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PDF issue: 2025-07-04

Annals of the Faculty of Computer and Information Scienses, Hosei University

(出版者 / Publisher)
Department of Computer Science

(雑誌名 / Journal or Publication Title)
Annals of the Faculty of Computer and Information Sciences, Hosei University / Annals of the Faculty of Computer and Information Sciences, Hosei University

(巻 / Volume)
2

(開始ページ / Start Page)
1

(終了ページ / End Page)
73

(発行年 / Year)
2002-03

No.2 March 2002

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Department of computer science

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Associate Professor

Runhe HUANG

Runhe HUANG was born in Fujian, China on December 4, 1962. She received her B.Sc. in Electronics Technology from National Defense University of Technology, China, in 1982, and her Ph.D. in Computer Science and Mathematics from the University of the West of England, UK, in 1993. She worked at National Defense University of Technology as a Lecturer during the period 1982-1988. In 1988, she received a Sino-Britain Friendship Scholarship for her Ph.D. study in U.K. She was an assistant professor in the Computer Science and Engineering Lab. of University of Aizu for 7 years. She becomes an associate professor in Hosei University since April 2000.

Her research fields include Computer Supported Collaboration Working (CSCW), Artificial Intelligence and its Applications, Multimedia and Distributed Processing, Genetic Algorithms. She has been involving or leading the following main research projects:

- Multimedia Modeling Framework (1995-1996)
- Genetic Algorithms for Survival Network Designs (1996-1997)
- Cheer: A Computer based Hyper Educational Environments (1997-1998)
- Multimedia Collaborative Working/Learning Environments (1998-1999)
- University21: 21st Century Virtual Education Community (1998-)
- Open Agent Architecture for Integrating Developed Intelligent Agents (1999-)
- Whenever, Wherever, Whoever Accessible System (2001-)

Her current research interests are mainly focused on Distributed Intelligent and Collaborative Computing including Multimedia Collaborative Systems over the Internet; Distributed Processing and Resource Management; Intelligent Agents for a Virtual University and Cyber-world; Intelligent Processing in E-business and E-commerce. Wireless Internet Computing in a Lifelong Learning Community.

Dr. Huang is a member of IEEE, ACM and IPSJ. She has been active in various academic societies. She has published more than 50 academic refereed papers in various international conferences and journals. She received the Best Paper Award from the 2000 International Conference on Information Society in the 21st Century: Emerging Technologies and New Challenges.

Message

With rapid developments of the Internet and Web technologies, the 21st century is a networked digital information era. Accompanying this era, a new world (*Cyberworld*) is on the way to be brought out. It is an interesting and a full of mystery world. It is the time for us to discover mysteries and make inventions, in particularly, in the fields of world modeling and finding scientific and social laws for guiding people's communications, collaborations and educations in this exciting world. Let us face the challenges and enjoy inventions in the 21st century!

My hobby is reading, traveling, cooking, gardening, programming and badminton.

Publications (January 2001 ~ December 2001)

1. Runhe Huang, Jianhua Ma, and Qun Jin, *A Shopping Negotiation Agent that Adapts to User Preferences*, Springer-Verlag Lecture Notes in Computer Science (LNCS 2252), Vol. 2252, pp45-56, 2001.

   Abstract — This paper describes a shopping negotiation agent that can adapt user preferences and automatically negotiate with its counter party on behalf of a user it represents. Since different users can have different preferences, it is important for the agent to have adaptation to different user preferences. This can be achieved by acquiring user preferences, tracing user's behavior on Web and mapping the behavior to a set of the preference parameters, creating the negotiation model class, and generating an instance negotiation model object with new/updated preference parameters.

2. Runhe Huang, Tao Huang, Jianhua Ma, Takeshi Yamazaki, and Minetada Osano, *A Hybrid Negotiation Model Based Online Shopping System*, in Proceedings of the Fourth International Conference on Human and Computer, pp236-241, September 2001, Japan.

   Abstract — With a reasonable negotiation model, shopping agents can negotiate intelligently on behalf of real-world's users to find a solution that maximizes the utility for all users. This paper presents an online shopping system that includes shopping agents, such as buyer agents and seller agents, which are based on a hybrid negotiation model and demonstrates how a shopping agent negotiates intelligently with counter party regarding a product on behalf of a user it represents.

3. Tao Huang, Runhe Huang, and Jianhua Ma, *Negotiation Modeling in E-trading*, in Proceedings of the Fourth International Conference on Human and Computer, pp230-235, September 2001, Japan.

   Abstract — In this paper, a new negotiation model, called a hybrid negotiation model, is proposed. The hybrid negotiation model is a combination of an extended Bazaar model (a

sequential decision making based Bayesian learning model) and a "lose bounded" Nash bargaining solution. With the proposed negotiation model, agents that represent buyers and sellers in the real-life can negotiate in an intelligent way to effectively and efficiently reach agreement and optimize their individual utility function, respectively, in a trading business. How learning in negotiations is proceeding and how common knowledge and public information are employed to make initial strategies of negotiations are described in details.

4. Runhe Huang and Jianhua Ma, *A Java Technology Based Shared Browser for Tele-lecturing in University21*, in the Proceedings of 4th International Conference on Computational Intelligence and Multimedia Applications (ICCIMA'01), pp298-302, October 2001, Japan.

   Abstract — This paper describes a shared browser and explains how it is integrated into a virtual collaboration room (VCR) and used to achieve effective and interactive tele-lecturing in a virtual university, University21. The shared browser allows multiple users in different remote sites to navigate same web document in the mode of what you see is what I see. This is a significant advantage over current popular browsers.

5. Jianhua Ma and Runhe Huang, *The Internet Group Tour via a Shared Web Browser,* in edited book: Enabling Society with Information Technologies, published by Springer, pp69-78, ISBN 4-431-70327-6, 2001.

   Abstract — When a group of people would like to visit or access the Internet together, it is necessary to have a shared web browser following the mode of what-you-see-is-what-I-see (WYSIWIS) that allows all group members to make inputs to the browser and distributes the results among the all members. This article presents our design and implementation of such a shared browser using the server-client model and Java technology. All users who connect to a same server of a shared browser belong to a same group, and see a same web page, and different groups must run their own browsers' servers.

6. Runhe Huang and Jianhua Ma, *An Object, Session, and Room Persistence in VCR for Enhancing Online Learning Effectiveness*, in CD Proceedings of International Conference on Information Technology Based Higher Education and Training (ITHET2001), July 2001, Japan.

   Abstract — This paper explains what is an object, a session, and a room persistence in a virtual collaboration room, and describes functions of object recording/replaying, session recording/replaying, and object and room persistence in VCR, and finally demonstrates by examples how the functions are used to solve schedule conflicting problems in a synchronous group activity and to support asynchronous group activities as well. Online learning is improved with the functions in terms of effectiveness and efficiency.

7. Runhe Huang and Jianhua Ma, *A Platform Independent Shared Web Browser*, Journal of Internet Technology, Volume 2, No.4, pp301- 308, 2001.

Abstract — The current popular browsers such as Microsoft Internet Explorer and Netscape Communicator allow only an individual to freely navigate on the Web. Our shared Web browser enables multi-users in physically different sites to simultaneously navigate the Web-based virtual world together. Using the shared browser, a group of users share not only a Web document but also operations on the browser and Web documents. In this article, we present the shared Web browser in details including command server, Web proxy server, and client and show its application in a multimedia collaboration system - VCR (Virtual Collaboration Room) as an object. The shared Web browser has potential applications in many other systems, such as tele-lecturing, tele-conferencing, shopping together in e-commerce, and group virtual tour.

8. Jianhua Ma and Runhe Huang, *Designs and Implementations of University21*, Computer Journal, Vol. 13, N0. 2, pp17-45, June 2001.

Abstract — University21 is an integrated educational system (IES) aimed at supporting all teaching, learning and administrating activities in Internet and Web based virtual universities of various scales. It consists of three parts: cyber-campus, facilities, and agents. In this article, we describe the functionality and composition of each part in details and demonstrate how they support to each other. It is emphasized that intelligent software agents can assist people and their work in a virtual university.

9. Timothy K. Shih, Shi-Kuo Chang, Jeffrey Tsai, Jianhua Ma and Runhe Huang, Supporting Well-Engineered Web Documentation Development-A Multimedia Software Engineering Approach towards Virtual University Courseware Designs, Annuals of Software Engineering International Journal, 2001 (accepted). 2001.

Abstract — Distance learning has become a very important mechanism for virtual university operation. In order to realize such an operation smoothly, it is necessary to consider distance learning from three perspectives: administration, awareness, and assessment. We are currently implementing a virtual university environment according to these guidelines. In this paper, we propose part of such a supporting environment of the Multimedia Macro-University project[1]. One of the most important focuses is a Web course development paradigm. On the other hand, software development paradigms were developed to support program construction. However, these traditional paradigms do not completely fit the needs of Web document development due to the following reasons. It is therefore necessary to investigate a new software development paradigm for developing Web documents. In this article, we propose such a new paradigm and its supporting environment, as well as software testing/metrics mechanisms for Web documents. The system is implemented as a three-tier architecture, which runs under MS Windows.

10. Timothy K. Shih, Shi-Kuo Chang, Jianhua Ma and Runhe Huang, *Web Learning Assessment and Adaptive Tutoring*, Journal of Applied Systems Studies, Cambridge International Science Publishing, 2001 (accepted).

Abstract — Web-based distance learning is a trend of instruction delivery. One of the most difficult challenges of such a learning mechanism is the assessment of students' learning criteria. It is hard to judge the behavior of a student since the instructor is separated spatially and temporally from the students. However, it is possible to rely on some Web-based tools to keep track of a student's course attendance, as well as the navigation behavior of that student. In addition, the navigation behavior of an individual can be compared to those of others. Analysis can be conducted. And interactive tutorial can be generated to assist the student of poor score. This paper proposes such a mechanism, as well as its supporting system run on Windows browsers.

11. Qun Jin, J. Ma, R. Huang and T.K. Shih, *Design Principles of an Open Agent Architecture for Web-based Learning Community*, in CD Proceedings of World Conference on Education Multimedia, hypermedia & Telecommunications (ED-MEDIA2001), pp829-834, Tampere, Finland, June, 2001.

Abstract — There is an inevitable choice to use various agents to assist or replace human to a certain extent for the work in a virtual learning community. There is a strong need for the development of the designated architecture for integrating and using various agents. This research is focused on developing an open agent architecture that can easily integrate developed agents to a learning system and flexibly modify the agents with permission. This paper describes the design ideas of such desired architecture, demonstrates how the architecture system works, and explains three agents in a Web-based learning system, University21.

12. Runhe Huang, Jianhua Ma and Timothy K Shih, *Integrating Agents into a Virtual University via an Open Agent Architecture*, in Edited Proceeding of Advanced in Educational Technologies, pp1-8, International Conference on Intelligent Multimedia and Distance Education, June, 2001, USA.

Abstract — A virtual university is far beyond putting learning materials into a Web site. Like a real physical university, it has enormous work involved with people, environment and facilities. Instead of employing lot of manpower like in a real university, a virtual university can use various agents to assist or replace human to a certain extend for the work involved in a virtual university. As agents are intelligent software programs that can be developed by different parties, how to integrate the developed agents to a virtual university becomes an inevitable issue for the virtual university research society. This paper proposes a so-called open agent architecture that can integrate developed agents to the virtual university system and allows specified people to modify the agents when it is

necessary.

13. Jianhua Ma, Runhe Huang and Timothy K. Shih, *Co-Navigation on the World Wide Web over the Internet*, in Edited Proceeding of Intelligent Multimedia Computing and Communications, pp131-140, International Conference on Intelligent Multimedia and Distance Education, June, 2001, USA.

