Informatics Leads to the Future

Abstract

June 8–9, 2006
National Center of Sciences

June 8 Thu
Conference Room 14:30〜15:30／16:30〜19:00
Poster Exhibitions and Demos
Hitotsubashi Memorial Hall
13:30〜14:00 Opening Address
Introduction of NII and "Sokendai" graduate school.
Masao Sakauchi, Director General, NII
14:00〜15:00 Invited Speech
'Hey Japanese, Where are You going?'
Takeshi Yoro,
Prof. Kitazato Univ., Prof.Emeritus, Univ.of Tokyo
15:30〜16:30 Keynote Speech
'Associative information access makes an association of ideas'
Akihiko Takano, Prof., NII
18:30〜20:00 Public Lectures
'Surviving in IT: How to Keep Out of the Risks of Network Society'
Hitoshi Okada, Assoc.Prof., NII and Ikuo Takahashi, Lawyer

June 9 Fri
Conference Room 10:30〜12:00／13:00〜17:00
Poster Exhibitions and Demos
Hitotsubashi Memorial Hall
10:30〜16:15 Symposium
"Towards the Construction of Cyber Science Infrastructure (CSI)"
10:30〜11:00 Towards the Construction of CSI
11:00〜11:40 Concept of the Next-Generation Science Information Network (SINET3).
14:00〜15:00 Construction of InterUniversity PKI (UPKI)
15:10〜16:15 Joint Project for Constructing Next-Generation Academic Content Infrastructure

Sponsor: Chiyoda City
Support:
National Archives of Japan, Tokyo Denki University,
Tokyo Aquarian Booksellers Cooperative, Meiji University
Poster Exhibitions and Demos

Hitotsubashi Memorial Hall

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Reception desk

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### Principles of Informatics

#### 101 YAMAMOTO, Yoshihisa
Timothy Byrnes / UTSUNOMIYA, Shoko

#### Quantum simulators using surface acoustic waves
The technological hurdles in building a scalable quantum computer are formidable. Many researchers have therefore directed their attention towards the fabrication of a "quantum simulator". In a quantum simulator, a complicated quantum system is mapped to another quantum system but with controllable parameters. We discuss the fabrication of a quantum simulator in a semiconductor device using surface acoustic waves to trap electrons in a 2D electron gas layer.

#### 102 MATSUMOTO, Keiji

#### On quantum interactive proof systems
The interactive proof system and its variants are of central importance in contemporary computational complexity theory. Not only being a basis of theoretical cryptography, one of its variants, PCP, plays a key role in the proof of inapproximability of certain optimization problems. Thus its quantum analogue is expected to play very important roles in the domain of quantum communication and cryptography. This presentation describes my recent work in the area, especially on multi-prover interactive proof systems and zero-knowledge proof.

#### 103 NEMOTO, Kae
Peter van Loock (NII) / Sebastien Locot (Sokendai) / Rod Van Meter (Kain University) / W. J. Maure, T. P. Spiller (HP Labs, Bristol)
T. Ladd (Stanford University) / S. L. Braunstein (York University) / G. J. Milborn (University of Queensland)

#### Qubus computation
Quantum information processing is a new and exciting research field that has attracted much attention as a future technology for truly secure communication and even faster computation. Quantum computation is one of the most demanding tasks in quantum information processing, and a huge world-wide effort has been made both in theory and experiment to realize such devices.

Our group at NII in conjunction with several external coworkers have proposed a new approach for generating the fundamental technology and devices required for quantum computation. We call this approach "qubus computation". In this poster presentation, we explain this approach and show several potential applications of the new scheme.

#### 104 WATANABE, Youdai

#### Security of quantum key distribution using nonorthogonal states
The quantum cryptography aims at achieving strong security against an adversary with unlimited resource of computation. This work examines the security of quantum key distribution using nonorthogonal states. In particular, we show the security of the B92 and DPSQKD protocols for arbitrary source and detector.

#### 105 SATOH, Ken

#### Speculative Computation in Multi-agent systems
We propose a method of distributed problem solving under incomplete information environment. To solve the problem, we propose a method using abduction. Abduction is a way of reasoning where some hypothesis will be used to complement unknown information. The idea is as follows. When communication is delayed or failed, then we use a default hypothesis as a tentative answer and continue computation. When some response is obtained, we check consistency of the response and the current computation. If the response is consistent, then we continue the current computation; else if the response is inconsistent, we seek an alternative computation. This way of computation is called speculative computation since computation using a tentative answer would lead to a significant advantage if it succeeds.
Research on Hypothesis Finding Systems

Inductive Logic Programming (ILP) is a research area of machine learning, which provides theoretical frameworks and practical algorithms for inductive reasoning in logical forms. Formally, given background knowledge B and an example E, explanatory induction in ILP infers a hypothesis H such that E is logically entailed by H together with B. In this research, we have developed an inductive system in Java language, called CF-induction, which is sound and complete for explanatory induction as well as abduction in first-order logic. By regarding CF-induction as an "ILP machine", application to discovery in biochemistry and extension to a web-based ILP system are currently developed in collaboration with French and British research institutes.

WebELS: General Purpose e-Learning Environment for Graduate Education

WebELS is an Internet-based contents-sharing e-Learning platform for post-graduate education, that consists of three sub-systems, i.e., a full-version WebELS, a beginners version WebELSx, and an online meeting system WebELS Meeting. Major characteristics of the system include powerful and easy-to-use end-user authoring interface with this users can create their own contents from existing files in Word, Power Point, Video, pdf etc., user’s environment is automatically generated on his/her PC by accessing to the WebELS server via Internet, multi-platform is provided for both Windows and Mac operating systems. WebELS supports postgraduate education in a global era.

Information & Communication Activity Navigation (ICAN)

In this research, we model human information and communication activities as six categories with two layers, and develop systems to support people in an integrated way. One application is “semblog” that extends Weblogs as communication space, and the other is "ActionLog" that also extends Weblogs by adding contexts taken from the real world.

