National Institute of Informatics News

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A robot that learns humans behavior

In recent years, efforts have been underway to put robots to use in people's everyday lives. One of the toughest problems faced in the context of such efforts lies in familiarizing robots with new environments. In the past, most robot demonstrations have involved programming robots based on predetermined environments, utensils, situations, and decisions, with robots behaving accordingly. However, the next generation of robots will have to reflect intelligence more akin to that of human beings, enabling these robots to familiarize themselves with new surroundings—asking questions of and learning from the people around them. This model of learning will thus replace the traditional approach of simply embedding in the robots predetermined information about the environments in which they will be active.

This research is designed to achieve a new form of intelligence, enabling robots to learn behaviors in stages through experience: through conversations, for example, in which they are taught behavioral patterns and ways of making decisions in accordance with various situations. No longer will developers and programmers simply embed specific knowledge structures in the robots. To this end, this research is proceeding on the basis of two distinct approaches.

1. Behavioral imitation system based on mirror neuron model

Mirror neurons form an area of the brain that fires when observing another party behave in a specific way and when one tries to behave in the same way. As the name indicates, this structure acts like a mirror, to reflect correspondence between one's one body and that of another. Since this part of the brain is near the language area of the brain, it is hypothesized that mirror neurons govern recognition, generation, abstraction, and verbalization of physical behavior. The behavior of these mirror neurons has now been replicated, through engineering design based on the proto-symbol space model. This innovation in engineering has now made it possible to imitate and communicate behavior through verbal communication in robots. By expressing behavioral patterns using the hidden Markov model (HMM), a means of abstracting time-series data using stochastic models, it is possible to allocate time-series behavioral patterns to rest points in space by defining pseudo-distances that represent the degree of similarity between individual HMMs. Within this defined space, a humanoid robot can reproduce human movements with
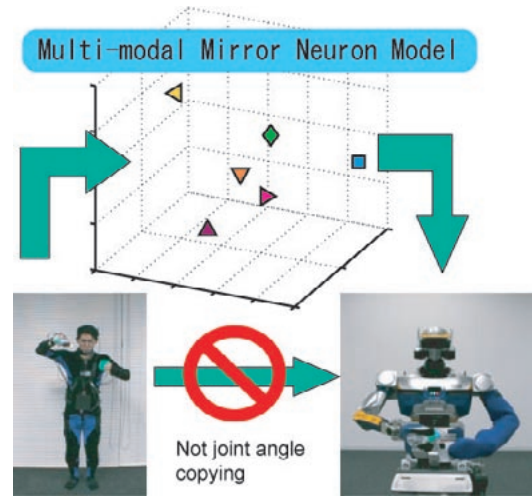

Illustration: Correcting and imitating behavior using the mirror-neuron model
(Collaboration with Prof. Inaba at Univ. of Tokyo)

its own body. This illustration shows an experiment being conducted by Prof. Masayuki Inaba of the University of Tokyo in a joint research project with the NII, in which a robot detects human error, and predicts and acts in accordance with intended behavior.

2. Adaptive conversation strategies model based on bayesian network

Since instructions given by human beings to robots are likely to include considerable ambiguity, compounded by uncertainties in environmental information, it is difficult for a robot to understand whether or not the instructions are correct in light of real-world circumstances. Using Bayesian networks, which are models that express stochastically the cause-and-effect relationships between phenomena, it is possible to construct decision-making systems with high levels of confidence. Here, the knowledge structures needed to execute the instructed task are stochastically expressed, and stochastic reasoning is applied in circumstances involving vagueness or uncertainty. This confidence distribution has been used to produce behaviors involving, for example, assessment of differences between the user's and the robot's intentions, through generation of the minimum required questions needed to resolve ambiguity in conversation.

By developing the two approaches above, we are aiming to develop a form of intelligence that would enable robots to turn experience into knowledge, through the accumulation of high-level interaction between robots and human beings through questions, confirmation, and instructions.

*(**Tetsunari Inamura**, Associate Professor, Principles of Informatics Research Division)*

New Information Public Policy

New type of competition is now started in Japanese communication industry. Old one is just a partial competition operated by relatively small competitors with renting network infrastructure of NTT, Japanese inconvent carrier. But the case of FTTH, Fiber to the home, huge electricity corporations, regulated dominant players in utility market but a newcomer in telecom market, dropped into the market. More over they made their own alternative network and got certain customers. Different from in electricity market or city gas market, in FTTH market domain player dropped in it with full line-up who has dominant share in other market. The condition of this complicated situation is shown in following Figure 1.

Now there is not serious side effect of the competition but we need to consider the modern completion policy like asymmetric regulation or business law system. We test various types of organizational structure models for utility industries and calculate a social welfare which is constituted by company profit and consumer surplus.

Calculated results show that bundled service competition is better performance in social welfare than partial entrance competition. Commonly speaking ICT industry enjoyed the best practice by combine with available modular parts but it may not be the case in the ICT infrastructure network competition. We continue to blush up the modelling for information public policy in order to build up reliable and safety infrastructure network with reasonable choices.

[Reference]

Masashi Ueda and Akiko Shimozima: Broadband Policy by Optic Fiber, interplace #107 (2006)

Takanori Ida and Masashi Ueda: 'The Interconnection and Pricing of the Internet' M. Kagami, M. Tsuji, and E. Giovannetti (eds.), Information Technology Policy and the Digital Divide, Edwards Elgar: 282-302 (2004).
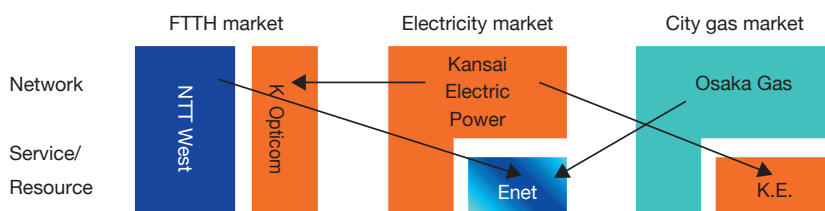
Figure 1. Cross entrance of dominant companies

*(**Masashi Ueda**, Assistant Professor, Information and Society Research Division)*

Lecture Series by Assoc. Prof. Lindenbaum

Assoc. Prof. Michael Lindenbaum from the Israel Institute of Technology (Technion) came to Japan as a visiting associate professor of NII in October, 2006. He conducted three lectures on the Analysis of Vision Algorithms, and they were open to the public. His research topic is Image Processing and Computer Vision, particularly the statistical analysis of visual tasks. Each lecture had a different theme, the "Sampling and Selection in Gaussian Random Fields", the "Probabilistic Analysis of Grouping Processes", and the "Visual Object Recognition – Predicting Reliability." These lectures were particularly interesting to the participants. During his lectures he had active discussions with many researchers and students from inside and outside of NII.