Abstract — It is noted that the current popular browsers such as Microsoft Internet Explorer and Netscape Communicator only allow a single user freely navigate on the Web. However, there is increasing demand of co-navigation on the WWW over the Internet, that is, multi-users in different sites can simultaneously navigate the Web-based virtual world together. This paper describes a shared Web browser that enables a group of users share not only a Web document but also operations on the browser and Web documents. To be platform independent, the browser is implemented in Java language under a server-client model. The server program is a Java application and the client program is a Java applet. To overcome Java applet security restrictions, it is indispensable to develop and implement a Web proxy server to access and/or download Web documents in remote Web sites on behalf of clients. The paper also shows how to integrate the browser into VCR (virtual collaboration room).

14. Runhe Huang and Jianhua Ma, *The Design of an Architecture for Incorporating Developed Agents to a Virtual Educational System,* Proceedings of 19th International Conference on Computer Processing of Oriental Languages, May 2001, Korea.

Abstract — This paper proposes an architecture for incorporating developed agents to a virtual educational system. As we know, a virtual educational system is a complex system that is far beyond to put web documents to a web site. In fact, it is involved enormous work with people, virtual environment, and virtual facilities. People may release from heavy work if they can use intelligent agents developed by other parties. However, how to incorporating the developed agents to a virtual educational system becomes problem. It seems an open architecture is needed. This paper describes such architecture with which a virtual educational system can easily and flexibly integrate the developed agents.

15. Jianhua Ma and Runhe Huang, Timothy K. Shih, Qun Jin, *Implementation of a Shared Web Browser Using Java Technology,* Proceedings of 19th International Conference on Computer Processing of Oriental Languages, May 2001, Korea.

Abstract — The shared Web browser is a collaborative tool that enables multi-users in physically different sites to simultaneously view a same Web document over the Internet. Using the browser, a group of users share not only a Web document but also operations such as entering a new URL link, clicking a hyperlink in a Web page, changing a size of the browser, moving the scroll bar, etc. Due to Java security restrictions, the shared

browser client, i.e., the applet, cannot directly access and download Web documents from other remote hosts except the host the applet came from. This problem has been solved via a Web proxy server through which clients can access Web documents including HTML, image, and other multimedia files resided in any other remote hosts. This paper is focused on describing the design ideas and implementations of the Web proxy server.

16. J. Ma, R. Huang, and R. Nakatani, *Towards a Natural Internet-Based Collaborative Environment with support of Object Physical and Social Characteristics*, International Journal of Software Engineering and Knowledge Engineering, V0l. 11, No. 1 (2001), pp37-53, World Scientific Publishing Company. 2001.

Abstract — Objects in this article refer to sharable applications, such as a whiteboard and a video player, used by multi-users who are in different sites and have computers connected to networks. The objects are important elements in our Internet-based desktop collaborative system, called virtual collaboration room. We argue that a natural collaborative environment should be developed in a framework of using both a room metaphor and an object metaphor, i.e., emulating the fundamental characteristics of real rooms and real objects, respectively. This article gives the first systematic specifications of object physical and social characteristics and discusses how to exploit and implement the object characteristics in VCR. A preliminary prototype of platform independent real-time audio/video communications among multiple users is also described. It can be used together with VCR.

Professor

Satoru S. Kano

Satoru S. KANO received a BS in physics from the University of Tokyo in 1972. He received an MS in physics in 1974 and a PhD in physics (quantum electronics and molecular physics) in 1977, both from the University of Tokyo, Japan, and worked as a research associate at the Department of Physics at the University of Tokyo until 1979. He worked as a visiting scientist at IBM San Jose Research Laboratory from 1977 to 1978 on partial leave from the University of Tokyo. He worked at Central Research Laboratory of Komatsu Ltd. from 1979 to 1980 as a research staff member. From 1980 until 1987, Dr. Kano was an associate professor at Institute for Laser Science at University of Electro-communications in Chofu, Tokyo. He also worked at Institute of Plasma Physics at Nagoya University from 1985 until 1987 as an associate professor (visiting). He worked for IBM Tokyo Research Laboratory from 1987 until 1996 as the Manager of Advanced Optics, Advanced Technology Institute. During his service at IBM, he was a professor (visiting), New Laser Device, RCAST (Research Center for Advanced Science and Technology), the University of Tokyo from 1991 to 1993. From 1996 until 2000, Dr. Kano was for the School of Engineering, Hosei University as a full professor, and he is at the Faculty of Computer and Information Sciences from 2000. From 1999, he is also a professor (visiting) at Department of Photoscience, School of Advanced Science at the Graduate University for Advanced Studies, Hayama, Kanagawa, Japan.

His current research is on nonlinear laser spectroscopy and its application to surface science, especially energy transfer processes of adsorbed molecules on metal surfaces. He is also interested in coherent manipulation of molecules and runs the experiments jointly with the chemists at Tokyo Institute of Technology.

He is a member of American Institute of Physics, Japan Society of Applied Physics, The Physical Society of Japan, and The Chemical Society of Japan.

Publications (January 2001 ~ December 2001)

1. Satoru S. Kano, Takashi Kasuga, Yasunari Zempo, and Yoshio Oyanagi, "Computational Physics, Problem Solving with Computers," Vols. 1 and 2, 500 pages, Asakura Shoten, April 2001.

   Abstract —A Japanese translation of the book by Rubin H. Landau and Manuel J. Paez, John Wiley & Sons, Inc., 1997. An introduction to computer methods for solving problems in the physical sciences whose difficulty or complexity places them beyond analytic solution or human endurance. This book offers detailed instruction in programming the hardware and using the program libraries of computers.

2. Satoru S. Kano, Hideko Kano, and Munetake Ichimura, "Basic Calculus," Part 1, 229 pages, Springer-Verlag Tokyo, December 2001.

   Abstract — A Japanese translation of the book by Alexander J. Hahn, Springer-Verlag New York, 1998. This introductory calculus text is developed by the author through his teaching of an honors calculus course at Notre Dame. The book develops calculus, as well as the necessary trigonometry and analytic geometry, from within the relevant historical context, and yet it is not a textbook in the history of mathematics as such. The notation is modern, and the material is selected to cover the basics of the subject. Special emphasis is placed on pedagogy throughout. While emphasizing the broad applications of the subject, emphasis is placed on the mathematical content of the subject.

Professor

Nobuhiko KOIKE

Nobuhiko KOIKE was born in Tokyo, Japan on October 14, 1947. He received the B.E. and M.E. degrees in Electrical engineering from Tokyo University, Tokyo, Japan in 1970, 1972 respectively. He received the Phd. from Tokyo University in 1991.

He was formerly with C&C Research Laboratories of NEC Corporation, where he was engaged in design and development of parallel machines including: parallel logic simulation machine HAL, parallel circuit simulation machine Cenju, and massively parallel machine Cenju-3 and Cenju-4. From 1996 to 1999, he served as the general manager of newly found C&C Research Laboratories NEC Europe, located in Germany.

Since 2000, he has been a Professor at the Faculty of Computer and Information Sciences, Hosei University.

His current research areas include: parallel computer architecture and its applications in scientific and intelligent computing.

He is a member of the IEICE of Japan and Information Processing Society of Japan.

He received the best paper award in 1985, the 25 year's anniversary best paper award in 1985, and the 30 year's anniversary best paper award in 1990, from the Information Processing Society of Japan.

Message

My research area focuses on achieving high-performance applying parallel and distributed processing technologies in both scientific and intelligent computing areas.

With the advancement of microprocessor, parallel processing is becoming important technology. However, exploiting parallelisms in applications and mapping them onto actual parallel machines become difficult if the number of processors is increased. Current research interest is to apply PC cluster system to important applications, such as DNA information processing.

My hobbies are Sailing-ship model building, Classical music listening and Skiing.

Professor

Yamin LI

Yamin Li received his BS, MS, and Ph.D degrees in computer science and engineering from Tsinghua University, Beijing, China in 1982, 1984, 1989, respectively. From 1984 to 1993, he was a faculty member of Tsinghua University. From 1993 to 2000, he was an associate professor of University of Aizu. Since 2000, he has been a professor at the Faculty of Computer and Information Sciences, Hosei University.

His current research interests include: advanced computer organization and architecture, distributed and parallel computer architecture, parallel multithreaded architecture, and computer arithmetic algorithm and hardware implementation.

He is a senior member of the IEEE and a member of the IEEE Computer Society.

Publications (January 2001 ~ December 2001)

1. Kenji Watanabe, Wanming Chu, and Yamin Li, "Exploiting Java Instruction/Thread Level Parallelism with Horizontal Multithreading", *Australian Computer Science Communications*, Vol.23, No.4, IEEE Computer Society Press, 2001, pp.122-129.

   Abstract — Java bytecodes can be executed with the following three methods: a Java interpreter running on a particular machine interprets bytecodes; a Just-In-Time (JIT) compiler translates bytecodes to the native primitives of the particular machine and the machine executes the translated codes; and a Java processor executes bytecodes directly. The first two methods require no special hardware support for the execution of Java bytecodes and are widely used currently. The last method requires an embedded Java processor, picoJavaI or picoJavaII for instance. The picoJavaI and picoJavaII are simple pipelined processors with no ILP (instruction level parallelism) and TLP (thread level parallelism) supports. A so-called MAJC (microprocessor architecture for Java computing) design can exploit ILP and TLP by using a modified VLIW (very long instruction word) architecture and vertical multithreading technique, but it has its own instruction set and cannot execute Java bytecodes directly. In this paper, we investigate a processor architecture which can directly execute Java bytecodes meanwhile can exploit Java ILP and TLP simultaneously. The proposed processor consists of multiple slots implementing horizontal multithreading and multiple functional units shared by all threads executed in parallel. Our architectural simulation results show that the Java processor could achieve an average 20 IPC (instructions per cycle), or 7.33 EIPC (effective IPC), with 8 slots and a 4-instruction scheduling window for each slot. We also check other configurations and

give the utilization of functional units as well as the performance improvement with various kinds of working loads.

2. Yamin Li and Shietung Peng, ``Fault-tolerant Routing and Disjoint Paths in Dual-cube: a New Interconnection Network", Proceedings of the 2001 International Conference on Parallel and Distributed Systems (ICPADS'2001), IEEE Computer Society Press, 2001, pp.315-322.

Abstract — In this paper, we introduce a new interconnection network, the dual-cube, its topological properties, and the routing/broadcasting algorithms in the dual-cube. The advanced subjects such as fault-tolerant routing and constructing multiple disjoint paths in dual-cubes are also included in this paper. The binary hypercube, or r-cube, can connect 2^r nodes. In contrast, a dual-cube with r links for each node, F_r, can connect 2^{2r-1} nodes while keeps most of topological properties of hypercubes. Fault-tolerant routing and constructing multiple disjoint paths in dual-cubes can be solved elegantly using a new structure, called extended cube. We show that for any two nonfaulty nodes s and t in F_r which contains up to $r-1$ faulty nodes, we can find a fault-free path s to t, of length at most $3d(s,t)$ in $O(r)$ optimal time, where $d(s,t)$ is the distance between s and t. We also show that, in a fault-free F_r, r disjoint paths s to t, of length at most $d(s,t)+6$ can be constructed in $O(2^r)$ optimal time.

3. Yamin Li and Shietung Peng, ``Algorithms of Routing and Matrix Multiplication on Dualcube", Proceedings of the Second International Conference on Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing (SNPD01), Nagoya Institute of Technology, Japan, Aug., 2001, pp422-429.

Abstract — Dualcube is an interconnection networks that has hypercube-like structure with the capacity to hold much more nodes than the conventional hypercube with the same number of links per node. The motivation of using dualcube as an interconnection network is to mitigate the problem of increasing the number of links in the large-scale hypercube network while keeps most of the topological properties of the hypercube network. In this paper, we focus on the design of efficient algorithms for routing and numerical operations on dualcube such as prefix computation, vector-matrix and matrix-matrix multiplications. Our results show that the routing and the basic numerical computations can be done on dualcube almost as fast as those on hypercube.