Semantic MediaWiki

Wiki is a widespread community site tool that allows users to freely create and edit Wiki pages on the Web browser. In this research, MediaWiki, a Wiki engine being used to run the Wikipedia and also other encyclopedia and dictionary sites, is extended to enable the writing of labeled links. This extension enables Wiki to write and manage RDF statements.

BioCaster: Detection and Tracking of Disease Outbreaks from Multilingual News Texts

Early detection and tracking of a possible disease outbreak such as SARS or Avian influenza is a joint responsibility for governments who are faced with monitoring massive quantities of local news on the WWW in several languages. In BioCaster we are developing a web-portal using the latest text mining technology that can filter news reports in various regional languages and present a summarized translation in the local language. Research will focus on creating: (1) a multi-lingual knowledge resource (ontology), (2) a high-performance cluster computer and storage system, (3) an intelligent linkage system for navigating between news about diseases and the latest research findings in the literature and genetics databases.

An Interactive Humanoid Robot that imitates Daily Life Behavior

Recently, an idea that an origin of human beings’ higher-order intelligence is the ability to imitate others’ behavior. We think that the same concept is effective to form intelligence of humanoid robots, which have real body, actuators and sensors. In this presentation, we propose a novel mechanism for humanoid robots to imitate humans’ daily life behaviors, by learning from performances of humans and consideration of effects and results of the behavior. A strategy will be explained in which the robot do not copy the joint angles but estimate humans’ intention and generate adequate behavior.
**Semantic Integration**
Sharing data disparate sources requires solving many problems of semantic integration. In the presentation, we introduce a method on establishing mappings between ontology elements.

**Iterative solution of least squares problems**
The most commonly used iterative method for solving large sparse least squares problems min_x || b – A x ||_2 where A is a m x n matrix is the CGLS method, which applies the (preconditioned) conjugate gradient method to the normal equation A^T A x = A^T b. In this presentation, we consider alternative methods by using an n x m matrix B and applying the Generalized Minimal Residual (GMRES) method, which is a robust Krylov subspace iterative method for solving systems of linear equations with nonsymmetric coefficient matrix, to min_z || b – AB z ||_2 or min_x || B b – BA x ||_2.

Next, we give a sufficient condition concerning B for the proposed methods to give a least squares solution without breakdown for arbitrary b, for over-determined, under-determined and possibly rank-deficient problems. Then, as an example for B, we propose the IMGS(I) method, which is an incomplete QR decomposition. Then, we show by numerical experiments on full-rank over-determined and under-determined problems that, for ill-conditioned problems, the proposed method using the IMGS(0) method, which is equivalent to diagonal scaling, gives a least squares solution faster than previous preconditioned CGLS methods. Finally, we perform some theoretical convergence analysis.

**Map coloring**
Map Coloring problem is to color a planar map in such a way that adjacent regions (i.e. those sharing a common boundary segment, not just a point) receive different colors. Here, we will discuss this problem and its applications.

**Different Substitution Theorem**
This paper proves Different Substitution Theorem: if a term is strongly normalizing after substituting an arbitrary single normal term for a set of variables, then this term is strongly normalizing after substituting arbitrary different normal terms for the variables. As an application of this theorem, this solves the open question proposed in 2005 by providing an intersection type system which characterizes persistent strongly normalizing terms.

**Toward a comprehensive model of grammar based on the typed lambda calculus**
Existing formal models of grammar tend to ignore aspects of natural language like semantics, generation, and learning. We study Abstract Categorial Grammar, a grammar formalism based on the typed lambda calculus. By uncovering its formal properties and presenting efficient algorithms for parsing, generation, and learning, we aim to build a comprehensive model of human language grammar.

**Towards logical verification of program execution time**
A computer program must be not just correct, but also executable within a reasonable amount of time. It would be useful if we have a principled way to verify the execution time of a given program without actually running it, since such a methodology will give good programs a theoretical guarantee, and rule out bad programs that cost exponential time in advance.

In this presentation, we introduce a theoretical foundation on the verification of program execution time based on linear logic.
Transdisciplinary Research Project:

New image data processing for classification indices of Antarctic Bryophyta (Moss)

A lot of antarctic Bryophyta are being kept as a cryopreservation or as dry specimens for academic research in Japan, assuming that these specimens are valuable. It is extremely difficult to obtain the valuable type specimens for identification or academic pursuits. Digital Pictures of Bryophyta are taken with a high digital microscope and are rendered for 3D. In addition, it introduces "New generation biotechnology portal”

Information Systems Architecture

Next Generation Middleware

Several middleware systems for mobile, ubiquitous, distributed computing have been design and implemented. One of them is to control and fusion multiple sensors, e.g., locating systems, and enable applications to dynamically adapt changes in the real world. The another is to manage distributed systems in a self-organized manner. It can automatically configure and deploy computers and software in a large-scale and dynamic distributed system.

Federated Software Infrastructure

Variety of systems are becoming to cooperate each other. Control/embedded software is becoming more and more enhanced and complex, and the program development is often said as the bottle neck of system development. Furthermore, real-time processing efficiency and high reliability are required. To answer these problems, we are studying a new software platform in which micro-kernel functions and virtual-machine functions are unified. Virtual machine functions support high reliability based on runtime snapshot and use of exiting programs. Micro-kernel functions support software components.