(International Affairs Division)

Workshop for research exchange between German Research Foundation (DFG) and NII

A research exchange workshop between the German Research Foundation (DFG) and NII was held on November 10th, 2006. After the formal greeting from the Director General, Prof. Sakauchi, the NII activities were explained by Prof. Adachi and the work of DFG was explained by Dr. Knobloch. The Network Infrastructure of NII and the NAREGI Project were reported by a NII researcher. The computer science activities at RWTH Aachen University, the research activities at Dresden University and Technische Universit at Munchen were reported by the DFG. In addition, the research and international activities at NII were explained and each researcher had active discussions about it. There was also some voiced anticipation for research development activities in the future.

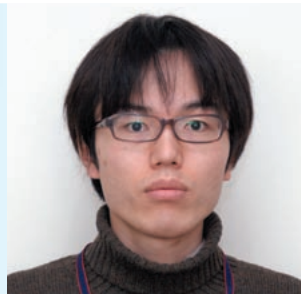*(International Affairs Division)*

Dr. Knobloch

NII Message from NII Researcher

Project Researcher,
Digital Content and Media Sciences Research Division

Daiji Fukagawa

My academic interest has been algorithms for structured data. Before I came to NII in April 2006, I have been studying algorithms for combinatorial optimization problems motivated in computational biology and bioinformatics: inferring Boolean networks from time-series data; tree edit distance and maximum common trees; inferring a graph from its path frequency; and so forth.

I currently work for NII with the support of Cyber Infrastructure for the Information-explosion Era (MEXT Grant-in-Aid for Scientific Research on Priority Areas). In this project, my supervisor Prof. Takasu belongs to a planning research unit in which we investigate basic technologies on "information linkage". Information linkage refers to basic techniques to identify relations between information segments which appear in distinct information sources but refer to the identical real-world entities or events. This kind of techniques may help users to find entities and to link them by boosting integration of available information, although such relations might be buried because of the explosively large amount of documents and databases we have.

For the purpose, many fundamental technologies are necessary: finding entities described in documents; identifying entities; and merging such description of entities and corresponding records in a database. Among them, my task in this project would be designing algorithms which effectively and efficiently compute similarities between entities. Since an entity in a document is described as a string, comparison based on (approximate) string matching may work, whereas identifying entities needs to carefully consult detailed description in the document and all our knowledge in databases. I currently try to design an algorithm to detect entities in a semi-structured document, for instance, XML document, by matching their structures as tree-structured data.

Mining structured documents is an exciting task which is important not only from theoretical point of view, but also from for our daily-life application. Moreover, developing an efficient and effective algorithm to compute similarity between structured data is also important in computational theory and graph theory. I hope that my research life here would be fruitful.

Message from Foreign Researcher

Project Researcher,
Architecture Science Research Division

Sébastien Duval

| 2001 – M.S. software engineering – EMN, France |
| 2002 – M.S. virtual reality & complex systems – INSTN, France |
| 2002 – M.S. management of virtual reality projects (Ranked 1st) – ISTIA/Laval, France |
| 2006 – Ph.D. informatics – SOKENDAI, Japan |

After studying informatics in France, I moved to Japan to benefit from the most advanced technologies in robotics, ubiquitous computing and virtual reality. The local freedom of research enabled me to combine psychology and informatics, complement the usual technical approach, and produce results useful to create systems for the general public.

Intern at Tokyo Institute of Technology with Professor Sato, I worked on "SPIDARs", devices that let users "touch" digital objects. Meeting Professor Andrès, I decided to join SOKENDAI doctor course at NII under the supervision of Professor Hashizume. I was sponsored by the French Ministry of Foreign Affairs (Lavoisier grant) and UFJ Bank (scholarship from Kawashima-Shoji Memorial Scholarship Foundation).

For my doctor thesis "Satisfying Fundamental Needs in Everyday Life With Wearable Computers – The Case of Belonging Needs" I investigated the influence of psychological needs in wearable computing thus broadening the field and allowing the creation of more useful, usable and likeable systems. I gathered data with interviews, question-naires and experi-ments. For the latter I created a wearable system that facilitates first encounters by evaluating common interests from photos, and calm/excitement from physiological signals. Thanks to NII MOU program, I spent time at Seattle's HITLab under the supervision of Dr. Weg-horst, which was critical for the success of my work. I showed that wearable computing can benefit from psychology to improve quality of life and foster the adoption of wearables. Cultural comparisons validated core hypotheses and highlighted peripheral specificities in France and Japan.

After graduating I became project researcher at NII. I follow a thread of my thesis, focusing on family support using ubiquitous computing. I investigate the design of such systems with Professor Hashizume, and investigate privacy issues with Christian Becker (Universität Bielefeld, Germany). The prototype under development aims at improving communication and strengthening affective bonds within the family. The whole system includes the evaluation of users' emotions, the transmission to family members, the visualization on a wearable device, and the management of interactions. Psycho-social factors should be clarified with evaluations in Japan, France, Germany, and USA.