4. Yamin Li, Shietung Peng, and Wanming Chu, ``Efficient Collective Communications in Dual-cube", Proceedings of the Thirteen IASTED International Conference on Parallel and Distributed Computing and Systems (PDCS-2001), Anaheim, USA, Aug., 2001, pp266-271.

Abstract — The binary hypercube, or n-cube, has been widely used as the

interconnection network in parallel computers. However, the major drawback of the hypercube is the increase in the number of communication links for each node with the increase in the total number of nodes in the system. This paper introduces a new interconnection network for large-scale parallel computers called dual-cube. This network mitigates the problem of increasing number of links in the large-scale hypercube network while keeps most of the topological properties of the hypercube network. Design of efficient routing algorithms for collective communications is the key issue for any interconnection networks. In this paper, we show that collective communications can be done efficiently in dual-cube.

5. Yamin Li, Shietung Peng, Wanming Chu, and Sanli Li, ``Properties and Performance of Dual-cube Architecture'', Proceedings of The Second International Conference on Computer and Information Technology (CIT'2001), *Journal of Shanghai University*, Vol. 5, Suppl. Sep. 2001, Shanghai University Press, pp.53-61.

Abstract — The properties and performance of the dual-cube architecture, an interconnection network for large-scale parallel computers, are studied. The dual-cube is derived from the conventional hypercube in order to mitigate the problem of increasing communication links in hypercube for large-scale parallel computers. We investigate the properties of the dual-cube, including diameter, bisection width, cost, average distance, and give algorithms for total exchange communication and arithmetic applications in dual-cube, and evaluate the performance of these algorithms.

Professor

Shaoying LIU

Shaoying LIU was born in Shannxi Province, China on April 25, 1960. He received a B.Sc and an M.Sc. degrees in Computer Science both from Xi'an Jiaotong University, Xi'an, China in 1982 and 1987, respectively, and a Ph.D in Computer Science from the University of Manchester, U.K. in 1992. From 1982 to 1988, he worked as an Assistant Lecturer and Lecturer, respectively, in the Department of Computer Science at Xi'an Jiaotong University. From 1991 to 1994, he worked as a Research Associate in the Department of Computer Science at the University of York, and as a Research Assistant in the Department of Computer Science at the Royal Holloway and Bedford New College of London University, respectively. In 1994 he joined Hiroshima City University, Japan, as an Associate Professor in the Department of Computer Science, and he worked there until March 2000. He was invited as a Visiting Research Fellow by The Queen's University of Belfast, Northern Ireland, U.K., in 1994, and an Academic Visitor by the Computing Laboratory at Oxford University, U.K., in 1998. In April 2000, he joined the Faculty of Computer and Information Sciences at Hosei University, Japan, as an Associate Professor, and then a Professor since April 2001.

His current research areas include: formal engineering methods, internet-based intelligent software engineering supporting environments, and safety-critical and complex computer systems. In particular, he has been concentrating on the research of developing a formal engineering method called SOFL and related software verification techniques, such as fault tree analysis, specification testing, and specification-based program testing.

He is a member of the IEEE Computer Science Society. He received an "Outstanding Paper Award" at 1996 IEEE International Conference on Engineering of Complex Computer Systems (ICECCS'96) and a "Certificate of Appreciation for Outstanding Service as ICFEM'97 General Chair and Founder" at 1997 IEEE International Conference on Formal Engineering Methods (ICFEM'97) from IEEE Computer Society Technical Committee on Complexity in Computing.

Message

The goal of my research is to provide effective languages, methods, and supporting environments for developing reliable and robust complex software systems. To reach this goal, my own and my group's research has been centered on the development of a formal engineering method called SOFL, standing for Structured Object-Oriented Formal Language, and the rigorous software verification techniques, such as fault tree analysis and testing. Recently, I am more interested in research on internet-based intelligent software engineering supporting environments, and application of formal engineering methods to safety-critical and complex computer systems.

My hobby includes table tennis, soccer, and Karaoke.

Publications (January 2001 ~ December 2001)

1. Takaaki Nakano, Shaoying Liu, "Improving Software Process Quality Using Formal Engineering Methods", Proceedings of Foundation of Software Engineering 2001 (FOSE2001), Kindai Science Press · November 2001, pp.163-166.

   Abstract — Many software projects fail because they are not well managed. One of the key reasons for the poor management is that the process is not precisely specified and analyzed before projects are carried out. In this paper, we put forward an approach to defining software processes using the formal specification language SOFL, standing for Structured Object-oriented Formal Language. We discuss how to use various resources, such as software, hardware, human, budget, time, and so on, and describe an example to demonstrate how this approach can be applied in practice.

2. Shaoying Liu, Jin Song Dong, "Class and Module in SOFL", Proceedings of The Second Asia-Pacific Conference on Quality Software", IEEE Computer Society Press, Hong Kong, 10-11 December 2001, pp. 241-245.

   Abstract — SOFL is a formal language and method for system specification and design. It was developed by integrating Petri Nets, Data Flow Diagrams, and VDM-SL. As the major feature of the original SOFL method is to use structured techniques for analysis and specification, and object-oriented techniques for design and implementation, SOFL has its own implementation language that is similar to C++. However, during our recent work of applying SOFL to software systems, the transformation of structured specifications to object-oriented implementations creates some difficulties, simply because of paradigms mismatch. In this paper we extend SOFL to a formal object-oriented language and method while keeping its structured features. This will allow powerful object-oriented reuse mechanism, such as class inheritance and object composition, to be utilized in the early phases, and transformation from SOFL specifications to commercial object-oriented programming languages to be readily achieved.

Associate Professor

Michael McDONALD

Michael McDONALD was born in Manchester, England, on August 21, 1959. He received the B.A. and M.A. degrees in music from Cambridge University, England, in 1975 and 1979, respectively. After obtaining certification as an English teacher (Royal Society of Arts Cert. TEFL), he taught English at Academy International, London, from 1979 to 1981. He then moved to Tokyo, first as an English teacher at Business English Center, from 1981 to 1987, and next as a technical editor at IBM Japan, from 1987 to 2000.

Since April 2000, he has been an Associate Professor of English at the Faculty of Computer and Information Sciences, Hosei University.

His current research interests include the structure of research papers, error analysis, and functional grammar.

He is a committee member of the Society of Writers, Editors, and Translators (SWET), and a member of the Japan Association of Language Teachers (JALT) and Teachers of English to Speakers of Other Languages (TESOL).

He received an Administrative Excellence award from IBM in 1990

Message

English is the *de facto* international medium of communication in the world of computers, and especially of the Internet. Hosei's Faculty of Computer and Information Science provides a unique opportunity for Japanese students to obtain a bilingual education in computer-related studies, and it is a pleasure and a privilege for me to be a part of this pioneering enterprise, particularly as it allows me to make use of the experience I have gained in my two previous lines of work, as an English teacher and as a technical editor.

I also retain a strong interest in my original field of study, classical music, and I enjoy playing the piano and listening to music in my spare time.

Professor

Tetsuo MIZOGUCHI

Tetsuo MIZOGUCHI was born in Harbin, Manchuria(now North-Eastern China) on December 22, 1941. He received a BE in electrical engineering from the Chiba University, Japan in 1965, an MA in computer science from the University of California, Berkeley, USA in 1971 and a Dr.Eng in Information Engineering from the Tokyo Institute of Technology in 1979. From 1965 to 1969, he was with the Computer Engineering Department, Kamakura, Mitsubishi Electric, Japan, where he was engaged in business computer hardware design (CPU, Main Memory System and Tape Drive/ Disk Drive control unit). From 1969 ,to 1972, he was a research assistant at Computer Science Department, University of California, Berkeley, USA. From 1972 to 1998, he was with Research and Development Lab, and System Engineering Center, Mitsubishi Electric, Japan where he worked on the developments of Database Management System, banking system, air traffic control system, navigation systems and others. From 1998 to 2002, he was with Department of Software and Information Science, Iwate Prefectural University, Iwate, Japan as a professor. Since 2002, he has been a professor of the Faculty of Computer and Information Sciences, Hosei University.

His current research areas include database management system development, information modeling (including biological information modeling, information sharing paradigm) and database applications(including air transport system, web database). He is a member of the IEEE computer Society, American Association for Advancement of Science, American Society for Biochemistry and Molecular Biology, Japanese Society for Management Information and the Information Processing Society of Japan.

Message

Computer Science is to deal with many artifacts, having nothing to do with natural and social entities, while finding and solving problems for natural and social contexts are real. Computer Science and its outcomes are the forerunner of human capability. It has to be emphasized that understanding 'rules' of artifacts combined with understanding real world is essential to be successful in this area.

Publications (January 2001 ~ December 2001)

1. T. Mizoguchi, "AIDC; Air Traffic Service Inter-facility Data Communication", Invited Presentation, ICAO (International Civil Aviation Organization) Asia/Pacific ATN Seminar, Singapore, Mar., 2001.
   http://www.icao.int/icao/en/ro/apac/attf3/pres_atns3-2.pdf

   Abstract — The document discusses what is AIDC and what are AIDC requirements, then describes AIDC as Standards. It is explained that there are two AIDC Standards, APANPIRG AIDC ICD and ATN AIDC SARPs. Before describing ATN AIDC SARPs, some notions of communication protocols are shown. ATN AIDC SARPs are described in two parts; Connecting Peer AIDCs, and Sending/Receiving messages. The implicit connection establishment and release, protocol machine state transition are shown for connection, then AIDC messages, state transition, message sequencing are described in messaging. Some remarks are made for AIDC implementations, choosing infrastructure, standards, and also addressed are transition issues, and mutual agreements between CAAs.

2. T. Mizoguchi, "AMHS; Air Traffic Service Message Handling System" Invited Presentation, ICAO (International Civil Aviation Organization) Asia/Pacific ATN Seminar, Singapore, Mar., 2001.
   http://www.icao.int/icao/en/ro/apac/attf3/pres_SN3-3_%20AMHS.pdf

   Abstract — The document discusses what is AMHS then describes AMHS as Standards. AMHS(ATS Message Handling System) is the system for ground communication for ATS. ATN AMHS SARPs are defined based on ITU-T X.400 standards. There are two major End Systems, AMHS Server (or MTA; Message Transfer Agent) and AMHS UA(User Agent). The messages transferred among Servers are handled in the store-and-forward manner. Also discussed are the AFTN/AMHS Gateway functionality and the transition issues from AFTN to AMHS.

3. T. Mizoguchi and Y. Tanaka "Modeling and Representing Biological Information" Technical Report of IEICE, Vol. 101, No.193, Data Engineering DE2001-95, June, 2001

   Abstract — There are huge amounts of biological experimental data as well as published or electronically stored documents. An approach is chosen to capture 'information' in some review papers published. A modeling template is adopted to

represent the contents of the review publications. One review paper is selected and the contents of the document are described in the form of diagram. Some lessons learning are discussed.

4. T. Mizuno and T. Mizoguchi, "Running time information sharing system among vehicle drivers" Technical Report ITS 6-30, Information Processing Society of Japan, Sept., 2001

Abstract — The concentration of cars causes a traffic jam. If we can disperse this concentration at the urban or commercial area where traffic jams often occur, by changing route or time, the traffic jam will be resolved. We think it is important to collect the detailed running time information and provide it to drivers. So we developed running time information sharing system which user shares one's condition with other users. And we studied how to collect information and how to display the collected information.