XQuery Equalities and its Cost Model

Functional query language XQuery is expected to enjoy various program transformation technique for general functional programming languages. These transformations have to be proven not to increase costs. We exploit a structural recursion and it’s basic transformation, by which various transformation rules can be proved. We also propose a cost model to quantify changes in evaluation cost.
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<td>204</td>
<td>YONEDA, Tomohiro</td>
<td><strong>A high-level synthesis system for asynchronous circuits</strong>&lt;br&gt;Asynchronous circuits with no global clock systems have potential for solving several problems that are facing current computer systems, such as clock skew and high power consumption. In this research project, we have developed an automated synthesis tool for asynchronous circuits, which takes a high-level specification language like C, performs resource scheduling/allocation, and generates near-optimal gate-level circuits. Furthermore, a systematic method to map asynchronous circuits on popular synchronous FPGAs is being developed.</td>
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<td>NAKAJIMA, Shin</td>
<td><strong>Towards Industrial Strength Formal Methods</strong>&lt;br&gt;Formal methods are expected to provide a systematic approach to increasing the system reliability. They are not panaceas, but already matured enough to use in developing software systems of non-trivial complexity. This presentation reports issues for the technology to be industrial strength, which is based on the experience in several application cases and teaching graduate courses.</td>
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<td>206</td>
<td>HONIDEN, Shinichi</td>
<td><strong>Flexible and Safe Contents Distribution by Mobile Agents</strong>&lt;br&gt;In the network society, it will be possible to transmit contents from anywhere. Technology to facilitate the flexible and safe distribution of contents without violating the intentions either of the provider or of the user will become important. In this research, we are looking for ways of using agent technology to encapsulate contents based on the intentions of creator, provider and user as policy, thus making it possible to distribute contents flexibly and safely.</td>
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<td>207</td>
<td>HOSOBE, Hiroshi</td>
<td><strong>Constraint Programming for Graphical Interface Construction</strong>&lt;br&gt;Constraint programming is a useful technology for modeling and solving various problems in many areas such as artificial intelligence, computer programming, and computer graphics. We present constraint satisfaction, a foundation of this technology, and constraint-based graphical interface construction, especially focused on recent results of our research.</td>
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<td>WASHIZAKI, Hironori</td>
<td><strong>Reuse Support Environments for Software Assets</strong>&lt;br&gt;Productivity and quality characteristics of software can be improved by reusing software assets in former developments. In this research, we are developing environments for providing reuse support functionalities such as the relation analysis, quality measurement, connection/composition, and retrieval. The environments deal with various software assets including software components and patterns.</td>
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<td>209</td>
<td>ASANO, Shoichiro</td>
<td><strong>Dynamic Resource Management for Next Generation Networks</strong>&lt;br&gt;Dynamic resource allocation for continuation of network operation in case of resource failure, and dynamic resource provision to maintain the quality of communication services in case of traffic congestion in certain area, are demanding sophisticated architectural solution in designing future networks. Recent results on these items are presented.</td>
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<td>210</td>
<td>ABE, Shunji</td>
<td><strong>Burst multiplexing methods with traffic smoothing for the optical burst switching network</strong>&lt;br&gt;Optical Burst Switching (OBS) has been expected as one of the next generation optical transport network. The bursty characteristic of the assembled traffic deteriorates the OBS network performance because there is no optical buffer. In this presentation, we will show two novel burst multiplexing schemes with traffic smoother, named Advanced Timer-based algorithm and Sliding window-based algorithm, which could reduce the burstiness and improve the burst loss performance.</td>
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<td>211</td>
<td>A DoS/DDoS Attacks Detection Scheme Based on In/Out Traffic Proportion</td>
<td>ABE, Shunji, Zhang, Fengzhang</td>
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<td>Denial of Service (DoS)/Distributed DoS attacks are the most prevalent threats against Internet. They are trying to disable the normal Internet services and uses. Many detecting mechanisms based on doubtable unidirectional traffic changes have been proposed. However they might cause false alarms when legitimately abrupt changes appear. According to this, we present a DoS/DDoS detection scheme that mainly checks the constancy property of In/Out traffic proportion, because in observation we’ve found the input-output ratio of the normal traffic for a server is nearly constant.</td>
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<td>212</td>
<td>Dynamics of Internet traffic</td>
<td>FUKUDA, Kensuke</td>
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<td>Japan is a leader in residential broadband deployment, however, we had no clear grasp of the macroscopic behavior of residential broadband traffic. This poster presents the impact of recent widespread residential broadband traffic on backbone, taken from 7 major Japanese ISPs.</td>
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<td>213</td>
<td>Satisfying Fundamental Needs in Everyday Life With Wearable Computers</td>
<td>HASHIZUME, Hiromichi, Duval, Sebastien</td>
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<td>To create wearable computers that improve our quality of life, we investigated the interest of the theories developed by the psychologist Abraham Maslow, which promote human growth and well-being. So far, we focused on physiological, safety, and belonging needs. We showed with interviews and self-completion questionnaires that the French and Japanese general publics are looking forward to wearables that gratify physiological and safety needs. Then we developed enhanced jackets to clarify results about services that satisfy belonging needs. The latest jacket acquires data from a multi-button device and physiological sensors (heartbeats, skin conductivity), stores information about the wearer and interlocutors, communicates with other prototypes, and displays graphics and messages on embedded screens. The service generates photos mirroring common interests of the wearers then displays them with a background color that reflects the wearer’s arousal evaluated with the physiological sensors. Our experiments validated the interest of enhanced garments supporting belonging needs and deepened our understanding of several design issues. As a whole, the results confirmed the usefulness of cyberclothes (enhanced garments satisfying fundamental needs) and allowed us to define design guidelines related to comfort, well-being, communication, artificial intelligence, emotional displays, gender, culture, and transparency of wearables’ activities.</td>
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<td>214</td>
<td>SSS-PC: The next generation operating system</td>
<td>MATSUMOTO, Takashi</td>
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<td>Takashi Matsumoto and his project members are developing a new generation operating system named SSS-PC (three S PC) which runs on commodity PCs in offices and makes up a highly dependable and high-performance computer system. SSS-PC can integrate up to a hundred thousands of PCs into a single high performance parallel computer. Furthermore, SSS-PC lets users do maintenance works such as machine replacement or component inspection without stopping running applications, and dynamically extend or reduce system configuration without system suspension. LINUX or UNIX applications can be ported to SSS-PC without modifying source codes by using compatible program development environment.</td>
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<td>215</td>
<td>The RSC generic scalable clustering model and applications</td>
<td>Michel Houle</td>
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<td>Due to an effect known as “the curse of dimensionality”, traditional distance-based similarity measures very rapidly lose their effectiveness as the representational complexity of the data rises. This poses severe limitations on the size of data sets that can be clustered in reasonable time. For this project, a generic model for clustering was developed that operates without explicit knowledge of the data domain, relying solely on an oracle that accepts a query in the form of a data item and returns a ranked set of items relevant to the query. Under this relevant-set clustering (RSC) model, the quality of cluster candidates, the degree of association between pairs of cluster candidates, and the degree of association between clusters and data items are all assessed according to the statistical significance of a form of correlation among pairs of relevant sets and/or candidate cluster sets. RSC clustering experiments were performed on a variety of very large data sets, including text, image, and protein sequence data. To support the RSC clustering, a highly scalable approximate similarity search structure, the SASH, was developed for use as the ranking oracle.</td>
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KOIBUCHI, Michihiro

**Interconnection Networks on PC Clusters**

Interconnection networks are a key role to improve the system performance of PC clusters. They are able to be classified into low-cost Ethernet and high-performance system area networks. In this panel, I clearly demonstrate and develop a topology, packet routing, and multicast suitable for parallel processing. Moreover, I show the impact of the topology, routing, and multicasts on two real PC cluster systems.