11th Annual Asian Computing Science Conference (ASIAN 2006)

The 11th Annual Asian Computing Science Conference was held from December 6 to 8, 2006. The ASIAN conference 2006 was co-hosted by the National Institute of Informatics (NII), the French Embassy in Japan, INRIA, and Keio University to discuss the secure software theory/practice and its research progress. This is an international conference that convenes in Asian countries that has been held every year since 1995, and last year was the 11th one. During the conference, 27 lectures from 13 countries/

Research & Education

areas, mainly Asia and Europe, were conducted and 80 people attended the conference from inside and outside of Japan. In addition, the three keynote speakers, Dr. Li Gong (Microsoft China), Prof. John Mitchell (Stanford University), and Prof. Patrick Cusot (Ecole Normal Superiure), gave lectures on a wide range of software technology from theoretically basic to business level. The ASIAN conference will be held in Qatar next year.

*(**Shin Nakajima**, Professor,*
Information Systems Architecture Science Research

Transdisciplinary symposium entitled "The Challenge of Creating Fused Knowledge"

On November 13, 2006, a transdisciplinary symposium entitled "The Challenge of Creating Fused Knowledge" was held as part of the Transdisciplinary Research Project, on the second floor of the National Center of Science.

Part of the Transdisciplinary Research Project advanced by the Transdisciplinary Research Integration Center of the Research Organization of Information and Systems, this project is promoted primarily by the NII. It is made up of three sub-projects, all of which seek to establish an information space and information infrastructure to promote transdisciplinary research across the four fields of the life sciences, the earth sciences, mathematics and statistics, and information science.

This symposium featured an overview of the project presented by the Project Leader, Deputy Director General Yoichi Tokura, followed by more research-oriented presentations from the leaders of the sub-projects (Prof. Akihiko Takano, Prof. Asao Fujiyama, and Prof. Noriko Arai). Next, attendees split up to attend the individual booths of the sub-projects, viewing various poster sessions and demonstrations. More than 120 persons representing organizations from private-sector businesses to universities attended this eventful symposium, which featured lively question-and-answer sessions.

(Research Cooperation Division)

Graduate Education

Entrance-exam orientation held at Department of Informatics at the Graduate University for Advanced Studies

Entrance-exam orientation held at Department of Informatics at the Graduate University for Advanced Studies

On Monday, November 13, 2006, the Department of Informatics at the Graduate University for Advanced Studies held at the NII an entrance-exam orientation for prospective students hoping to start their studies (in the advanced PhD and five-year PhD programs) in April 2007.

A total of 15 prospective new students took part in this orientation, listening intently to presentations by Department Head Prof. Hayami and Prof. Yoneda and introductions to student life presented by Project Researcher Taizo Yamada, in addition to discussions held by part-time students with full-time jobs and regular full-time students. In addition, after a tour of graduate students' offices, lecture halls, the NII Library, and other facilities on the grounds of the NII, participants could consult individually with a number of enthusiastic advisors: Department Head Prof. Hayami,

Prof. Yoneda, Prof. Takeda, and Asst. Prof. Furuyama.

For prospective students who were unable to take part in this orientation, a video of the presentations and materials from the orientation are available on the program's website.

http://www.nii.ac.jp/graduate_event/index-j.shtml

(Research Cooperation Division)

Graduate Education

Message from Graduate Students

Md. Nurul Huda

1995 Dhaka University, Bangladesh, B.Sc.
1997 Dhaka University, Bangladesh, M.Sc.
Current Ph.D. Student at NII, SOKENDAI.

I received my B.Sc. and M.Sc. degrees in 1995 and 1997 respectively, from Dhaka University, Bangladesh. I joined Beximco Ltd. as an IT Executive in 1997. In 1998, I switched to Comilla University as a Lecturer. Since 2000, I have been working as a Faculty Member in Dhaka University. In April 2004, I joined the National Institute of Informatics (NII), The Graduate University for Advanced Studies (SOKENDAI), Tokyo, to promote my Ph.D. degree with the support of a scholarship from NII. My research interests include routing protocols for wireless and ad-hoc networks, software agent, privacy protection in multi-party computation problems, privacy preserving data mining etc.

I have proposed a cost-effective lifetime prediction based routing protocol, called CLPR, which tries to maximize the network lifetime as well as minimize power cost. CLPR offers better path efficiency considering network lifetime and routing cost, a good packet delivery ratio and results in a more stable network.

I have devised a privacy loss model for multi-party computation and a novel privacy metric, called the Min privacy metric, for measuring privacy loss quantitatively. I have also proposed a mobile agent-based scheduling scheme called EPMS, which has low computational complexity, results in a global utility close to the optimal level necessary, and achieves better privacy protection by utilizing a common computational space. Last but not least, I have proposed the security system of an agent server platform, called iCOP, for protecting privacy in solving multi-party computation problems. Traditional (i.e. non-cryptography-based) algorithms can be used for iCOP, yet very good privacy protection can be achieved in solving many problems. Also, it can provide complete privacy protection with the cost of a little higher computational time.

In my future research work, I want to extend my iCOP model for various e-commerce applications.

Development & Operations

International symposium on library staff development

As part of its ongoing educational and training activities, in partnership with cosponsors the Hiroshima University Library, the Osaka University Library, and the Tohoku University Library, and under the auspices of the Japan Association of National University Libraries, the NII held an international symposium entitled "Library Services to be expected and Staff Development" at three venues: Hiroshima University on November 14, Osaka University on November 15, and Tohoku University on November 17.

Today, human-resources development has become a pressing issue in light of dramatic changes in the environments in which universities and libraries operate. This symposium was intended to provide the opportunity (rare to date in Japan) for participants to learn about the current state of staff development elsewhere—in this case at university libraries in Scandinavia and

Oceania. The event was also specifically aimed at fostering in-depth discussions on activities to resolve issues currently faced in Japan. The symposium featured lectures and panel discussions from active librarians and instructors from Uppsala University (Sweden), Flinders University (Australia), and the University of Auckland

(New Zealand).

