Introduction to Time Series Analysis

— in 2006 —

- A Course on Time Series Analysis for Economics and Finance
- Advances in Kernel Methods: SVM, Nonlinear Data Analysis, and Structured Data
- Basic Medical Statistics using R
- Introduction to Statistics
- Lectures on Information Theory and Mobile Telecommunication Technologies –Systems and Hardwares for Large-Scale Data Processing–

- International Standardization of Statistical Methods –Precision and Trueness of Measurement Methods and Results–Capability of Detection
- A New Trend of Adaptive and Learning Control Theory
- A Game Theoretic Approach to Mathematical Finance
- Introduction to Quantitative Methods for Social Sciences
- Statistical Pattern Recognition
- Introduction to Statistical Data Analysis
- Statistical Mathematics of Rock-Scissors-Paper Game
- An Introduction to Statistical Analysis Based on the Theory of Martingales
- Introduction to Risk Analysis with R –Application of Tree-based and Nonparametric Modelling–
- Introduction to Survey Data Analysis using R

In addition, once or twice 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.

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), +81-3-5421-8796 (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. — *Typical examples of application* — • 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 (*BAYesian SEasonal Adjustment*)	— *Main features* — Computer program for realizing a decomposition of a time series into trend, seasonal and irregular 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. — *Typical examples of application* — • 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 (*QUANTification 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 Likelihood maximization*)	— *Main features* — Davidon's variance algorithm subroutine customized for maximum likelihood. — *Typical examples of application* — • Analysis of medical data • Analysis of multi-dimensional non-stationary data

ARdock (*dock for AR models*)	— *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 Libraries 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* — • Seasonal adjustment
Jasp (*Java based Statistical Processor*)	— *Main features* — An experimental statistical analysis system written in Java language. — *Typical examples of application* — • Explanatory data analysis • Developing new computational statistical methodology
Jasplot (*Java statistical plot*)	— *Main features* — Statistical graphics library in Java language. — *Typical examples of application* — Data visualization

(Machine room-1)

(Machine room-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 co-operation 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."

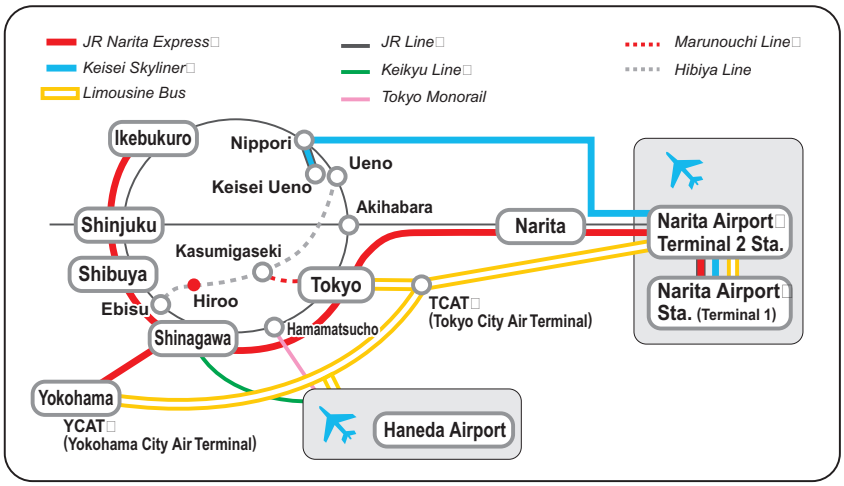
(from the *President's Statement*)

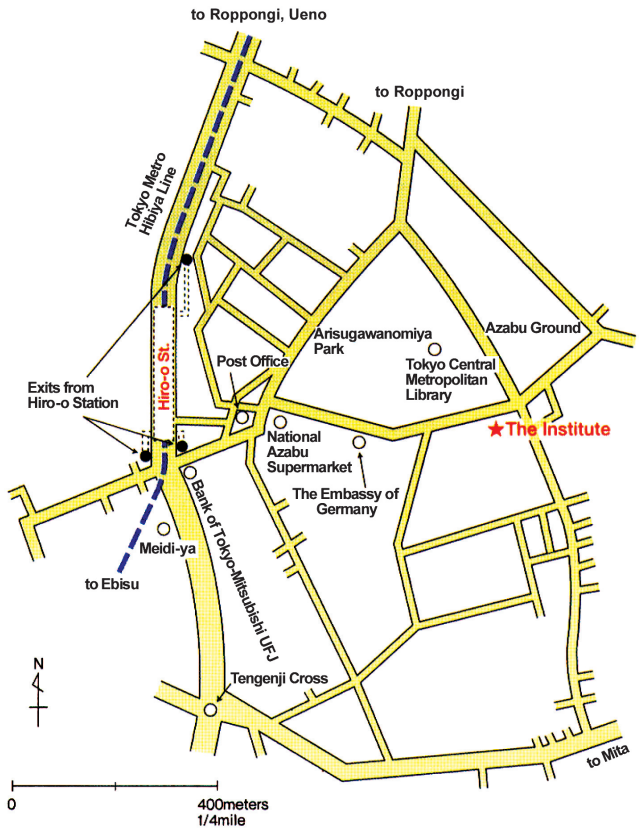
The Graduate University for Advanced Studies was thus established in October 1988 with seven institutes as parents. As of April 2007, the University has grown to have 18 parent institutes and 1082 Ph.D. students. The organization is composed of 6 schools that comprise 23 departments and a center.

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, 70 Doctors of Philosophy have been conferred by the Department. As of April 2007, the Department has 25 students (normally regulated to 14 students per year).

Location of the Institute





Access to the ISM
- Tokyo Metro Hibiya Line, Hiroo Sta.
  About 7 min on foot
- Tokyo Metro Namboku Line, Azabu-jūban Sta.
  Toei Ōedo Line, Azabu-jūban Sta.
  About 20 min on foot

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

4-6-7, Minami-Azabu, Minato-ku, Tokyo 106-8569, Japan

Phone: +81-3-3446-1501, Facsimile: +81-3-3443-3552

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