5. Y. Ozawa and T. Mizoguchi, "Validation of conflict avoidance of the airplane in free flight" Annual Fall Convention Record 5P-7 , Information Processing Society of Japan, Sept., 2001

Abstract — The current ATS; Air Traffic Service is based on the ground navigation aids, radar and voice communication. The location-fixed ground navigation aids imply that the air routes are fixed. GPS makes it possible for airplane to fly without depending on the ground navigation aids. The free flight is proposed to fly alone any non-fixed air routes even without any clearances by controllers. It is still unclear whether free flight is feasible in the crowded air space or not. The simulation study is conducted to validate the conflict avoidance scheme in free flight environment.

6. M. Suzuki and T. Mizoguchi "Management Information System for municipalities" Annual Fall Convention Record 4T-4 , Information Processing Society of Japan, Sept., 2001

   M. Suzuki and T. Mizoguchi "Management Information System for municipalities" Annual Fall Convention Record 1B-1-3, Japanese Society for Management Information, Oct., 2001

Abstract — It will be a current trend to introduce ERP as a new system to municipalities. But there must be many municipalities unable to introduce ERP because of timing problems of renewal systems, budget and so on. We think municipalities having problems can introduce "total optimization", essences of ERP, by improvements of current systems, "personnel section", "financial section" and "general planning section". It will make them to able to refer other sections' data, promote mutual understanding, and make municipalities' business management more flexible. In addition, it will promote improvements of managerial posts inferior to private sectors.

7. T. Mizoguchi, "Two Dimensional Representation of Aircraft Surface Movement in Airport" Technical Report ITS 7-8, Information Processing Society of Japan, Nov., 2001

Abstract — A scheme of two dimensional representation for Surface Movement of Aircraft in Airport is proposed. The information related to the Surface Movement is in three dimensional domain; two dimensions in space and one in time. It is highly desirable to represent the Surface Movement information in a two dimensional form, since it enables for controllers to issue clearances, display and confirm the isuued clearances, and modify them as required, while an algorithm will be provided to generate conflict-free clearances. The scheme is applied to a set of samples of actual aircraft movements.

8. T. Mizoguchi, "Input to Routing Policy (IDRP) documentation" ICAO (International Civil Aviation Organization) Asia/Pacific ATN Transition Task Force Ad hoc WG-B meeting, Chiang Mai, Thailand, Dec., 2001.

Abstract — The messages are routed over the ATN via Routers. The messages are routed based on the technical, autonomous routing rules of IDRP, where each domain can make the routing decision based on the values of QoS: Quality of Service; integrity, performance, and cost, provided at the inter-domain interface. Besides the QoS based routing rules in the ATN, there is a need of routing policy in the Asia/Pacific region where the IDRP is open to include such policies. The structure of BIS hierarchy and BIS connectivity as well as the institutional considerations in the region has to be reflected to the routing policy. In the paper, the classification of routers, the roles of routes and their associated potential routing policy, and some other considerations are presented.

9. T. Mizoguchi, "Technical Document on ATN Performance" ICAO (International Civil Aviation Organization) Asia/Pacific ATN Transition Task Force Ad hoc WG-B meeting, Chiang Mai, Thailand, Dec., 2001.

Abstract — The paper provides the technical information on ATN Performance to be planned, installed and operated in the Asia/Pacific region. In order to focus our attentions and give a clear understanding on performance, the subject is divided into three sub-topics.

(1) At first, it provides some information on what is meant by ATN performance, and what kind of parameters are needed to characterize ATN performance,

(2) In order to provide any specific performance achievement, it is necessary to facilitate how the requirements are defined and stated, after that ,

(3) It provides how the operations based on the stated requirements are managed.

Professor

Ikuo NAKATA

Ikuo Nakata received the B. S. and M. S. degrees in mathematics and the D. Sc. degree in information science from the University of Tokyo, in 1958, 1960, and 1977, respectively.

He joined the Central Research Laboratory, Hitachi, Ltd. in 1960 and the Systems Development Laboratory, Hitachi, Ltd. in 1974. From 1979 to 1997 he had been a Professor of the Institute of Information Sciences and Electronics, University of Tsukuba. From 1997 to 2000 he had been a Professor of the University of Library and Information Science. Since 2000, he has been a Professor at the Faculty of Computer and Information Sciences, Hosei University.

His current research interests include programming languages, language processors, software engineering, and parallel processing.

He is a member of the Information Processing Society of Japan, the Institute of Electronics and Communication Engineers of Japan, the Japan Society for Software Science and Technology, the IEEE Computer Society, and the Association for Computing Machinery.

Publications (January 2001 ~ December 2001)

1. Miyni Guo and Ikuo Nakata, "A Framework for Efficient Data Redistribution on Distributed Memory Multicomputers," The Journal of Supercomputing 20 (3), pp. 243-265, November 2001.

Abstract — Array redistribution is required often in programs on distributed memory parallel computers. It is essential to use efficient algorithms for redistribution; otherwise the performance of the programs will degrade considerably. The redistribution overheads consist of two parts: index computation and inter-processor communication. In this paper, by using a notation for the local data description called an LDD, we propose a framework to optimize the array redistribution algorithm both in index computation and inter-processor communication. That is, our work makes an effort to optimize not only the computation cost but also communication cost for array redistribution algorithms. We present an efficient index computation method and generate a schedule that minimizes the number of communication steps and eliminates node contention in each communication step. Some experiments show the efficiency and flexibility of our techniques.

Professor

Kenji OHMORI

Kenji OHMORI was born in Aichi, Japan on April 12, 1945. He received a BE in mathematical engineering from the University of Tokyo, Japan in 1969, an MS in electrical engineering and computer science from the University of California, Berkeley in 1972 and a Dr.Eng in Information Technology from the University of Tokyo 1983. From 1969 to 1985, he was with the Central Research Laboratory, NEC, Kanagawa, Japan, where he was engaged in research of multi-processor computer architecture, computer-aided design machines and an object-oriented language. From 1985 to 2000, he was a professor of the Department of Industrial and System Engineering, Hosei University. Since 2000, he has been the founding dean and professor of the Faculty of Computer and Information Sciences, Hosei University.

His current research areas include computer architecture, computer-aided design, intelligent computing, genetic algorithm, image processing, pattern recognition and homotopy.

He is a member of the IEEE computer Society, the ACM, the Institute of Electronics, Information and Communication Engineers, and the Information Processing Society of Japan.

He received a Best Paper Award in 1985 from the Information Processing Society of Japan.

Message

Having a big dream and realizing it step by step are crucial in the information age, which is characterized by "change" and brings you a lot of chances such as achieving innovative technologies, establishing a breakthrough science, innovating profitable e-business and implementing sustainable social infrastracture.

Publications (January 2001 ~ December 2001)

1. H. Hanaizumi, K.Ohmori and T. Nakagawa. "Three Dimensional Thinning Algorithm and Its Application to Lung Cancers" JAMIT Frontier 2001 (in Japanese)

   Abstract — The helical CT is a very powerful tool to detect lung cancers. The helical CT, however, outputs a lot of slice images to be examined for a patient. Increase of number of images to be examined may cause miss detection of cancers. On the other hand, rapid development of multi- slice CT provides very high resolution 3D images and huge number of images to be examined. An efficient screening system has been required for improving the efficiency and the accuracy of the examination. We consider that multi-temporal proceeding of 3D lung images, i.e. changes detection between blood vessel images is one of the solutions to make efficient screening. Here, we propose a skeletonizing algorithm for blood vessel images whose shapes are distorted by breathing. The validity of the proposed algorithm was confirmed by numerical simulation. The application results of the algorithm to the actual 3D blood vessel images were also shown.

2. K. Narimatsu, S.Takatani and K.Ohmori. " A Multi-Element Tonometry Sensor For Noninvasive Measurement of Pulse Wave Velocity", Frontiers of Medical Electronics and Biological Engineering, Vol. 11, No. 1, pp45-58 (2001)

   Abstract — In the previous study, the multi-element tonometry sensor based noninvasive PWV measurement system was evaluated for its frequency response characteristics, and for its accuracy in pulse wave propagation time measurement in simulated circulatory system. Excellent results supported the use of this system in noninvasive measurement of PWV possibly from the carotid and femoral arteries. However, its accuracy has not been validated in the actual physiological system. Since the noninvasive pulse wave measurement is affected by the tissue between the sensor and the vessel, hold-down force applied to position the sensor, and physiological variables such as heart rate and blood pressure levels, further study was undertaken to quantify their effects upon pulse wave, hence PWV measurement. For the animal model, we used the common carotid artery of female goats whose body weight was close to average human size(60 Kg). The study was divided into two groups; in Group I the tonometric sensor was directly applied to the exposed left common carotid artery, while in Group II the sensor was applied over the skin and subcutaneous tissues covering the artery. As a control measurement, a 1.4 F Millar catheter was inserted inside the carotid artery at the vicinity of tonometric measurement site. Also, a 4 F Millar catheter was inserted through a contra-lateral carotid artery and its tip was advanced to the root of aorta for

measurement of aortic pressure waveform. Both the Millar and tonometric measurements were referenced to the aortic waveform for computation of PWV. First, we changed the hold down forces of the sensor applied to the artery. Second, systolic blood pressure levels were changed from 85 to 170 mmHg by drugs. Third, heart rate was changed from 80 to 145 beats/minute by drugs and a pacemaker. The results showed an excellent correlation between the tonometric and Millar measurements with and without skin and subcutaneous tissues. The correlation coefficients between the Millar and tonometric methods for PWV measurements were 0.99 with and without skin and subcutaneous tissues. The bias±2SD for the pulse transmission time between the two methods(the Millar minus tonometric) were -1.14±0.76 ms for the exposed artery, while for the covered artery -0.87 ± 0.56 ms. These results confirmed that the arterial wall, subcutaneous tissue and skin do not affect the accuracy of pulse wave measurements under varying physiological conditions. It was thus concluded that the multi-element sensor could be used for effective and accurate noninvasive PWV measurement in vivo.

3. K.Narimatsu, S. Takatani, H. Kanai and K. Ohmori. "Accuracy of Multi-Element Tonometry Sensor-Based Noninvasive PWV Measurement System as Evaluated in Animal Model" Journal of the Japan Society of Medical Eletronics and Biological Engineering, Vol.39 No.3 (2001) 30-36(in Japanese)

Abstract — A new pulse wave velocity (PWV) measurement system has been developed using a novel multi-element tonometry carotid sensor combined with a heart sound sensor. In this system, PWV is derived from the time lag between the second heart sound (S2) obtained from the heart sound sensor and the dicrotic notch in the carotid pulse waveform, and the physical distance between the heart and the neck. We assessed the accuracy of the system in an animal model. The study was divided into two groups; in Group I the tonometric sensor was directly applied to the exposed artery, while in Group II the sensor was applied over the skin and subcutaneous tissues covering the artery. To examine the fidelity of the dicrotic notch, the ejection time with the tonometry sensor was compared with that obtained from the intra-arterial catheter measurement. The correlation coefficients between them were 0.99 in both groups. The bias error±2SD, defined as the mean of the differences between the tonometry and the catheter measurements±the twice the standard deviation, was 0.13±1.45 ms in Group I, while in Group II 0.16±1.64 ms. These results confirmed that the arterial wall, subcutaneous tissue and skin did not affect the accuracy of the dicrotic notch fidelity. The reproducibility of the system was assessed in 18 human subjects. The 2SD of intraobserver and interobserver reproducibility of the S2-carotid PWV measurement were 0.54 and 0.38 m/s, respectively, demonstrating high reproducibility of the measurement. From a clinical point of view, the S2-carotid PWV was compared with the aortic PWV. The bias error±2SD between the two measurements was –0.14±3.24 m/s with the correlation coefficient being 0.73. Although the S2-carotid PWV may not replace the aortic PWV directly, we believe that the S2-carotid PWV with the new system may become a new clinical parameter for early detection of cardiovascular disorders such as cerebrovascular diseases.