A total of approximately 300 persons participated in this seminar at all three venues. Attendees were clearly impressed by the proactive human-resources development activities underway in each country, and listened attentively to reports on efforts to address issues shared in Japan—such as the retirement of large numbers of experienced librarians and dramatic changes in the media used to transmit academic information. Panel discussions featured lively discussions between lecturers and participants, providing a concrete sense of how

developing and retaining human resources at university libraries—the foundations of the academic information infrastructure—is a topic of concern that crosses national borders as well as the boundaries between public and private institutions.

Materials from symposium presentations are stored at the Hiroshima University Institutional Repository (HIR) and may also be accessed at the NII website:
http://www.nii.ac.jp/hrd/sympo2006/

(Planning and Coordination Division)

Training Program for Japanese Information Specialists

The NDL-JF training program for Japanese information specialists was held from November 27 to December 15, 2006, and was co-hosted by the Japan Foundation (JF) and National Diet Library (NDL). NII also cooperated with them. The program was for information related to Japan and the knowledge/technology for databases and library services. Twelve people, basically librarians for Japanese studies from overseas universities/institutions in 11 countries, participated in the program. On November 29, 2006, as part of the program, practical training and explanations on CSI, contents services, cooperation with overseas institutions, and the contents service usage from overseas were also conducted, and active discussions by the participants were encouraged. In addition, NACSIS-CAT Training course was held for three people from the

NACSIS-CAT participating institution on December 18, 2006.

(International Affairs Division/
Planning and Coordination Division)

Building the Next-Generation Science Information Network (SINET3)

The NII is promoting the construction of Japan's Cyber Science Infrastructure (CSI), in cooperation with universities and other organizations. At the core of the CSI project is the Next-Generation Science Information Network (SINET3).

User surveys, surveys into trends in overseas research networks, and other activities were conducted in the establishment of SINET3, under the auspices of a fundamental plan established by the Organization for Science Network Operations and Coordination. Today, network design and integration are underway, based on the following basic concepts.

1. Integrating existing SINET and Super SINET systems to realize a seamless network; employing a new network architecture (optical IP hybrid architecture) to enable efficient, flexible transmission of large volumes of traffic
2. Efforts including installation of large-capacity telecommunications devices (such as IP routers) in telecommunications carriers' data centers and use of multiple loops in backbone connecting data centers, for the establishment of a highly reliable network resistant to disasters and downtime
3. Achievement of backbone speeds of 10–40 Gbps and node speeds of 1–20 Gbps, to provide Japan's largest ultra-high-speed network, capable of withstanding the

large volumes of traffic handled by users, including those in advanced research fields and research institutions

4. Adoption of advanced telecommunications devices and networking technologies, to realize efficient network operation as well as to enhance and strengthen network services (e.g., multilayer services, multi-VPN services, multi-QoS services, bandwidth-on-demand services, and traffic information provision services)

5. Coordination with overseas research-information networks, ensuring that SINET3 stands as a world-class network that will serve as role of the international academic information infrastructure

The existing SINET and Super SINET systems are planned to shift to SINET3 from April through May 2007 one after another. Please understand that although limited instances of network downtime may occur during the shift, every effort will be made to ensure that the extent and time of such instances are kept to a minimum.

The schedule for building the SINET3 network and the start times for provision of various services will be posted to the SINET website as soon as they are available:

http://www.sinet.ad.jp/

(Research and Development Center for Academic Networks/Network Group, Network Division)

Symposium, "TRANSFER — Issues and Solutions Related to Transferring Journals Between Publishers" held at Library Fair & Forum 2006

As part of its public relations activities and human resources development, the International Scholarly Communication Initiative (SPARC Japan), together with the United Kingdom Serials Group (UKSG)—and also with the support of the Public University Library Association, the Japan Association of Private University Libraries, and Blackwell Publishing—held a symposium entitled "TRANSFER — Issues and Solutions Related to Transferring Journals Between Publishers" on November 20 at the Library Fair & Forum 2006 (November 20–22).

This symposium invited Nancy Buckley, Chair of the UKSG's TRANSFER Project, who provided some background to the moving of journals between publishers, the objectives and progress of the TRANSFER Project, and the project's next steps. About 70 people, including representatives of university libraries and academic publishers, attended this symposium, which had a lively discussion especially about the implications of these

issues on stakeholders.

Details of and materials used in this symposium are available on the "Events" page of the SPARC Japan website:

http://www.nii.ac.jp/sparc/event/

(Content Division)

Report on "Standing on the Shoulders of Digital Giants," an international symposium

On December 18 and 19, 2006, the NII's Organization for Scientific Resources Operations and Coordination held an international symposium entitled "Standing on the Shoulders of Digital Giants" at the Toshi Center Hotel, with support from the Ministry of Education, Culture, Sports, Science and Technology; the Science Council of Japan; the National Diet Library; Japan Science and Technology Agency; the Japan Association

of National University Libraries; the Public University Library Association; and the Japan Association of Private University Libraries.

Intended as a forum for discussions on future developments in academic communication in the advancing and expanding digital information environment, this symposium, subtitled "International Symposium on Institutional Repositories, e-Science,

and the Future of Scholarly Communication," invited nine experts from Japan and around the world, including Daniel Greenstein, Associate Vice Provost for Academic Information Services, Office of the President of the University of California, who discussed a wide range of related topics.

A total of 290 persons—including representatives of university libraries, academic publishers, and academic information systems, as well as researchers from various fields—attended this symposium, which featured fruicful discussions among both attendees and presenters.

Details and materials of this symposium are available at the following website:

http://www.nii.ac.jp/irp/symposium2006/

(Content Division)

NII attends EAJRS annual meeting

The annual meeting of the European Association of Japanese Resource Specialists (EAJRS) was held during September 27–30 in Venice, Italy. Attendees from the National Institute of Informatics included Prof. Akira Miyazawa of the Information and Society Research Division, Chief Haruo Asoshina of the Content Division's Academic Portal Section, and Tomoko Saitoh of the Content Division's Cataloging Information Management Section.

The EAJRS is an association intended to promote the exchange of information among researchers studying Japanese topics in Europe. Approximately 70 members from more than 10 countries took part in this meeting.