MATSUKATA, Jun

**Network control scheme for very fast Internet**

Realization of high-speed communication over the Internet requires not only that the high-speed backbone network but also that complete hardware and software conditions in the end equipment such as computers in the campus network. The network control scheme for realizing high-speed communications is researched regarding the end equipment as well as the network. Moreover, it is examined where the bottlenecks that prevent high-speed communications resides.

JI, Yusheng

**Providing Absolute Quality of Services in Next Generation Optical Internet**

Optical Burst Switching (OBS) has increasingly received attentions as a potentially bandwidth-efficient approach to support next generation optical Internet. In this paper, we address how to provide efficient QoS guarantee in OBS networks. Dynamic Wavelength Preemption (DWP) is proposed in order to achieve the upper bound on end-to-end burst loss probability for guaranteed traffic. Our simulation results show that the proposed algorithm is an effective solution to provide incessantly end-to-end loss guarantee for the mission-critical applications.

KAMIOKA, Eiji

**An Agent Platform for Dynamic Application Interactions Considering Privacy Protection**

We present an application platform called EMAPP (Encapsulated data and Mobile Agent based Privacy Protection) which controls the access to user’s personal data. It protects the user’s personal information and privacy preference in the encapsulated space where only the user can manage. When the user requires a series of collaboration services, the service provider sends mobile agents to the user’s encapsulated space. The user’s personal data is referred to by the mobile agents only inside the encapsulated space.

ARTHIO, Cyrille

**Model Checking Networked Programs**

Software model checkers can be applied directly to single-process programs, which typically are multi-threaded. On the other hand, multiple processes can usually not be model checked directly. Several approaches to deal with this problem are possible: Network operations may be replaced with (application-specific) stubs, a special model-checking-aware cache layer may be inserted between the model checker and the system, or processes may be converted into threads. This talk covers these possibilities, emphasizing the last solution called "process centralization". Previous work has not covered all issues regarding centralizing, most importantly, TCP/IP communication.

Digital Content and Media Sciences

SATO, Imari

**Modeling Object Appearance under Varying Illumination**

The appearance of an object is known to change significantly under different illumination conditions. For the task of object recognition and image synthesis, it is thus important to be able to predict the variation of objects' appearance under varying illumination conditions. In this study, we present a novel method for analytically obtaining a set of basis images of an object for arbitrary illumination from input images of the object taken under a point light source and extended light sources.
**Photometric Compensation for Projected Images**

Digital projectors have been steadily becoming smaller and cheaper, and are now used to augment a variety of surfaces with digital information. In this study, we introduce a method for modifying the inputs to a digital projector to generate the desired appearance on the surfaces.

**A Study on Structuring Large-Scale Broadcast Video Archives**

We are investigating technologies to delineate any necessary information upon users’ requests from large-scale broadcast video archives combining image analysis, natural language processing, data mining, information retrieval, artificial intelligence, etc. Our primary goal is to establish a method to somehow understand the contents of broadcast video streams by computers.

**Incremental Modeling of 3D Environment using a Mobile 3D Scanner**

We developed a mobile 3D scanner, which is a laser scanner mounted on a turning table, for three-dimensionally measuring the surrounding environment. We then developed a method using this sensor for constructing 3D model of the environment. In addition, we propose a method for incrementally updating the environment model according to the motion of the sensor where the correspondence between planes before and after a motion of the sensor is established and then used for estimating the motion.

**Digital Typhoon: The Design of Near Real-time Large-scale Earth Databases Across Heterogeneous Data Streams**

Digital Typhoon (http://www.digital-typhoon.org/) aims at realizing near real-time large-scale earth databases by integrating heterogeneous data streams such as imagery, text, and other earth observation data. This presentation evaluates the current system in terms of association, organization and retrieval of various data streams, and the construction and utilization of past cases contained in the databases. We also summarize the future extension of the system.

**Virtual 'Bokeh': Various Blur Shapes from a Single System of Lenses**

Many camera users enjoy various kinds of 'Bokeh-Aji', which means a certain blur shape, by replacing lenses. There are no words for 'Bokeh-Aji' in English, so 'Bokeh' can be understood as a universal word. Here we introduce virtual 'Bokeh' generation from a single system of lenses. By applying some 3-D filters to multiple differently focused images, arbitrary 'Bokeh' images can be generated well.

**Author Identification in scholarly Documents**

When we use bibliographic databases and citation indices, it can be difficult to identify individual authors of scientific papers due to abbreviations of author names. This presentation will show the techniques to deal with this problem for efficient bibliographic information search.

**CEAX Project**

— Research on Integration and Utilization of Digital Archives about Historic and Artistic Objects —

This poster presentation shows our collaborative research project called CEAX, which aims to provide mechanisms of integration and utilization of digital archives about historic and artistic objects. The project covers design of global metadata schema and software platform for cultural objects, construction of digital resources of metadata with subjective annotations, and a graphical navigation tool for classrooms. An interactive demo will be planned.
**A Study on Text Corpora and Term Dictionaries: Construction and Utilization of Community Dictionaries**

A study on automatic construction of dictionaries using text corpora including Web, newspaper articles, patents is introduced. The generated dictionaries utilize large-scale text resources that have become readily available recently and reflect the term sets and usage examples of corresponding domains and communities. This enable us to facilitate domain-specific information retrieval or to detect the semantic diversity of terms across different communities.