4. K. Ohmori and T. L. Kunii. "Shape Modeling Using Homotopy" Shape Modeling International '2001 (May), Genoa Italy (2001) 126-133

Abstract — We introduce a new method of shape modeling using homotopy and object-oriented modeling. Homotopy is a kind of topology that gives more general ideas of preserving invariant properties of geometrical objects and is further expanded to conceptual objects. The conventional shape modeling using polygonalization has serious difficulties in preserving invariant properties, leading to the necessity of a massive amount of data. On the other hand, the combination of homotopy and object oriented modeling, which uses class hierarchy, help preserve invariant properties of all abstraction levels. We will explain how our new method will help us preserve invariant properties, which keeps the amount of data to the minimum possible level, using an example of a tennis ball rolling on a slope.

5. K. Ohmori, "Cellular Structured Spaces for Multimedia" Proceedings of The 7th International Conference on Distributed Multimedia Systems, pp. 171-178, Tamkang University, Taipei, Taiwan, September 2001.

Abstract — We introduce new conceptual tools for multimedia. Multimedia, ranging from traditional media such as newspapers, TVs and movies to new media such as computers, mobile phones and game machines, is a leading technology in the information age and is based on various technologies. Among them, computer graphics and digital animation are key technologies. These technologies are based on shape modeling of how objects are visualized as multimedia. We introduce a new method of multimedia using homotopy and object-oriented modeling. Homotopy is a kind of topology that gives more general ideas of preserving invariant properties of geometrical objects and is further expanded to conceptual objects. The conventional shape modeling in multimedia uses polygonalization and has serious difficulties in preserving invariant properties, leading to the necessary of a massive amount of data. On the other hand, the combination of homotopy and object-oriented modeling, which uses class hierarchy, help preserve invariant properties at all abstraction levels. We will explain how our new method will help us preserve invariant properties, while keeping the amount of data to the minimum possible level, using an example of a teapot.

6. H. Hanaizumi and K.Ohmori. "Three Dimensional Thinning Algorithm and Its Application" JAMIT Frontier 2002, Beppu Japan (2002) (in Japanese)

Abstract — In order to construct a screening system in which multi-temporal 3D helical CT data are registered and shape changes of vessels during the period are detected, we propose an algorithm using Homotopy of recognizing vessels and bronchus in lung. This algorithm is one of region growing algorithms and we call it as successive region growing (SRG). The algorithm successively expands cross sections from the start point to the end of vessels and a skeleton of the vessel is obtained by tracing gravity centers of each cross section. Since SRG is very sensitive, it may yield false branches for a noisy surface. These false branches are successfully removed by using an index 'significance' of the branch. In

the case of bronchus recognition, terminal point of its small branch may connect to outer lung in terms of boxel density and the connection causes miss-recognition of branches. For avoiding the miss-recognition, SRG automatically detects the connection and stops itself. In this paper, we describe the principle and the procedure of SRG. The application results of SRG to actual multi-temporal 3D CT images are also shown.

7. W. Li and K.Ohmori. "Hierarchical Visualization of 3-Dimensional Objects Using Cellular Structured Spaces", Workshop on ITS and Image Processing, Sapporo Japan (2002) (in Japanese)

Abstract — Three-dimensional computer graphics is currently visualized on a computer display, using the technology of polygonization modeling with a single layer structure. However, characteristic properties of objects cannot be preserved by a single layer structure. Therefore, this paper describes how to build data structure of objects with multiple-layered structure. Cell structured spaces give means of a cell model for representing abstract classes of an object, and are helpful as effective tools for expressing the abstract model of visualization.

Professor

Akira K. ONOMA

Akira K. ONOMA He received BS Degree in Physics from Tokyo University of Sciences at 1963. From 1963 to 1970, he worked for Hitachi, Tokyo Japan and from 1970 to 1999 he worked for Hitachi Software Engineering, Yokohama Japan. At 1990, he moved to Hitachi America, Tarrytown NY and founded Hitachi Software Engineering America, Brisbane CA and he managed it as a President. He also managed Information and Graphics Systems, Boulder CO as a Board Director from 1990 to 1991.

He received doctoral degree in Software Engineering from Hiroshima University, Hiroshima Japan at 1998. He was a visiting professor, Computer Science and Engineering, University of Minnesota, Minneapolis MN from August 1999 to February 2000. Since April 2000, he has been a Professor of Computer and Information Sciences, Hosei University.

His research interest is in Software Engineering and Software Life Cycle including software design and software quality assurance.

His main academic service has been for IEEE and ACM. He was a Program Chair of IEEE HASE'96 (High Assurance Systems Engineering Workshop, Niagara-on-the-Lake Canada) and IEEE COMPSAC'98 (International Computer and Software Applications Conference, Vienna Austria) and ACM SSR'99 (ACM Symposium on Software Reusability, Los Angeles CA) and one of program committee members of COMPSAC'99 (Phoenix AZ), COMPSAC'00 (Taipei Taiwan) and COMPSAC'01 (Chicago Ill). He is now an editing committee member of Journal of the Society of Project Management from May 1999. He is a Steering Committee member of HASE.

He is a member of Computer Society of IEEE, ACM, JIPS and PM.

Professor

Shietung PENG

Shietung PENG was born in Shinchu, Taiwan on January 25, 1947. He received the B.S., and M.S. degrees in mathematics from National Taiwan University and Chin-Hua University in 1975 and 1977, respectively; and then, received M.S. and Ph.D. degrees in computer science from University of Texas at Dallas in 1984 and 1986, respectively. From 1986 to 1993, he was with the University of Maryland, Baltimore County, USA. From 1993 to 2000, he was with the University of Aizu, Aizu-wakamaysu, Japan. Since 2000, he has been a Full Professor at the Faculty of Computer and Information Sciences, Hosei University.

His current research areas include: parallel algorithms/ architectures, interconnection networks, routing algorithms, cluster computing, and design of array processors. He is a senior member of the IEEE Computer Society and ACM.
He received awards and grants from AFOSR and DOE, USA, and Grant-in-Aid for Scientific Research, Japan.

Message

My research and that of my graduate students focus on (1) design and analysis of parallel algorithms; (2) interconnection networks, (3) design of array processors; (4) design of efficient routing and communication algorithms for parallel computers and computer clusters. The motivation for the work is to find ideas that give the new knowledge about the efficient and effective use of the parallel/distributed computer systems. My hobbies are igo-playing, mountain-climbing, and swimming.

Publications (January 2001 ~ December 2001)

1. Y. Li, S. Peng, "Title: Fault-tolerant routing and disjoint paths in dual-cube: a new interconnection network," The Proceedings of The International Conference on Parallel and Distributed Systems (ICPADS'01), page 315 – 322, June 2001.

   Abstract — Fault-tolerant routing and multiple disjoint paths problem are the important issues for parallel/distributed computing and communication. In this paper, we give fault-tolerant routing algorithms and construction of disjoint paths in dual-cube: a new interconnection network for large-scale parallel/distributed computers. We show that for any two non-faulty nodes s and t in r-dimensional dual-cube with up to $r-1$ faulty nodes, a fault-free path of length at most $3d(s,t)$ can be found in $O(r)$ optimal time, where $d(s,t)$ is the distance between s and t. We also show that r disjoint paths of length at most $d(s,t)+6$ can be constructed in $O(r^2)$ optimal time.

2. Y. Li, S. Peng, "Algorithms of routing and matrix multiplication on dual-cube," The Proceedings of The International Conference on Software Engineering, Artificial Intelligence, Networking & Parallel/Distributed Computing (SNPD'01), page 422—429, August 2001.

   Abstract — Dual-cube is an interconnection network that has hypercube-like structure with the capacity to hold much more nodes than the conventional hypercube with the same number of links per node. In this paper, we present efficient algorithms for routing and numerical computations on dual-cube. The computational problems considered in this paper include prefix computation, vector-matrix and matrix-matrix multiplication. Our results show that routing and the basic computational problems listed above can be done on dual-cube almost as fast as on hypercube.

3. Y. Li, S. Peng, W. Chu, "Efficient collective communication in dual-cube," The Proceedings of The International Conference on Parallel and Distributed Computing Systems (PDCS'01), page 266 – 271, August 2001.

   Abstract — Collective communication is the core issue in parallel computing and networking. In this paper, we present efficient routing algorithms for collective communications in dual-cube, a new interconnection network for large-scale parallel

computers. The collective communications include one-to-all and all-to-all broadcasts and personalized communications. The results indicate that for collective communication, the dual-cube can be almost as efficient as the hypercube under single-port, cut-through communication model.

4. G-P Gu, S. Peng, "Multi-hop all-to-all broadcast on WDM optical networks," The Proceedings of The International Conference on Parallel Processing (ICPP'01), Workshop on Optical Networks, page 291 -- 296, September 2001.

Abstract — This paper considers the problem of wavelength routing in WDM optical ring, 2-D torus, or 3-D torus networks. The wavelength requirement is critical in large-scale WDM optical networks, especially for gossiping (all-to-all broadcast). In this paper, we show that the number of wavelengths for gossiping can be significantly reduced if multi-hops routing strategy is used. We prove that gossiping can be realized in k-hops by $cN^{1+1/k}$ wavelengths on the ring, $cN^{1+1/(2k)}$ wavelengths on the 2-D torus, and $cN^{1+1/(3k)}$ wavelengths on the 3-D torus, where N is the number of nodes.

5. Y. Li, S. Peng, W. Chu, S. Li, "Properties and Performance of Dual-cube Architecture," The Proceedings of The International Conference on Computers and Information Technology (CIT'2001), page 53 – 61, September 2001.

Abstract — The properties and performance of the dual-cube architecture, an interconnection network for large-scale parallel computers, are studied. The dual-cube is derived from the conventional hypercube in order to mitigate the problem of increasing communication links in hypercube for large-scale parallel computers. We investigate the properties of the dual-cube, including diameter, bisection width, cost, average distance, and give algorithms for total exchange communication and arithmetic applications in dual-cube, and evaluate the performance of these algorithms.

Professor

Yuji SATO

Yuji SATO was born in Tokyo, Japan on July 3, 1957. He received the B.E and Ph.D. degrees in engineering from Tokyo University, Tokyo, Japan in 1981, 1997, respectively. From 1981 to 2000, he was with the Hitachi Ltd., Tokyo, Japan. From 1992 to 1995, he was also temporarily transferred to Real World Computing Partnership, Tsukuba, Japan. In April 2000, he joined the Faculty of Computer and Information Sciences at Hosei University, Japan, as an Associate Professor, and then a Professor since April 2001. His current research areas include: evolutionary computation for neural networks, and evolution of machine learning techniques in design.

He is a member of the IEEE Computer Society, International Society for Genetic and Evolutionary Computation, and Information Processing Society of Japan.

Message

My research and that of my graduate students focus on evolutionary computation, artificial life, and complex adaptive systems. I want to bring up talented people with the creatively. My hobby is to play tennis, traveling, and gardening.

Publications (January 2001 ~ December 2001)

1. Y. Sato, "Proposal for a Field-Evolvable Hardware based on a Microprocessor Incorporated Flash Memory", Proc. of the 2001 Congress on Evolutionary Computation, IEEE Press, pp. 608-615, Seoul, Korea, May 2001.

   Abstract — A new idea for evolvable hardware based on a microprocessor is proposed. Evolvable hardware is a new direction in hardware research that fuses evolutionary computation and reconfigurable logic LSI circuits. In recent years, there has been much research using Programmable Logic Devices (PLD) and Field Programmable Gate Arrays (FPGA). In particular, the application of digital circuit evolution to engineering fields has already begun. On the other hand, long learning time, difficulty to predict when an effective capability will appear, large chip size and other such problems have hindered progress in diffusion into engineering fields. Here, we propose register transfer level evolution performed on a microprocessor as a means of addressing these problems. Specifically, we propose (1) incorporating flash memory into the microprocessor to allow on-board programming and reprogramming, (2) using genetic algorithms to provide a register transfer level learning capability, and (3) the use of a framework that provides for the coexistence of static programs and programs that self-organize through learning. On the basis of a simple hand-design, we concluded that the proposed method is more effective in terms of learning efficiency and reliability than the conventional approach using FPGA and PLD.