NII participated in a series of programs aimed at introducing on the activities of participating researchers and institutions and exchanging opinions. They also gave a presentation under the title "The NII's Provision of Academic Information," reporting on the NII's projects to support the creation of institutional repositories, GeNii, and NACSIS-CAT/ILL. This meeting provided an excellent opportunity to broaden the understanding of European researchers studying Japan, particularly in regard to the NII's projects to support the creation of institutional repositories.

EAJRS website:

http://japanologie.arts.kuleuven.be/eajrs/

(Content Division)

NAREGI booth exhibition at SC06

The Center for Grid Research and Development presented a NAREGI booth exhibit at the International Conference for High Performance Computing, Networking, Storage, and Analysis (SC06), held from November 11 to 17, 2006 at the Tampa Convention Center in Tampa, Florida, U.S.A.

This booth featured panels describing topics such as an overview of NAREGI Grid middleware, methods of use, and collaboration with grid computing off shore establishment. In addition, in a demonstration of NAREGI Grid middleware ß2 version now under development, attendees were shown various operations, from actual computing to data sharing, using computers from the Center for Grid Research and Development and a number

of other organizations.

More than 7,000 persons in total attended SC06. The NAREGI booth welcomed a large number of these visitors, providing numerous opportunities for valuable discussions.

(Planning and Coordination Division)

Report on tour of the U.S. TeraGrid

The Grid Systems working Committee in the NII's Organization for Science Network Operations and Coordination was formed to handle all of the elements of grid establishment, from investigating the adoption of the grid middleware required for research environments in Japan and the use of this middleware as an element of the scientific infrastructure through actual operation of such an infrastructure.

Examples of grid middleware used in research networks are already apparent overseas, including TeraGrid in the United States and EGEE in Europe. With a view to establishing a grid infrastructure for Japan, approximately 25 persons, mainly members of the Grid Committee, toured the TeraGrid system operated by the National Science Foundation (NSF) in the U.S. on November 20 and 21.

On the first day of this tour, participants visited the National Center for Supercomputing Applications (NCSA), which serves as the resource center for TeraGrid. At the NCSA, TeraGrid's resource-management and resource-allocation policies and system operation were explained, and participants got a full picture of the U.S. system and staff. They learned, for example, that NCSA resources can be used free of charge as TeraGrid resources, and that user support is available 24 hours/day.

On the second day, visitors toured the Argonne National Laboratory (ANL), which supervises TeraGrid operations overall. The ANL provided an opportunity for discussions on building grid infrastructures, while details on TeraGrid's current state and future plans, the latest Globus information, and planned supercomputers were explained to NII participants, who in return gave an overview of NAREGI grid middleware.

Although it was a hurried two-day schedule, participants were able not only to gain the latest technological information on grid computing operations in the U.S. but also to discuss future cooperation in grid computing with overseas institutions. It was, needless to say, a very productive tour.

(Planning and Coordination Division)

Research into U.S. public key infrastructures

Centered on the Authentication Systems Working Committee within the Organization for Science Network Operations and Coordination, the NII is proceeding with the construction of the University Public Key Infrastructure (UPKI), for use in cooperation between universities.

For reference purposes in building the UPKI, a group of 25 persons, mostly those connected to the Authentication Systems Working Committee, visited the University of Wisconsin in the United States over two days, on November 10 and 11, 2006. This university began full-fledged public key infrastructure (PKI) research and use seven years ago.

At the University of Wisconsin, a number of researchers involved in building public key infrastructures at other U.S. universities, including Prof. Keith Hazelton (Senior IT Architect), described to the visitors from NII the Shibboleth authentication software and the current state of public key infrastructure development at Wisconsin and other U.S. universities. In addition, the team from Japan described its efforts to establish public key infrastructures at participating universities, the state of implementation

of wireless LAN roaming services, and NAREGI-CA development, and took part in general discussions of public key infrastructure development at universities.

Although the UPKI project has only recently begun, this visit made it clear that universities in the U.S., taking the lead in public key infrastructure development, had to overcome numerous difficulties to develop their authentication infrastructure. The knowledge gained on this trip will certainly be put to use in future UPKI construction.

(Planning and Coordination Division)

NII Introduction to participants undertaking the Practical Training Course

As part of its educational and research activities, the NII has now established practical Training Course. This course involves education of staff members from universities and other institutions in areas such as methods for planning, proposing, and implementing an infrastructure for distributing scientific information, providing these staff members with experience in practical operations at the NII for several months. After completion of this program, the staff members are expected to apply the results of their course in their own institutions.

In the 2006 academic year, the NII accepted three participants for such practical training course. This issue features introductions to two of these participants.

Shin Nagai

Institution:	Information Planning Section, General Affairs Division, Tohoku University Library
Period of training:	August 1–December 15, 2006
NII department:	Training Section, Planning and Coordination Division, Development and Operations Department

I work at the Tohoku University Library. I often find it difficult to know whether or not I'm doing my job as effectively as I can, given the daily advance of a range of technologies and services. At these times, it would be extremely helpful to learn the practical skills I need and to be able to use these skills in my daily duties. It would also be very valuable to have the opportunity to attend courses and lectures that would expose me to a wide range of approaches, through the exchange of ideas with colleagues in similar circumstances.

The NII provides training courses for library staff at universities and other institutions, and I work as a participants in planning and implementing such activities. It's challenging; I need to stay focused each day. In planning activities such as curriculum preparation and choosing instructors we think hard about what skills are needed by library staff today and work to ensure everything goes smoothly at the training venue. Despite the challenges, I have been able to gain a solid base of experience, with lots of helpful instruction from NII personnel.

I think that in order for the materials and skills that libraries have amassed to be passed on to the next generation—and the next after that—we must implement aggressive training not just at the NII, but at universities and in local communities as well. After returning to Tohoku University, I'd like to work to improve the level of training in the Tohoku region and to enhance opportunities for training, applying the lessons I've learned through this practical training course.