**Building a Large Scale Test Bed for Web Information Retrieval**

We have built a test collection consisting of a 1.36TB Web data collection, a sufficient number of search topics, and their relevant document lists. We also conducted a workshop to which several research groups participated and through which we evaluated various search techniques. In this presentation, we will introduce overview and characteristics of the test collection, relations between the search topic characteristics and the effective search techniques, and so on.

**Extracting Topic Maps from Web browsing histories**

We propose a clustering method to extract Topic Map from the Web browsing history. Our method is based on conventional agglomerative clustering with the constraint of the Web structure and the weight of link relation. Topic Map shows 2D-visualized overview graph of the Web browsing history, and the relations between the topics that are gathered by a user and extracted from the pages around the history pages. Using the Web browsing history, we experimentally evaluate the extracted Topic Maps.

**Dealing with Translation Errors in Cross-Language Image Retrieval**

When non-textual media such as images are retrieved with texts, mismatches between query words and words termed to the retrieval targets become problematic. This problem worsens if the languages used are different, due to the errors of machine translation. The performance decrement of retrieval and measures that could be used to reduce this deterioration were investigated through participating in ImageCLEF, an evaluation workshop on cross-language image retrieval.

**Developing Digital Map Archive and Its Application to Historical and Ecological Studies of Southeast Asia**

This collaborative research project between National Institute of Informatics, Center for Southeast Asian Studies (CSEAS), Kyoto University, Graduate School of Creative Cities, Osaka City University, Chulachomklao Royal Military Academy (Thailand), GIS Center, UC Berkley (USA), and Graduate University of Chinese Academy of Science (China) aims at developing digital archive of CSEAS maps and aerial photographs collection and promoting historical and ecological studies of Southeast Asia using digital maps and aerial photographs.

**Monitoring Geomedia Information System using a Remote Control Helicopter-base Data Acquisition System**

This collaborative research project between National Institute of Informatics, University of Tokyo, and JRPpropo aims at developing an open source platform to monitor Geomedia information systems based geomaedia acquisition using a Remote Control Helicopter.

**CTM4PL: The "Collaborative Topic Maps for Practice Learning" Project**

This collaborative research project aims at developing and promoting the collaborative tool set "CTM4PL" for learning by practice the semantic classification of digital resources. The target of this tool set is to improve documents and resource semantic management life cycle such as industrial information system. Also the 1000 schools” Best practice regarding “the Memory with the Past” demonstrates the approach.
**NII Research Presented by a 2D Virtual Agent as a Story**

This research presents a novel method for the construction of story-like web presentations. The method is based on (i) an implementation of a simple event annotation scheme that is derived from Rhetorical Structure Theory (RST) and (ii) an ontology-based reasoning engine that handles event sequencing to produce presentations that follow narrative (story-like) principles. The resulting story has the form of dialogues between virtual character agents. As our initial application domain, we will demonstrate the presentation of NII research content.

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**Real-time Emotion Recognition from Bio-Signals**

In this research, we develop novel methods for processing biometric signals in real-time and interpreting them as affective (emotional) states. A key challenge is to account for both individual bio-signal properties such as different latency periods (slow onset vs. fast onset) as well as duration-related properties of different emotions. Examples include (sudden) surprise, accumulating frustration, and relaxed happiness.

As an example scenario, we implement the interaction between a 3D agent that is endowed with verbal and non-verbal means of emotional expression and a human user. Depending on the user’s (recognized) emotional state, the agent adapts its behavior with the goal of undoing negatively valenced user feelings.

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**Event Detection in Document Stream**

Topic Detection and Tracking (TDT) refers to automatic techniques for discovering, threading, and retrieving topic-related material in streams of data. Mainly existing research projects had not detect topic shift, or allow enough observing interval to detect.

We introduce a new method for the Event Detection in this paper. The method is not based on the traditional similarity measurement method, but concentrate on whether a word co-occurrence has existed or not.

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**FLWR Arranging: XQuery Partial Evaluation**

An XQuery optimization by rewriting, named "FLWOR Arranging", is proposed for composite XQuery expressions in P2P data integration.

This optimization is based on a static analysis of such expressions. A schema mapping between peers is expressed as an XQuery using element constructors in P2P data integration on the Web. An ad hoc query to a peer is transformed into one to another peer by expanding a schema mapping in the ad hoc query.

This expanded query forms a composite XQuery because this query is toward intermediate results of another query. Our contribution is to eliminate both redundant element construction operators and redundant expressions from "child axis" path expressions over the intermediate results. The proposed algorithm is the first attempt to eliminate redundant element construction operators based on node-id equality.
Development of Information System for Digital Contents

We propose a method that automatically extracts keywords of digital archives, as well as automatic classification using extracted keywords, with the aim of decreasing searching cost. Coordination between DRM (digital rights management) and DRE (digital rights expression)

With the advent of the new digital age, the time has come to look at distributions of information other than commercial content. We offer a business model that achieves state transition between common and commercial domains.

Information Institution Research: Building a Weblog Site for Online Law Information

There is great gap between the technological reality and the legal assumption in this information-oriented society. In order to remove this gap as possible, Information Institution Research Division researches: the interpretation of the regulations now in force, the clarification of legislation problem to be solved, and the enactment of information network law. We are preparing a weblog site as a space of opinion gathering, discussion, and agreement to catch up the speed of change, and end of which is introduced this time.

Interdisciplinary research toward development of "government information studies"

This presentation reviews perspectives on, and research results and practices concerning, government information, in research fields of political science, law and legal studies, public administration studies, records management studies, library and information science, and archival studies. Then, it discusses issues of access to government information in electronic environment, especially the relationship between "easiness of access" and "publicness of open government."

From Information to Intelligence — Role of Intelligence in the Post-Cold War Era —

The history of intelligence is that of the challenge to estimate the future based on the information analysis. The concept of war started changing to "total war" since the 19th century. Accordingly, the future estimate has come to be done by bureaucratic organizations based on a hierarchical structure, a division of labor and standard operating procedures. This system managed to work until the end of the cold war. However, it is incapable of countering the threats in the post-cold war era, which have come to be proliferated and diversified. The future image of intelligence organization will be considered and proposed.