2. Y. Sato, "Proposal for a Register Transfer Level Evolution on a Microprocessor Incorporated Flash Memory", Proc. of the 2001 Genetic and Evolutionary Computation Conference, Morgan Kaufmann Publishers, p. 1216, San Francisco, USA, July 2001.

   Abstract — A new idea for evolvable hardware based on a microprocessor is proposed. In recent years, there has been much research using Programmable Logic Devices (PLD) and Field Programmable Gate Arrays (FPGA). In particular, the application of digital circuit evolution to engineering fields has already begun. On the other hand, long learning time, difficulty to predict when an effective capability will appear, large chip size and other such problems have hindered progress in diffusion into engineering fields. Here, we propose register transfer level evolution performed on a microprocessor as a means of addressing these problems.

3. R. Goto and Y. Sato, "Motion Analysis of Moving Objects with Genetic Algorithms", Proc. of the 2001 Genetic and Evolutionary Computation

Conference, Morgan Kaufmann Publishers, pp. 1276-1283, San Francisco, USA, July 2001.

Abstract — A series of basic experiments were conducted to investigate the applicability of genetic algorithms (GAs) to complex problems including (1) multiobjective optimization, (2) time-series prediction, (3) analysis from noisy observational data, (4) implicit function solutions, and other problems. More specifically, this work addresses the problem of tracking a moving object as it tries to camouflage its movements (say to avoid being pursued or attacked) by exploring the effectiveness of genetic algorithms in predicting the future position of moving objects from noisy time-series data alone such as obtained from radar or observational equipment. For the present purpose, we assume a moving object such as a ship that would be unlikely to maintain forward momentum with frequent sharp course corrections. We therefore assume a moving object that attempts to camouflage its movements by pursuing sine-wave, zigzag, or linear motion. The experimental findings demonstrate that the genetic algorithm-based approach yields more accurate solution than the conventional approach based on regression analysis and assuming uniform velocity linear motion.

4. Y. Sato, M. Kawamoto, and M. Chizaki, "Verification of Text Transcription History by using Evolutionary Algorithms", Advances in Artificial Life, Lecture Notes in Artificial Intelligence 2159 (Proc. of the 6th European Conference on Artificial Life), J. Kelemen and P. Sosik (Eds.), Springer-Verlag, pp. 444-453, Prague, Czech Republic, September 2001.

Abstract — The application of ALife methods to the field of historical document genealogy is reported. At first, the conventional analytical approaches to Greek and Latin text transcription history are described and the problems associated with them are discussed. Next, focusing on the similarities between text transcription history and the Tierra system, we propose the use of evolutionary algorithms for the verification of text transcription genealogies with the purposes of breaking through the limitations of conventional analysis of Greek and Latin text transcription history and increasing the reliability of those methods. In this report, as the first step, we deal only with the mutations involved in copying, and attempt to make use of them in the verification of genealogy. We conducte computer simulation experiments based on existing manuscript data and demonstrate the feasibility of effectively using evolutionary algorithms as one means of verifying the currently proposed Greek and Latin text genealogies.

5. Y. Sato, "Interactive Evolution of Adaptive Parameter for Speaker Verification Systems", Proc. of the IPSJ Symposium Series Vol. 2001, No. 12, pp. 227-232, Kyoto, Japan, October 2001. (in Japanese)

Abstract — The application of interactive evolutionary algorithms (EA) is proposed as a means of improving the accuracy of a speaker verification system through the adaptation of semi-continuous hidden Markov models (HMM). Interactive EA is an evolutionary

algorithm in which the genetic operator evolves on the basis of the user's subjective criteria as the result of interaction between the user and a computer. The use of interactive EA is spreading, primarily in artistic fields such as computer graphics and music. We employed an interactive EA to search for the parameter to create a speaker HMM through speaker adaptation of a speaker-independent phoneme HMM that was obtained earlier through trial and error experimentation by other researchers. Specifically, the parameter is the confidence coefficient of a maximum a posteriori (MAP) probability estimation. Our motivation was the belief that it would be possible to make good use of the special feature of evolutionary algorithms that they can be applied effectively to problems for which the nature of the target function is not well known. The result was an observed speaker verification accuracy of 6% for voice recorded by telephone and 1% for voice recorded from a microphone.

6. Y. Sato, "Proposal for a Field-Evolvable Hardware based on a Microprocessor Incorporated Flash Memory", Proc. of the IPSJ Symposium Series Vol. 2001, No. 12, pp. 115-122, Kyoto, Japan, October 2001. (in Japanese)

Abstract — A new idea for evolvable hardware based on a microprocessor is proposed. Evolvable hardware is a new direction in hardware research that fuses evolutionary computation and reconfigurable logic LSI circuits. In recent years, there has been much research using Programmable Logic Devices (PLD) and Field Programmable Gate Arrays (FPGA). In particular, the application of digital circuit evolution to engineering fields has already begun. On the other hand, long learning time, difficulty to predict when an effective capability will appear, large chip size and other such problems have hindered progress in diffusion into engineering fields. Here, we propose register transfer level evolution performed on a microprocessor as a means of addressing these problems. Specifically, we propose (1) incorporating flash memory into the microprocessor to allow on-board programming and reprogramming, (2) using genetic algorithms to provide a register transfer level learning capability, and (3) the use of a framework that provides for the coexistence of static programs and programs that self-organize through learning. On the basis of a simple hand-design, we concluded that the proposed method is more effective in terms of learning efficiency and reliability than the conventional approach using FPGA and PLD.

7. R. Goto and Y. Sato, "Motion Analysis of Moving Objects with Genetic Algorithms", Proc. of the IPSJ Symposium Series Vol. 2001, No. 12, pp. 211-214, Kyoto, Japan, October 2001. (in Japanese)

Abstract — A series of basic experiments were conducted to investigate the applicability of genetic algorithms (GAs) to complex problems including (1) multiobjective optimization, (2) time-series prediction, (3) analysis from noisy observational data, (4) implicit function solutions, and other problems. More specifically, this work addresses the problem of tracking a moving object as it tries to camouflage its movements (say to avoid being pursued or attacked) by exploring the effectiveness of genetic algorithms in predicting the

future position of moving objects from noisy time-series data alone such as obtained from radar or observational equipment. For the present purpose, we assume a moving object such as a ship that would be unlikely to maintain forward momentum with frequent sharp course corrections. We therefore assume a moving object that attempts to camouflage its movements by pursuing sine-wave, zigzag, or linear motion. The experimental findings demonstrate that the genetic algorithm-based approach yields more accurate solution than the conventional approach based on regression analysis and assuming uniform velocity linear motion.

8. Y. Sato, M. Kawamoto, and M. Chizaki, "Verification of Text Transcription History by using Evolutionary Algorithms", Proc. of the IPSJ Symposium Series Vol. 2001, No. 12, pp. 3-10, Kyoto, Japan, October 2001. (in Japanese)

Abstract — The application of ALife methods to the field of historical document genealogy is reported. At first, the conventional analytical approaches to Greek and Latin text transcription history are described and the problems associated with them are discussed. Next, focusing on the similarities between text transcription history and the Tierra system, we propose the use of evolutionary algorithms for the verification of text transcription genealogies with the purposes of breaking through the limitations of conventional analysis of Greek and Latin text transcription history and increasing the reliability of those methods. In this report, as the first step, we deal only with the mutations involved in copying, and attempt to make use of them in the verification of genealogy. We conducte computer simulation experiments based on existing manuscript data and demonstrate the feasibility of effectively using evolutionary algorithms as one means of verifying the currently proposed Greek and Latin text genealogies.

Professor

Hiroshi HANAIZUMI

Hiroshi HANAIZUMI was born in Fukushima, Japan on February 16, 1956. He received the B.Sc. degree in communication engineering from the University of Electro-Communications, Tokyo, Japan, in 1978, and the M.Sc. and Dr. Eng. Degrees in instrumentation physics from The University of Tokyo, Japan, in 1980 and 1987, respectively. From 1981 to 1987 he was a research assistant at the Department of Mathematical Engineering and Information Physics, The University of Tokyo. He joined Hosei University in 1987 as a Lecturer in the Department of Industrial and Systems Engineering, and was an Associate Professor from 1989 to 1995, and has been a Professor since 1996. Since 2000, he has been a Professor at the Faculty of Computer and Information Sciences, Hosei University. His current research areas include remote sensing, face recognition and 3D medical image processing.

He is a member of the IEEE Computer Society, Geoscience and Remote Sensing Society, Institute of Electronics, Information and Communication engineers, and Society of Instrument and Control Engineers.

Message

My research focuses on image processing and recognition. Images have much information on the objects, for example, remotely sensed images include spectral, spatial and temporal information about terrain objects, and face images personal information. The main purpose of the image processing is to extract the information by using various techniques. Noise reduction is one of very important processing in these techniques. The information extracted is then generalized with the physical properties (priori information) and is used for recognizing "what or how is the object". The recognized results are used as sources of digital media. I want to realize smart recognition like human. My current research interests are image processing in remote sensing, medical image processing and person recognition from face image. My hobbies are reading and gardening.

Publications (January 2001 ~ December 2001)

1. M. Kagawa and H. Hanaizumi, "Development of a System for InSAR Phase Processing," *Trans., SICE*, Vol.37, No.11, pp.1012-1019, November 2001 (in Japanese)

   Abstract — This paper describes an InSAR (Interferometric SAR) processing system which we developed for obtaining accurate interferogram, Digital Elevation Model (DEM) and Differential Interferogram. There have been proposed many methods for deriving these products from SAR raw data. In the most of former methods, the co-registration was made using a linear function of the range pixel and the azimuth line. The linear function is, however, insufficient to represent local disparities around peaks or valleys. In the proposed system, two Single Look Complex (SLC) images to be co-registered are divided into many triangles so that vertices of these triangles are the corresponding points obtained by the offset measurement process. After the division, images are co-registered by applying Affine transformation to each triangle pair. The piecewise co-registration removes disparity at least on the corresponding points. On the other hand, only the nominal value of the baseline length is currently provided for the interferometric processing. The fixed value, however, does not represent non-parallel orbits from which raw interferogram is obtained. The ambiguity causes the geometrical distortion in DEM and the apparent displacement in the result of differential InSAR processing. The system derives coefficients of both functions for baseline length and for inclination angle by fitting the local disparities to a geometrical model.
   Using the system, the accuracies of both coherence image and interferogram derived from actual SAR raw data were successfully improved.The baseline estimated by the system reduced apparent displacement in differential interferogram to 1/10 of that yielded by the nominal baseline.

2. T.Yamamoto and H.Hanaizumi, "An Automated Method for Registration of Remotely Sensed Images with Adaptive Generation of Corresponding Point Pairs to Local disparities," *Trns. IEICE*, Vol. J84-B, No.9, pp.1673-1682, Sept. 2001 (in Japanese)

Abstract — An automated method is proposed for registration of remotely sensed images with local disparities. In the method, we regard the images as sequential shots of a video image, and detect the disparity by obtaining optical flow vectors between them. A new pair of corresponding point is automatically generated at the point which has maximum length of the optical flow vector. This generation process is repeated until the maximum length of the optical flow vector falls below a threshold. Thus, the method enables us to ensure the accuracy of the image registration by obtaining the optimal number of point pairs at the optimal locations.