(December 8, 2006)

Akira Niitsuma

Institution:	Network Section, Information Infrastructure Division, Information manegement Department, Tohoku University
Period of training:	December 21, 2006–March 30, 2007
NII department:	Network Planning Section, Network Division, Development and Operations Department

I work at the Network Section of the Information Infrastructure Division in the Information Management Department at Tohoku University. My job involves the administration and management of the university's campus network. Primarily, I work on maintenance of the mail servers used by faculty and graduate students and on system development to improve network operation.

Although I constantly work to improve my networking knowledge and skills on the job, since for better or worse Tohoku University's campus network is fairly stable, I haven't had much experience in responding to system trouble. I also have no experience in actually building a network. Given these circumstances, I've started to work as part of a team planning for the university's next-generation campus network.

When I was lucky enough to hear about the NII's progress in constructing the Next-generation Science Information Network SINET3, I knew I would like to be part of this effort as a participants in the NII's practical training course. Although SINET3 and the campus network differ in some respects (such as size and operating structure) through this practical training course I've gained valuable lessons in areas from network construction tasks to methods of operation. I am excited to apply what I have learned in the program to the establishment and operation of the university's next-generation campus network.

(January 18, 2007)

Report on FY 2006 educational and training programs

In FY 2006, a total of 48 sessions in 12 training courses were conducted, for approximately 1,200 trainees.

[User Training]

These courses, targeting those involved in NACSIS-CAT services operations, provided instruction on the concepts of union catalog databases content and data registration.

With the support of university libraries, the number of training held in each region increased from the previous fiscal year.

Course Name	Venue	Number of trainees	Number of applicants	Sessions
NACSIS-CAT Training Course (Book Course)	NII	173	241	5
NACSIS-CAT Regional Training Course (Book Course)	University libraries	202	264	11
NACSIS-CAT Training Course (Book Course) For data-entry operators and other subcontractors	NII	23	26	1
NACSIS-CAT Training Course (Book Course) Held jointly with training program for Japanese Information Specialists	NII	3	3	1
NACSIS-CAT Training Course (Serial Course)	NII	102	192	3
NACSIS-CAT Regional Training Course (Serial Course)	University libraries	110	132	4
NACSIS-ILL Training Course	NII	104	190	3
NACSIS-ILL Regional Training Course	University libraries	15	27	1

[Advanced Training Programs]

This training was offered to convey requisite knowledge and skills to personnel playing central roles in supporting academic research.

Training in building institutional repositories was provided as a sub-theme of overall training for academic portal training course. The curriculum of each training session is under constant review, resulting in frequent updates, including (to cite one example) a new focus on formulating plans to build repositories.

Development & Operations

Program Name	Venue	Number of trainees	Number of applicants	Sessions
NACSIS-CAT Advanced Training Course	NII	16	24	1
Academic Portal Training Course	Nagoya University/NII	72	136	2
Academic Information Literacy Training Course	Osaka University/NII	100	133	2
Seminar for University Librarians	Kyoto University/University of Tokyo	82	85	2
Karuizawa Information Processing Seminar	NII International Seminar House for Advanced Studies (Karuizawa)	8	12	1
Information Security Training Course	Tokyo/Osaka	53	60	2
Network Security Training Course	Tokyo/Osaka	40	73	2
Network Administration Training Course	Tokyo/Osaka	80	104	4

[NII practical training course]

NII practical training is conducted to provide staff members from universities and other institutions with the knowledge and skills necessary to work with advanced academic information systems, in practical operations at the NII for several months.

Trainee	Period	Research theme
Yukiko Sampei (Hokkaido University Library)	July 3–September 29, 2006	Studying the handling of audiovisual materials in NACSIS CAT
Shin Nagai (Tohoku University Library)	August 1–December 15, 2006	Planning and managing training for library staff
Akira Niitsuma (Information Infrastructure Division, Information Management Department, Tohoku University)	December 21, 2006–March 30, 2007	Planning and managing academic network integration

[Other activities in cooperation with external organizations]

- Holding of International symposium concerning personnel training by co-sponsoring with universities
- To support guidance and user training on NII services sponsored by universities and acacademic societies, NII offers a number of services, for example providing training text or materials curriculum advice, and assignment of user IDs.
- Various training that external organizations holds

Details of training activities for FY 2007 will be covered in the outlines of educational and training programs sent to each institution and on the NII's Education and Training Program website:

http://www.nii.ac.jp/hrd/

(Planning and Coordination Division)

Topics

NII exhibition at Library Fair & Forum 2006

Library Fair & Forum 2006 was held over the three-day period from November 20 to 22, 2006, at Pacifico Yokohama.

Library Fair & Forum is held to disseminate the latest information on, and to provide additional opportunities for, the exchange of information. This event brings together a wide range of companies and other parties involved in the library business.

NII's booth focused on introductions to NACSIS-CAT/ILL catalog information service, GeNii scholarly

Topics

and academic information portal, and institutional repositories. Of the total of approximately 22,000 attendees at Library Fair & Forum over three days, more than 2,200 visited NII booth.

In addition, on November 20 NII held a presentation entitled "Realizing the Next-Generation Academic Information Infrastructure: GeNii, NII-REO, and institutional repositories" and hosted a forum entitled "TRANSFER: UKSG Working Group — the Solution to Transfer Journals."

(Publicity and Dissemination Division)
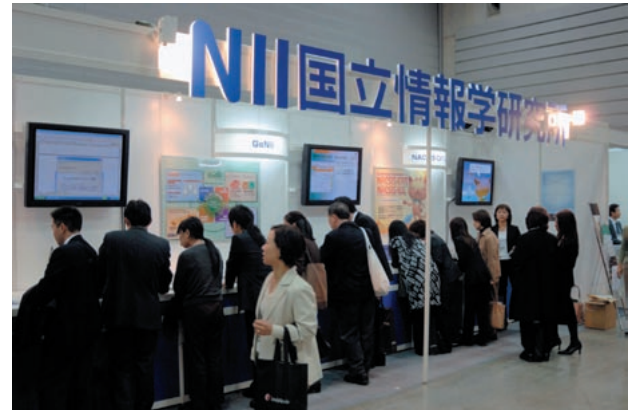
Karuizawa Saturday Salon 2006

The sixth, and seventh lectures of the Karuizawa Saturday Salon were held respectively on October 28, and November 11, 2006, at the International Seminar House for Advanced Studies in Karuizawa, Nagano.