Open source software is now used as a part of network infrastructure in our society. More over this type of projects are model of R&D or corporation. This study overviews these situation and these socio-economic effects then find the success model of open source project as a social infrastructure.

Making creative use of the Internet — NetCommons: Collaborative learning & working platform

We have been developing a CMS, called NetCommons, from 2001. NetCommons is designed mainly for educational use from elementary school level to graduate school and life-long education. By installing NetCommons, one gains CMS, groupware, mailinglist, e-learning, portal site and virtual private office at the same time on one server. We believe that NetCommons deserves for the title of genuine one-stop service.
407 KOYAMA, Teruo

Structural Analysis of Multicomponent Japanese Compound Terms

Classification of multi-component Japanese compound terms, it is important to decide the compound structure of the composit terms. In this research we study about a method to presume the structure based on the strength of connectivity between every two morphemes, and the frequency of component morphemes.

408 MIYAZAWA, Akira

Character Code: What was the problem.

Character code issues have been repeatedly argued in Japan, especially concerning “kōji” characters, though it seems calmed in these years. In this occasion, analysis of the issues is useful for not to repeat the useless debate.

409 KANDO, Noriko

SEKI, Yohei / David K Evans / NAKAYAMA, Norio / FUJISAWA, Satoko

How Computer Learn from Texts — Text Understanding for Enhanced Information Access

Information access technologies has focused on the facts or objective topics in the texts to date. However, for more effective information access, investigations on (1) extraction of subjectivity, attitude and affection from text, (2) differentiate facts and opinion, (3) analysis of relationships among entities, (4) appropriate metadata for each user, (5) differentiate the viewpoint of each user groups are critical. We have investigated on identification and extraction of various types of subjectivity, relation, viewpoints and the application for information access systems such as information retrieval and summarization.

409-1 NAKAYAMA, Norio

A Model for Emotion Expression in Book/Movie Reviews

We proposed a model for emotion expressions, which consists of “Attitudes”, “Subject”, “Object”, “Reason” and related components in order to apply it for movie/book retrieval. The results of the user studies reported here showed that “Reson” of the emotion expressed in the reviews is critical for users to utilize the reviews for their selection of books,movies.

409-2 FUJISAWA, Satoko

Automatic Creation and Enhancement of Metadata for Cultural Heritage:

Metadata about Persons and Metadata for Different User Groups

We propose an approach to extract metadata from texts relating to cultural heritage. For the metadata for fine arts, human-beings related to the artifacts and their roles are important to describe its nature and value. We focus on extracting information on the roles of individuals related to works and the relationship between individuals. Moreover, I propose the method to paraphrase complicated description into simpler explanation based on extracted metadata.

410 KANDO, Noriko

OYAMA, Keizo / David Kirk Evans / KISHIDA, Kazuaki (Keio University)


Importance of the information access technologies to retrieve relevant information from large amount of stored documents and support to utilize information in such document like information retrieval, cross-lingual information access, summarization, question answering, text categorization, text mining, etc., is increasing. NTCIR is a project aiming to enhance the research in information access technologies by providing (1) large-scale reusable test collections, (2) cross-system comparison between international research front systems, and (3) investigation on evaluation methods and metrics. We organize an international workshop once per one and half years and the test collections constructed through the projects are available for research purpose.
Forgetful or strategic?
—The mystery of the systematic avoidance of reference in the cartoon story narrative.

When asked to retell a cartoon story, most narrators fail to mention particular scenes from the story. By examining the structure of the story, as such, and how the narrators organize the narrative, we are finding out that the narrators avoid mentioning the scenes not because of lack of memory capacity, nor because the scenes are minor details, but because of some other reasons. The present poster paper describes them and their implications for psycholinguistics and human information processes.

3D Shape Decomposition using Spectral Methods

3D shapes are often constructed by joining many pieces together, each of which is a simple geometric object. However, once such shapes are constructed, it is not easy to decompose them into the original objects. In this study, we present a simple and efficient method for decomposing 3D shapes. The method is based on the spectral graph theory for partitioning large graphs into small subgraphs with minimal cuts.

Web 2.0 and Ajax --Present and Future of the Web

Although the bursting of the dot-com bubble, various IT companies have actively engaged in the Internet. Web 2.0 is a term that refers to their state of technologies. Ajax is a group of web technologies that facilitates client-server communication. Asynchronous and dynamic web services with Ajax are becoming important parts of Web 2.0 and have been changing the world of the Internet.

Analysis of effect of research promotion by Grant-in-Aid for Scientific Research

We report the adoption patterns of the Grants-in-Aid for Scientific Research from 1985 to 2003 about the prizewinner and the researchers who were awarded the large-scale funds in recent years. In addition, we mention about the correlation between adoption pattern and research output pattern experimentally. Moreover, we show the outline of the questionnaire survey about the contribution of the Grants-in-Aid.

University-Industry research collaboration in Japan: an analysis through coauthorship of academic publication and patent application

Nowadays university-industry collaboration is highly promoted in various areas by various ways. In this study we try to evaluate university-industry linkage objectively through analysis of coauthorship of academic publications and survey on patent application. To assess the university-industry collaborative activity comprehensively, we choose to use the National Citation Report for Japan (NCR-J) of Thomson Scientific, Citation Database for Japanese Papers (CJP) of NII, Patent and Utility Models Gasket Database as well, to investigate and discuss the situation, trends and characteristics of Japanese university-industry linkages from both international and national perspective.
Graduate Students

501
ATCHARIYACHANVANICH, Kanokwan
OKADA, Hitoshi

A Comparative study of E-Commerce: A case of Japan, China and Thailand

The diffusion of E-Commerce among Japan, China, and Thailand are different. These differences are examined widely in terms of infrastructure and economic status. However, the overlooked factors such as social and culture are needed to be investigated.

In addition, although Japan, China, and Thailand are Asian countries, these factors differ significantly. This research shows the differences based on the questionnaires gathering from EC users in these countries and analyzes them based on statistical model.