3. T.Yamamoto, H.Hanaizumi and S.Chino, "A Change Detection Method for Remotely Sensed Multispectral and Multitemporal Images Using 3-D Segmentation," *IEEE Trans. GRS*, Vol. 39, No.5, pp.976-985, May 2001

Abstract — A new method is proposed for detection of the temporal changes using three-dimensional (3-D) segmentation. The method is a kind of clustering methods for temporal changes. In the method, multitemporal images form an image block in 3 –D space; x-y plane and time axis. The image block is first divided into spatially uniform sub-blocks by applying binary division process. The division rule is based on the statistical t-test using Mahalanobis distance between spatial coefficient vectors of a local regression model fitted to neighboring sub-blocks to be divided. The divided sub-blocks are then merged into clusters using a clustering technique. The block-based processing, like the spatial segmentation technique, is very effective in reduction of apparent changes due to noise. Temporal change is detected as a boundary perpendicular to the time axis in the segmentation result. The proposed method is successfully applied to actual multitemporal and multispectral LANDSAT/TM images.

Professor

Munetake ICHIMURA

Munetake ICHIMURA : born in Kobe, Japan on November 3, 1938.

Obtained B.S. (1961), M.S. (1963) and Dr. of Science from University of Tokyo in 1966.

1966-1969	Lecturer of Department of Physics, Nihon University.
1969-1999	Associate Professor and then Professor of Institute of Physics, College of Arts and Sciences, University of Tokyo.
1995-1997	Dean of College of Arts and Sciences, University of Tokyo.
1998-1999	Vice president of University of Tokyo.
1999-2000	Professor of Ion-beam Technology, Hosei University
2000-	Professor of Faculty of Computer and Information Sciences, Hosei University

Current research areas	Theory of Nuclear Structure and Reactions
Academic activities	A member of the Physical Society of Japan.

Publications (January 2001 ~ December 2001)

1. K. Kawahigashi, K. Nishida, A. Itabashi and M. Ichimura, "Distorted wave impulse approximation analysis for spin observables in nucleon quasielastic scattering and enhancement of the spin longitudinal response," Phys. Rev. C 63, (2001) 044609.

Abstract — We present a formalism of distorted wave impulse approximation for analyzing spin observables in nucleon inelastic and charge exchange reactions leading to the continuum. It utilizes response functions calculated by the continuum random phase approximation. Using the formalism we analyzed the spin-longitudinal and the spin-transverse cross sections, IDq and IDp, of ^{12}C, ^{40}Ca (p,n) at 494 and 346 MeV. The calculation reasonably reproduced the observed IDq, which is consistent with the predicted enhancement of the spin-longitudinal response function. However, the observed IDp is much larger than the calculated one, which was consistent with neither the predicted quenching nor the spin-transverse response function obtained by the (e,e') scattering. The Landau-Migdal parameters for the nucleon-Delta transition and the effective mass at the nuclear center are treated as adjustable parameters.

2. H. Sakai and M. Ichimura, "New development of research for the nuclear spin-isospin responses," *BUTURI* (the bulletin of the Japan physical society) Vol. 56 (2001) 492, (in Japanese).

Abstract — Atomic Nuclei consist of protons and neutrons, which are characterized by the isospin up and down respectively. They have the ordinary spin 1/2. Therefore, the excitation modes, which involve the spin and the isospin simultaneously, are a specific nature of the nucleus. Recent development of experimental technique about the high energy polarized proton beam and the high efficiency neutron polarimeter made great progress in investigation of the nuclear spin-isospin modes. We reviewed the new facet developed by the investigation. We especially focus on the contrast between the quenching problem of the Gamov-Teller transition at low momentum transfer region and the enhancement phenomena of the spin-longitudinal response function in the high momentum transfer region. One of the main aims is the unified understanding of the superficially contradicting results in connection with the effective nuclear interaction specified by the Landau-Migdal parameters.

3. N. Onishi and M. Ichimura, "Quantum Mechanics," Nihon Housou Shuppan Kyoukai, 2001, Tokyo (in Japanese).

Abstract — This is the textbook for the professional course lecture "Quantum mechanics" in the Air-university, which is broadcast by TV. Starting from the history of discovery and establishment of Quantum Mechanics, we discussed the fundamental subjects such as the hydrogen atom, uncertainty principle, spin and statistics, atoms and molecules, scattering theory, perturbation theory and absorption and emission of light. At the end we reviewed the present understanding about what and how nature is constructed by.

Professor

Tsuneo IKEDO

Tsuneo IKEDO is a professor in the Digital Media Department of Computer Information Sciences. His current research interests are developing application-oriented processor for virtual reality multimedia systems. He received an MA at Tokyo Metropolitan University and a PhD in engineering from Tsukuba University.

Website: http://www.parims.com/

Publications (January 2001 ~ December 2001)

1. Ikedo T. and Obuchi E., "A Realtime Rough Surface Renderer" in Proceedings of the Computer Graphics International Conference CGI2001, IEEE Computer Society Press, April 2001.

   Abstract — A realtime hardware renderer for light-reflected images with rough surface properties has been developed as one of the graphics functions embedded within a single chip. The renderer comprises Phong and Cook/Torrance models on the basis of empirical, physical or wave theory. To simplify hardware architecture and avoid vector-normalization, every polygon interpolation, surface normal, light-source direction, view direction and bump normal is represented by angular form. The renderer manipulates multiple light-source reflections in directional, spot, and light-attenuation, producing reflective images of rough surfaces within 0.8ns (1.25 billions pixels). The paper describes the new hardware-based algorithms and architectures.

2. Research Reports of Parims Group, under http://www.parims.org

   Abstract — Parims.org has operating through host universities since 1994 for R&D of multimedia engines, focusing on hardware architectures especially for graphics processors. This website shows various hardware oriented algorithms and architectures for realtime graphics based upon empirical or physical models. To generate a realtime virtual reality scene, fine-grained hardware processing is indispensable. This can be realized only by discovery of hardware algorithms and their implementations, without reliance upon fake technologies such as texture mapping. The site provides engineers with the most recent and edged technologies of graphics engine and renderer.

Professor

Tosiyasu L. KUNII

Tosiyasu L. KUNII was born in Tokyo, Japan on January 1, 1938. Tosiyasu L. Kunii is currently Professor of Hosei University, Director of IT Institute at Kanazawa Institute of Technology, Visiting Professor of Kanazawa Institute of Technology, Honorary Visiting Professor of University of Bradford, and Professor Emeritus of the University of Tokyo.

He was the Founding President and Professor of the University of Aizu dedicated to computer science and engineering as a meta discipline, from 1993 to 1997. There, he coined and installed an integrated and computer-based educational system on Unix workstations and on the Internet to cover all academic disciplines. He received his B.Sc. in 1962, M.Sc. in 1964 and D.Sc. in 1967 all from the University of Tokyo. He had been Professor of Department of Computer and Information Science at the University of Tokyo from June 1978 until March 1993.

He received the 1998 Taylor L. Booth Education Award of IEEE Computer Society , the highest educational award of IEEE Computer Society given to one individual annually, for "initiating and promoting computer and information science education in Japan and for seminal contributions towards the integration of computer-based education in all academic disciplines" on November 13, 1999. In January 1991 he was elected Fellow of IEEE for his contribution to visual computer and visual computation. He was also elected Fellow of the Information Processing Society of Japan (IPSJ) for "International Contributions to Pioneering in and Establishing the Discipline of Visual Computing", March 14, 2000.
He authored and edited over 50 books in computer science and in general areas, and published over 500 refereed original academic/technical papers in computer science and applications.
His development of *raster graphics* in late '60 is recorded in the 1st SIGGRAPH and in the special issue of Computer and Graphics as its proceedings. He also developed networked *workstations* porting UNIX in early '80. Actually he was the first in Japan to contract the UNIX source code license for academic use and commercial use from Bell Lab. He exhibited the Unix workstations at COMDEX in Las Vegas in 1983, making him among the first originators of UNIX workstations in the world. Soon after, he also developed a *broadband network* system, now a hot subject, and installed it at

500 sites for real time control of various equipment and multimedia. The University of Aizu networked business system, interconnecting 1000 UNIX workstations on campus including a digital library system, was developed by the team having the core of people he used to train at Information Science Department he initiated the foundation in 1970 at the University of Tokyo and then employed and trained as professional software experts by Software Research Center of Ricoh under the direction of Dr. Hideko S. Kunii.

Message

Since I was 8 years old when the 2nd World War ended, my lifetime goal has been to dedicate my life for the growth of other people and our society through higher education to rebuild better world. My Favorite music is Pergolesi's Stabat Mater he composed in his deathbed at the age of mid twenties. This was the music that had encouraged me to stand upright during my difficult presidency at the University of Aizu. I enjoy the nature. Back packing and alpine skiing are refreshing. I had been a ski instructor, and still is occasionally.

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Publications (January 2001 ~ December 2001)

1. Tosiyasu L. Kunii, "Practicing Global Openness in Education: From Elementary Schools to Graduate Schools", Proceedings of Digital and Academic Liberty of Information (dali 2001), March 26-29, 2001, Aizu-Wakamatsu, Japan.

Abstract — An experience-based summary of global open education is presented solely for promoting its practices. My life has been benefited from practicing open education, first at an elementary school and later at a graduate school. The openness has been local because of the lack of globalization mechanisms in education. It is fairly recent that we have effective global educations mechanisms for global interactivity and global two way communications such as the web and cyberspaces. Compared to local open education, global open education removes the boundaries of ages, organizations, nations, sexes, and disciplines. Many unseen barriers exist to prevent global open education, mostly originating from survival intuitions and fights embodied in life itself. Since the barriers are rooted in the nature of life, it is hard to practice global openness in education. Hence it is important to cooperate for us to practice it to see real advances in our knowledge.

2. Tosiyasu L. Kunii, "Topological Graphics", Proceedings of Spring Conference on Computer Graphics 2001 (SCCG 2001), (April 26-28, 2001, Budmerice Castle, Slovak Republic), pp. 2-9, (IEEE Computer Society Press, Los Alamitos, California, U. S. A.).

Abstract — Topological graphics opens up completely new worlds in computer graphics applications. It is supported by advances in modern algebraic topology: homotopy theory and cellular spatial structures in particular. Topological graphics lays out the framework to interactive construct cyberworlds emerging on the web. It guides graphics software design to make it minimal and reusable. This progress report on our own frontier researches gives abundant of examples as well as the brief summary of the theoretical foundation.

Key words and phrases: web graphics, homotopy, algebraic topology, differential topology, a cellular model, cellular spatial structures, a cyberworld model.

3. Kenji Ohmori and Tosiyasu L. Kunii, "Shape Modeling Using Homotopy", Proceedings of International Conference on Shape Modeling and Applications 2001 (SMI 2001), Genoa, Italy, May 7-11, 2001, pp. 126-133, IEEE Computer Society Press, Los Alamitos, California, May 2001.

Abstract — We introduce a new method of shape modeling using homotopy and object-oriented modeling. Homotopy is a kind of topology that gives more general ideas of preserving invariant properties of geometrical objects and is further expanded to conceptual objects. The conventional shape modeling using polygonalization has serious difficulties in preserving invariant properties, leading to the necessity of a massive amount of data. On the other hand, the combination of homotopy and object-oriented modeling, which uses class hierarchy, help preserve invariant properties at all abstraction levels. We will explain how our new method will help us preserve invariant properties, which keeps the amount of data to the minimum possible level, using an example of a tennis ball rolling on a slope.

Keywords: homotopy model, cellular spatial structures, filtration.

4. Taku Komura, Yoshihisa Shinagawa and Tosiyasu L. Kunii, "Motion Conversion Based on the Musculoskeltal System", Proceedings of Graphics Interface 2001, June 7 - 9, 2001, Ottawa, Ontario, Canada, pp.27-36.