Sixth Lecture (Violin concert): October 28, 2006

Neue Bahnen (New Paths)

Violinist **Junko Ohtsu**
Pianist **Tomoko Okada**

Last year I presented a program featuring works by composer and critic Robert Schumann (1810-56), one of the major figures of German Romanticism in classical music. In pursuing my interest in Schumann and the composers with whom he enjoyed close relationships, I selected Johannes Brahms (1833-97) as the subject of this year's concert.

Brahms was born in Hamburg, and in his childhood studied violin and cello with his father, a bass player in the Hamburg State Theater, and piano with Otto Cossel. Brahms showed exceptional promise as a pianist, mastering the keyboard at an early age and choosing it as the preferred instrument for expressing his musical ideas. He continued his studies in Hamburg with Eduard Marxsen, a well-known and respected teacher of piano and music theory. Very strict and programmatic in

his teaching approach, Marxsen impressed upon his pupil the importance of studying the works of history's greatest composers -- J. S. Bach, Mozart, and Beethoven -- while sparking Brahms' recognition of the genius of such composers as Schubert and Chopin. The instructor also guided the budding composer in the exploration

of German folk tunes, as well as in the evolution of the musical form, "variation." This strong grounding in fundamentals at a young age provided an invaluable foundation for Brahms' development, helping to produce one of the greatest German composers in history.

At the age of twenty, a concert tour brought Brahms to the city of Hanover where he met the young Hungarian, Joseph Joachim (1831-1907), a brilliant violin virtuoso. Joachim soon became a close friend and trusted advisor, often providing Brahms with suggestions on writing for strings. Profoundly impressed by the compositional talent of his new friend, the violinist provided him with a letter of introduction to Robert and Clara Schumann. The enthusiastic response of the Schumanns toward Brahms and his music compelled Robert to write and publish a glowing testimonial about him in the "Neue Zeitschrift fur Music" in 1853. It was in this essay, entitled "Neue Bahnen" (New Paths), that Schumann famously proclaimed Brahms a genius. The article introduced him to the larger musical world, and precipitated his emergence as a successful composer. Later in life,

♪Program♪

- ● Romance Op.2 ·········· J. Joachim
- ● F. A. E. Sonata for Violin and Piano (dedicated to J. Joachim)
- ● 1st movement ··········· A. Dietlich
- ● 2nd and 4th movement ········· R. Schumann
- ● 3rd movement ··········· J. Brahms
- ● Sonatine for Violin and Piano Op.100 ············· A. Dvorak
- ● Balad ··········· C. Porumbescu

Brahms would similarly recognize and celebrate the talent of a young composer, the Czech Antonin Dvorak (1841-1904). Just as Schumann had befriended and encouraged him, Brahms became a lifelong friend and advocate of Dvorak.

(written by Junko Ohtsu)

(Publicity and Dissemination Division)

Seventh Lecture: November 11, 2006

The role of scientists

President of the National Institute of Advanced Industrial Science and Technology,
Former President of Tokyo University

Hiroyuki Yoshikawa

In order to understand the role of scientists, you will need to start with the question of what a scientist is. This question includes what scientists do, what profession they are in, and how they are positioned in a society. It was not very long ago that those who are called "scientists" appeared; however, their roles changed with the times and are still changing. Therefore, scientists need to think carefully about what they should do or can do now. The age of "today" is characterized by the word "sustainability", which means qualitative change in science—and scientists will be responsible for this big change.

In this lecture, I will examine not only what a scientist is, but also the privileges and responsibilities of scientists, scientific research, and the communities of scientists. I will also analyze the penetration of scientific knowledge into a society, scientists' positioning in a society, requests from a community to scientists, and their suggestions to

a society. Finally, outlining modern society, which has created an unprecedented situation under the strong influence of science, I will discuss the modern role of scientists, who are given more severe and clearer responsibilities than they have ever been given in the past.

(Excerpt quoted in leaflets handed out at the seminar)

(Publicity and Dissemination Division)

NII Public Lectures 2006 "Eight Words to Talk Informatics"

Image medium: What is next-generation information processing?

Assistant Professor (at the time),
Digital Content and Media Sciences Research Division

Imari Sato

March 2005	Doctor of Interdisciplinary Information Studies, University of Tokyo
2004	Researcher (PRESTO), Japan Science and Technology Agency
2005	Assistant Professor, National Institute of Informatics

[Research fields]
Modeling 3D Shape and Reflectance Properties of Real Objects and Creating Spatially Immersive Displays

Digital projectors have been steadily becoming smaller and cheaper, and are now used to augment various surfaces with digital information. The use of projectors allows us to display computer images on every surface in a space, and the novel computer interaction techniques seen in Science Fiction films, such as operating a computer with a virtual keyboard and a mouse, might be realistically achieved in the near future. In this lecture, image processing techniques for next-generation human-computer interaction were considered.

(Publicity and Dissemination Division)

User Interfaces: What are effective methods for accessing a computer?

Associate Professor,
Information Systems Architecture Research Division

Hiroshi Hosobe

1993	Bachelor of Science in Information Science, University of Tokyo
1998	Doctor of Science in Information Science, University of Tokyo
1998-1999	Postdoctoral JSPS Research Fellow, Department of Information Science, University of Tokyo
1999-2000	Research Associate, Research and Development Department, National Center for Science Information Systems
2000-2004	Research Associate, Software Research Division, National Institute of Informatics
2004-2006	Associate Professor, Research Center for Testbeds and Prototyping, National Institute of Informatics
2004-Present	Visiting Researcher, Center for Tsukuba Advanced Research Alliance, University of Tsukuba
2002-2004	Concurrent Associate Professor, School of Multidisciplinary Sciences, Graduate University for Advanced Studies
2005	Invited Professor (Enseignant Invité), Institute of Computer Science (LINA), University of Nantes, France
2006-Present	Associate Professor, Information Systems Architecture Research Division, National Institute of Informatics
2006-Present	Part-time Visiting Associate Professor, Faculty of Science and Engineering, Waseda University
2006-Present	Senior Scientific Research Specialist, Research Promotion Bureau, Ministry of Education, Culture, Sports, Science and Technology

[Research field] Computer Science

Computers are used in various areas, such as business, education, and entertainment, and we are becoming dependent on more than one computer in our daily lives.