502
Reseach Cooperation Division, Institutional and Research Cooperation Department

Introduction of Graduate Education

NIL establishes Department of Informatics, School of Multidisciplinary Science at Graduate University for Advanced Studies (SOKENDAI), and offers both 5 year and 3 year doctoral programs.

These 2 courses makes the best use of the specialty of NIL that is pioneering and international research institutions of informatics, and aims at the promotion of the excellent talent who leads "Knowledge society" of the 21st century.

It is in the good conditions of location located in the center of a Tokyo, and working member of society can also learn and research.

It has been registered 60 students in Department of Informatics as of April, 2006 (among 18 international student and 30 working member of society).

We guide the entrance exam to entrance in the outline and April, entrance and 2007 October, 2006 of Department of Informatics in the corner.

The graduate school entrance exam briefing is held in 18:30 and the first floor special conference room on Thursday, 8th 16:30 of June, 2006.

Project/Development and Operation

A1 ONO, Kinji
KITAMOTO, Asanobu / OHNISHI, Makiko / YAMAMOTO, Takeo / Elham Andaroodi / IKEZAKI, Tomohiro / DEUFF, Dominique

Digital Silk Roads — Digital Archiving of Cultural Heritage in Danger —

We are promoting the digital archives of the culture and the natural heritage which is on the verge of destruction or disappearance as part of a “digital Silk Road” project. The research of the digital archive of the Toyo Bunko rare book, development of a Bamiyan digital museum were conducted in cooperation with human sciences researchers.

Development of the DSR portal for creation and dissemination of contents and information on “digital Silk Road Project”, and two international symposium of Digital silk Roads, the digital archive training of a cultural heritage in Azerbaijan: one of the RADIT countries have been carried out. This exhibition reports focusing on 3-dimensional digital restoration of the destroyed ruins of Bam and ASPICO portal in a "digital Silk Road project".

A2 KITAMOTO, Asanobu
OHNISHI, Makiko / IKEZAKI, Tomohiro / DEUFF, Dominique / MEYER, Eka / MURAMATSU, Takako / KAMIDA, Ryo / SATO, Sonoko / YAMAMOTO, Takeo / ONO, Kinji

The Digital Archive of Rare Books that Promotes the Research and Education of Culture

We have collaboration with Toyo Bunko, or the Oriental Library, that owns rare books— academic references, photo albums, and others known as basic references on Silk Roads. The goal of the project is to make all pages of rare books digitized and freely accessible on the Website. We also introduce a few trials for promoting research and education on Silk Road culture using the information infrastructure of digital rare books.

A3 HONIDEN, Shinich
NAKAJIMA, Shin / WASHIZAKI, Hironori / TAHARA, Yasuyuki / TAGUCHI, Kenji

Top SE Project: New Educational Program for the Super Architect

The Top SE project is a new educational program funded by the Special Coordination Funds for Promoting Science and Technology by MEXT in 2004 jointly developed by NTT Data, CSK Systems, Toshiba, NEC, Hitachi, Fujitsu Laboratories and Matsushita Electric Industrial (until 2005 and tentative in 2006). Its aim is to educate super architects who can play a leading role in industry.
| A4 | Content Division, Development and Operations Department, NII |
| A5 | Content Division, Development and Operations Department, NII |
| A6 | Content Division, Development and Operations Department, NII |
| A7 | Content Division, Development and Operations Department, NII |
| A8 | Planning and Coordination Division, Development and Operations Department, NII |
| A9 | Center for Grid Research and Development |

### NACSIS-CAT/ILL
NACSIS-CAT/ILL is service for libraries to construct union catalog database of books and serials in the libraries and to provide the books and article of serials for all researchers and students in Japan. The union catalog database is offered to public through Webcat Plus as a component of GeNii. At present, there are over 80 million books are registered.

### Institutional Repository
The institutional repository is a science information resource management system that aimed to preserve and to open electronic, intellectual products produced in the academic organization such as universities to the public. NII is supporting the construction of the science organization repository as the mounting experiment of software for the repository is conducted jointly with the university library.

### GeNii: NII Academic Contents Portal
The GeNii system of NII is the integrated portal service to contribute a range of scientific content required in scientific research. GeNii is comprised of four components: (1) Book and Journal Information, (2) Article Information, (3) Research Result Information, and (4) Specialized Scientific Information. GeNii serves as the transmission point of scientific information in Japan.

### The Science Information Network (SINET) and the Next Generation Network (SINET3)
The Science Information Network (SINET) is an information communication network which connects universities and academic research institutions in Japan. Super SINET is an ultrahigh-speed network which is intended to promote advanced academic researches in Japan. As the next generation network, SINET3 will be launched in April 2007, to integrate SINET and Super SINET. An overview of our network construction plan will be presented.

### Inter-University Authentication and Authorization Platform for Japanese Cyber-Science Infrastructure
Development of public key infrastructure is vital for the safety, security, construction, and utilization of the Cyber Science Infrastructure (CSI). The University Public Key Infrastructure (UPKI) enables mutual cooperation and authentications between public key infrastructures that have been developed by various universities/organizations. Currently, the National Institute of Informatics is facilitating a joint research project for formulating a scheme policy and developing the application technology that is required for inter-university collaboration; progress will be based on the opinions and desires of Hokkaido University, Tohoku University, the University of Tokyo, Nagoya University, Kyoto University, Osaka University, Kyushu University, Tokyo Institute of Technology, and the High Energy Accelerator Research Organization.

### NAREGI: National Research Grid Initiative
NAREGI (National Research Grid Initiative) is one of the collaboration projects among industry, academia and government, initiated by the Ministry of Education, Sports, Culture, Science and Technology (MEXT). At the Center for Grid Research & Development, our research and development area are the grid middleware and the networking technologies; the Grid is regarded as the foundation for the information technology in the 21st century. Japan’s leading institutions from industry, academia and government also take part in NAREGI Project, and it is expected that the fruits of the project will boost the research and development in the related scientific fields, and furthermore, will lead to the strengthening of Japan’s competitiveness in the world’s economy.
Special Exhibition

B1 National Archives of Japan Japan Center for Asian Historical Records, National Archives of Japan

National Archives of Japan, Digital Archive: "Past is Prologue"

National Archives of Japan (NAJ) launched "Digital Archive" in last year, providing catalogue database and some of its holdings in digital images. With the concept of "ubiquitous internet service," the system is based on the next generation of digital archival standards, such as JPEG2000 and EAD/XML. NAJ holds demonstrations and displays of "Digital Archives," with its precursor, Japan Center for Asian Historical Records (JACAR).