When people use computers, there is a bridge, called the user interface, between the user and computer. One of the most common user interfaces is the graphical user

interface (GUI) for personal computers. When we use the GUI, we input textual and positional information into a computer using a keyboard and a mouse, and receive output information via a computer display. With the GUI, the user not only controls these devices, but also performs various operations through the manipulation of windows, icons, and menus on the screen. Personal computers are becoming easier to use because of the wide use of the GUI. However, the GUI alone isn't sufficient enough these days. Mobile phones, for example, need different user interfaces than the GUI for personal computers. Then what types of user interfaces are being used today? How were they created, and how will they be developed in the future? In this lecture, I introduced past and present user interfaces with some future prospects.

(Publicity and Dissemination Division)

Eighth Lecture: Wednesday, February 14, 2007

Optimization: What is the technology that makes efficient systems?

Associate Professor,
Principles of Informatics Research Division

Takeaki Uno

March 1993	Graduated Department of Information Science, Tokyo Institute of Technology, JAPAN.
March 1995	Graduated Master Course of Department of Systems Science, Tokyo Institute of Technology, JAPAN.
March 1998	Graduated Doctoral Course of Department of Systems Science, Tokyo Institute of Technology, JAPAN,
1998	Got Doctor of Science Qualifications Dr. Science, Department of Systems Science, Tokyo Institute of Technology
1998	Associate Professor, Dept. of Industrial Engineering and Management, Tokyo Institute of Technology
2001-	Associate Professor, National Institute of Informatics, Japan

[Research fields]
Mathematical Programming, Algorithms, Data structure, Combinatorial Optimization

Improving efficiency using information technology generally means digitizing the tasks to which computers are well suited, such as memorization, calculation, and search functions. However, increasing efficiency using computers is about more than just digitization. Car navigation systems not only have digital road data, but also functions that find the shortest route to a destination. These functions cannot be achieved by simply digitizing the data. Even if a computer is very fast, it would take an almost infinite amount of time to check through all of the possible routes.

People can intuitively distinguish between the routes and find some convenient ones, whereas computers cannot do this. However, when handling a vast amount of data, people need some automatic methods. A method for automatically finding the optimal solution is called "optimization". Optimization is an essential technology that can be used in various areas, such as industry, public administration, education, and even everyday life.

In this lecture, I have discussed where optimization can be used, what it can do, and what kinds of techniques are employed in this technology.

(Publicity and Dissemination Division)

Intellectual Property Center News

Handling information in joint research with companies

Since joint research through industry-academy partnership involves the sharing among participants of advanced technological information from the Inter-University Research Institute as well as private company information, as a rule joint research agreements requires to keep secrets of such information. Companies handle information on matters such as R&D structures and plans—including mid- to long-term strategies for developing markets through adoption of new technologies—as confidential information. Accordingly, the Inter-University Research Institute must manage strictly the information designated as confidential, including non-technical information. For example, leaks of confidential information due to an inadequate structure to manage such information or announcement of the details of research without advance approval could lead to claims for damages. Further, it must be noted that cases involving the possibility of fraudulent motives could lead to penalties under the Unfair Competition Prevention Law.

Anticipating that in some cases countermeasures against the above matters may be inadequate, from time to time the Intellectual Property Office visits the sites of joint research with companies to hold explanatory meetings with small groups of participants. Project groups wishing to hold such meetings are asked to consult with the Intellectual Property Office. Further, relevant case studies and other information resources are found in the "Guidelines for preparation of rules for managing confidential business information at universities and other institutions" (http://www.meti.go.jp/policy/innovation_corp/tlo2/0600608himitu-sisin.pdf), issued by the Ministry of Economy, Trade and Industry in April 2004 (revised May 2006).

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(Intellectual Property Center)

Description of the cover

Jabion

In the biological sciences, which are all subject to near-daily advances, information sources are difficult to find on individual sites. As a result, finding the information you're looking for can require considerable time and effort. Jabion provides information related to the biological sciences that is suited to a wide range of user needs—from the latest in genome information to definitions of specialized terminology.

The site's genome viewer—which enables integrated, high-speed searches of genome databases from multiple sites—is a powerful tool for specialist use. Moreover, the paper search and terminology sections are easy to use for the general user, thanks to the incorporation of Japanese-language ontological structures and accurate Japanese definitions of specialized terminology. Aiming to become the top site for integrated searching in the biological sciences, the Jabion provides the biological information needed to improve overall scientific literacy in Japan.

http://www.bioportal.jp
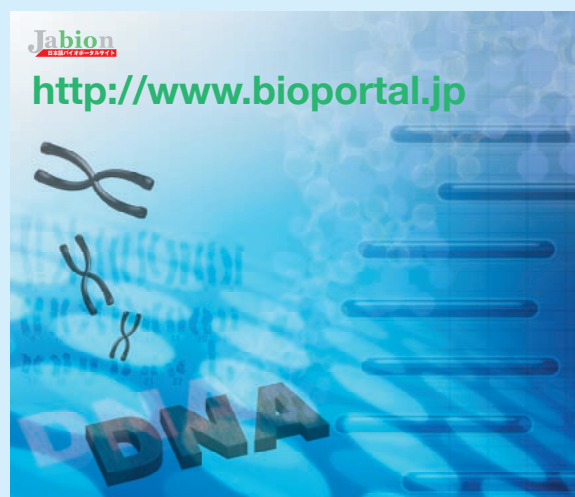
Detailed information on the research
and projects of NII is available at our Website.

http://www.nii.ac.jp/