B2 Tokyo Denki University

The 100th Anniversary of Tokyo Denki University: Reform of all faculties and establishment of "School of Science and Technology for Future Life"

Tokyo Denki University was founded in 1907 as Tokyo Denki School and is celebrating its 100th year in 2007. We take this opportunity to look at the future of science and technology and will establish a "School of Science and Technology for Future Life" in Kanda, which is based on the new concept that "human being" is a key word. Also, the Faculty of Engineering at the Kanda campus and the Faculty of Science and Engineering at the Hatoyama campus will be reorganized responding to the demands of the present age. The Faculty of Information Environment in the Chiba New Town campus has already reorganized this year, and Tokyo Denki University will turn over a new leaf with this subsequent reorganization. This exhibition presents you with a full picture of this dramatic change.

B3 Tokyo Aquarian Booksellers Cooperative

"Nihon-No-Furuhon-Ya" (Old Japanese Book Shop System):
Search site for antique books

Tokyo Aquarian Booksellers Cooperative launched an antiquarian database in 1998, and this database has been appreciated ever since by researchers and book lovers nationwide. Now, the burning issue is how antiquarian bookshops with rich philological knowledge can cooperate with the young generation, which can make full use of computers. "Nihon-No-Furuhon-Ya" is now in the process of development.

B4 Chiyoda City

Edo Tenka Matsuri

In 2003, the Chiyoda ward of Tokyo celebrated the 400th Anniversary of Edo (Tokyo) Shogunate by holding the "Edo Tenka Matsuri", a festival that is officially called "Edo no hana" in Japanese, and it attracted about 800,000 people. It consists of parades of floats, mikoshi or traditional hand-held paper lanterns, and other traditional festival attractions. The Tenka Matsuri is a symbol of the prosperity of the Edo period. In response to repeated requests for continuation, this festival was again held on October 29 and 30, 2005, impress upon people the history and culture of the Edo period. Through this festival, we hope people can feel the "bond of people", which has been prevent in Chiyoda ward since the Edo period, having been handed down through the generations. This exhibition presents the "Edo Tenka Matsuri 2005" with a film.

B5 Meiji University Library

IIZAWA, Fumio / UKIZUKA, Toshio

Meiji University Library Ashida Bunko Antique Map Exhibition

Ashida Bunko at Meiji University Library is a collection of antique maps and topography maps which are initially collected by Koreto Ashida (1877-1960), a pioneer of Japanese topography, who compiled "Dai Nihon Tokushi Chizu" and "Dai Nihon Chishi-Taikai". Meiji University Library has been working on the project of digitizing these antique maps since 2002. This is an electronic exhibit with a high quality digital image of Ashida antique maps.

B6 TAKANO, Akihiko

NISHIOKA, Shingo / MARUYAMA, Yuzo / KOIKE, Yuji (Research and Development Center for Informatics of Association)

Associative information access makes an association of ideas

A new information access environment is proposed. Users can freely combine the bits of information from the different sources to get inspiration. Currently, databases of library catalogues, antique bookstores, and museum artifacts are available.
**Book Town JIMBOU — a portal to the world largest book town**

JIMBOUCHO is known for its 170 antique bookstores and 30 bookshops. As the portal site of it, JIMBOU provides the access to the database of the current stock of these bookshops. It also offers JIMBOUNAVI, which is a map service for finding the best match bookstores.

**The new reference environment at the refurbished Chiyoda library**

Chiyoda Library will be born again in the new building in April 2007. The reference environment will be redefined, where books organized by subjects work as the new reference tools to meet the live requests from the users.
Experience Conner

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<tr>
<th>C1</th>
<th>ADACHI, Jun</th>
<th>KANDO, Noriko / AIHARA, Kenro / YAMADA, Taizou / FUJISAWA, Satoko</th>
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**CEAX Project**

— Research on Integration and Utilization of Digital Archives about Historic and Artistic Objects —

This poster presentation shows our collaborative research project called CEAX, which aims to provide mechanisms of integration and utilization of digital archives about historic and artistic objects. The project covers design of global metadata schema and software platform for cultural objects, construction of digital resources of metadata with subjective annotations, and a graphical navigation tool for classrooms. An interactive demo will be planned.

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<th>SATOH, Hiroko</th>
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**Visualizing and Touching for Knowing Chemistry — Chemical Graphics Open Source Library "ChemoJun" and Haptic Molecular Model System "HaptiChem"**

We demonstrate two systems for visualizing and touching for knowing chemistry: A chemical graphics open source library "ChemoJun" and a haptic molecular model system "HaptiChem".

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<th>C3</th>
<th>Frederic Andres</th>
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**Monitoring Geodata Information System using a Remote Control Helicopter-based Data Acquisition System**

This collaborative research project between National Institute of Informatics, University of Tokyo, and JRPropo aims at developing an open source platform to monitor Geodata information systems based geodata acquisition using a Remote Control Helicopter.

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<th>Helmut Prendinger</th>
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**Attentive Presentation Agents: NII Research Presented by a Team of Highly Realistic 3D Virtual Agents that Attends and Adapts to Users' Visual Interest by Using Eye Tracking Technology**

This research proposes an attentive interface as a novel means to communicate with users in a highly intuitive and unobtrusive way. Attention is an excellent clue to interest and preference. By analyzing and interpreting human eye movements ("eye gestures"), the interface may automatically adapt to users' visual interest.

Our system implements a virtual research promotion scenario, where NII research content is presented in a dynamic, interactive and story-like way. A team of highly realistic 3D agents is rendered in real-time on a large screen by using advanced graphics techniques. The agents present using multiple modalities (speech, gestures) and adapt their performance according to the input from a non-contact video based eye tracker, thereby accounting for the user's focus and shift of visual interest in an entirely natural way.