Abstract — Inverse kinematics is one of the most popular method in computer graphics to control 3D multi-joint characters. In this paper, we propose an inverse kinematics algorithm that takes the characteristics of human bodies into account. The mausculoskeletal model is used to solve the redundancy of the human body. Using our method, feasible human body motion can be obtained simply by specifying the motion of several end effectors or body segments. Since muscle dynamics is taken into account, the configuration space of the human body is automatically calculated, and unrealistic postures can be avoided, it is also possible to tune the motion by changing the external

load applied to the muscles. Using our method, the amount of work by the animators is reduced to create natural human animation.

5. Masayuki Hisada and Tosiyasu L. Kunii, "Implementation of Object Attachments by Cellular Modeling", Proceedings of CG International 2001, July 3-6, 2001, Hong Kong, pp.159-166, IEEE Computer Society Press, Los Alamitos, California, July 2001

Abstract — We research the defects of geometric modeling in representing object attachments. It is difficult to represent different types of object attachments such as gluing or fusing in current computer graphics. We consider two types of different attachments such that an object is put on the top of another object, and an object is fused to the top of another object. To represent the relationships of object attachments, we assume a hypothesis such that we can represent the information of object attachments in computer graphics based on the cellular models, and consider the real implementation in computer graphics for proving that the cellular model of object attachments meets the hypothesis. The results of our research are expected to influence major applications including computer integrated manufacturing (CIM).

6. Taku Komura, Yoshihisa Shinagawa and Tosiyasu L. Kunii, "An Inverse Kinematics Method Based on Muscle Dynamics", Proceedings of CG International 2001, July 3-6, 2001, Hong Kong, pp.15-22, IEEE Computer Society Press, Los Alamitos, California, July 2001.

Abstract — Inverse kinematics is one of the most popular method in computer graphics to control 3D multi-joint characters. In this paper, we propose an inverse kinematics algorithm that takes the characteristics of human bodies into account. The mausculoskeletal model is used to solve the redundancy of the human body. Using our method, feasible human body motion can be obtained simply by specifying the motion of several end effectors or body segments. Since muscle dynamics is taken into account, the configuration space of the human body is automatically calculated, and unrealistic postures can be avoided, it is also possible to tune the motion by changing the external load applied to the muscles. Using our method, the amount of work by the animators is reduced to create natural human animation.

7. Masaki Hilaga, Yoshihisa Shinagawa, Taku Kohmura, and Tosiyasu L. Kunii, "Topology Matching for Fully Automatic Similarity Estimation of 3D Shapes", Proceedings of SIGRAPH 2001, August 12-17, 2001, Los Angels, USA, pp.203-212, ACM Press, 1515 Broadway, New York, NY, 10036, USA, August, 2001.

Abstract — There is a growing need to be able to accurately and efficiently search visual data sets, and in particular, 3D shape data sets. This paper proposes a novel technique,

called *Topology Matching*, in which similarity between polyhedral models is quickly, accurately, and automatically calculated by comparing Multiresolutional Reeb Graphs (MRGs). The MRG thus operates well as a search key for 3D shape data sets. In particular, the MRG represents the skeletal and topological structure of a 3D shape at various levels of resolution. The MRG is constructed using a continuous function on the 3D shape, which may preferably be a function of geodesic distance because this function is invariant to translation and rotation and is also robust against changes in connectivities caused by a mesh simplification or subdivision. The similarity calculation between 3D shapes is processed using a coarse-to-fine strategy while preserving the consistency of the graph structures, which results in establishing a correspondence between the parts of objects. The similarity calculation is fast and efficient because it is not necessary to determine the particular pose of a 3D shape, such as a rotation, in advance. Topology Matching is particularly useful for interactively searching for a 3D object because the results of the search fit human intuition well.

Keywords: Computer Vision, Shape Recognition, 3D Search

8. Tosiyasu L. Kunii, Gleb V.Nosovskij and Vladimir L. Vecherlinin, "Two-Dimensional Diffusion Model For Diffuse Ink Painting", International Journal of Shape Modeling, Vol. 7, No. 1, 2001, pp. 45-58, World Scientific Publishing Company, Singapore.

Abstract — In our previous work the multidimensional diffusion model for computer animation of diffuse ink painting was suggested. The model, which we proposed, provided the intensity distributions very similar to those in real images. In the previous paper, only few calculations in the case of a circle as an initial zone were presented. Now we modify the model and present the results of more accurate calculations for an initial zone of arbitrary shape.

Keywords: Multidimensional diffusion processes, Colloidal liquid, Computer animation.

Associate Professor

Jianhua MA

Jianhua MA was born in Xi'an, China on October 14, 1962. He received the B.S. and M.S. degrees of Communication Systems from National University of Defense Technology (NUDT), China, in 1982 and 1985, respectively, and the PhD degree of Information Engineering from Xidian University, China, in 1990. He has joined Hosei University since 2000, and is currently an associate professor at Faculty of Computer Information and Science. Previously, he had worked for 7 years at NUDT, 3 years at Xidian University, and 5 years at the University of Aizu in Japan, respectively.

From 1984 to 1990, his research fields were the error-control coding techniques applied to digital HF and mobile communications, and secure systems in computer data, audio and video transmissions. During 1991-1993, he was leading a project of an intelligent speech computing system, including speech analysis, recognition, synthesis, encryption, encoding, and decoding. In 1994-1996, he was devoted to multimedia synchronization modeling, hyper-world interface technology, and advanced bump-mapped shading algorithms and fuzzy-object generating algorithms for high performance graphics ASIC. Since 1997, his research has been focused on multimedia technologies, networks, intelligent agents and distributed collaborative systems, and their applications in virtual university, distance learning community and other e-business over the current and future Internet.

Dr. Ma is a member of IEEE. He is an editor of the International Journal of Computer Processing of Oriental Languages. He served the International Journal of Software Engineering and Knowledge Engineering as a guest editor. He organized the 6th International Conference on Distributed Multimedia Systems in 1999, and the International Workshop on Virtual University for Multilingual Education in 2000, respectively, as a program co-chair. He is a foundation member of the International Consortium of Macro University, a federation of virtual universities, in which there are currently more than 20 universities from the world, including Japan, USA, Australia, Taiwan, Germany, Korean, etc.

He received the Annual Excellent Paper Awards from China Information Theory Society, Electronics Society, and Association of Hunan Science and Technology in 1985, 1986 and 1991, respectively. He received the Best Paper Award from the 2000 International Conference on Information Society in the 21st Century: Emerging Technologies and New Challenges.

Message

Because of the Internet and Web, a networked and computerized digital world, called *Cyberworld* or *Hyperworld*, is coming. The world is still a mystery to us. We are not fully clear about what the new world is, what are its basic scientific and social laws, and how to live, work and learn in such world. However, it is sure that, no matter what the world is, a person needs collaborations with others and helps from other people, agents or tools. Therefore, it is important to study and develop corresponding techniques and systems to support effective *computer based collaborations over networks* among remote people and provide them efficient assistances from *software intelligent agents* in the world. Furthermore, current universities will be totally changed in the new world. It is necessary to investigate elements, architectures, styles, rules as well as techniques of the next generational university - *Virtual University*. As a fundamental unit in the cyberworld, research, developments, constructions and experiments of the virtual university will also help us to reveal the secrets of the new world. Based on the above philosophy, my current researches are focused on the following three fields: 1) Java based multimedia collaborative systems over the Internet, 2) software intelligent agents on the WWW, and 3) distance learning and virtual university through the Web.

My hobby is basketball, travel, skiing, cooking, and reading.

Publications (January 2001 ~ December 2001)

1. Runhe Huang, Jianhua Ma, and Qun Jin, *A Shopping Negotiation Agent that Adapts to User Preferences*, Springer-Verlag Lecture Notes in Computer Science (LNCS 2252), Vol. 2252, pp45-56, 2001.

   Abstract — This paper describes a shopping negotiation agent that can adapt user preferences and automatically negotiate with its counter party on behalf of a user it represents. Since different users can have different preferences, it is important for the agent to have adaptation to different user preferences. This can be achieved by acquiring user preferences, tracing user's behavior on Web and mapping the behavior to a set of the preference parameters, creating the negotiation model class, and generating an instance negotiation model object with new/updated preference parameters.

2. Runhe Huang, Tao Huang, Jianhua Ma, Takeshi Yamazaki, and Minetada Osano, *A Hybrid Negotiation Model Based Online Shopping System*, in Proceedings of the Fourth International Conference on Human and Computer, pp236-241, September 2001, Japan.

   Abstract — With a reasonable negotiation model, shopping agents can negotiate intelligently on behalf of real-world's users to find a solution that maximizes the utility for all users. This paper presents an online shopping system that includes shopping agents, such as buyer agents and seller agents, which are based on a hybrid negotiation model and demonstrates how a shopping agent negotiates intelligently with counter party

regarding a product on behalf of a user it represents.

3. Tao Huang, Runhe Huang, and Jianhua Ma, *Negotiation Modeling in E-trading*, in Proceedings of the Fourth International Conference on Human and Computer, pp230-235, September 2001, Japan.

Abstract — In this paper, a new negotiation model, called a hybrid negotiation model, is proposed. The hybrid negotiation model is a combination of an extended Bazaar model (a sequential decision making based Bayesian learning model) and a "lose bounded" Nash bargaining solution. With the proposed negotiation model, agents that represent buyers and sellers in the real-life can negotiate in an intelligent way to effectively and efficiently reach agreement and optimize their individual utility function, respectively, in a trading business. How learning in negotiations is proceeding and how common knowledge and public information are employed to make initial strategies of negotiations are described in details.

4. Runhe Huang and Jianhua Ma, *A Java Technology Based Shared Browser for Tele-lecturing in University21*, in the Proceedings of 4th International Conference on Computational Intelligence and Multimedia Applications (ICCIMA'01), pp298-302, October, 2001, Yokosuka city, Japan.

Abstract — This paper describes a shared browser and explains how it is integrated into a virtual collaboration room (VCR) and used to achieve effective and interactive tele-lecturing in a virtual university, University21. The shared browser allows multiple users in different remote sites to navigate same web document in the mode of what you see is what I see. This is a significant advantage over current popular browsers.

5. Jianhua Ma and Runhe Huang, *The Internet Group Tour via a Shared Web Browser,* in edited book: Enabling Society with Information Technologies, published by Springer-Verlag, pp69-78, 2001.

Abstract — When a group of people would like to visit or access the Internet together, it is necessary to have a shared web browser following the mode of what-you-see-is-what-I-see (WYSIWIS) that allows all group members to make inputs to the browser and distributes the results among the all members. This article presents our design and implementation of such a shared browser using the server-client model and Java technology. All users who connect to a same server of a shared browser belong to a same group, and see a same web page, and different groups must run their own browsers' servers.

6. Qun Jin and Jianhua Ma, *Individualized E-Learning and Multimedia Support for Collaborative Virtual Universities*, in the Proceedings of 7th International Conference on Distributed Multimedia Systems (DMS2001), pp24-31, Taipei,

ROC, September 26-28, 2001.

Abstract — Internet makes it possible to deliver, share and create knowledge among large and diverse groups of people across the networks. We have proposed a framework for community-based collaborative virtual universities that widely open to everyone who is willing to learn and to share their knowledge with others through networks. In this paper, we describe the overview of community-based collaborative virtual universities. We discuss how to provide individualized e-learning and multimedia support, and demonstrate a prototype of implementation in a web-based social virtual environment.

7. Timothy K. Shih, Chuan-Feng Chiu, Hui-huang Hsu, Jianhua Ma and C-Y Yang, *A Recommendation System over Internet based on User Classification*, in Proceedings of the 7th International Conference on Distributed Multimedia Systems (DMS'2001), pp297-304, Taipei, Taiwan, September 26-28, 2001.

Abstract — Traditional buying and selling activities have been changed to work over the Internet. However with the advent of the World Wide Web, online merchant must know what users want or interest and let the users buying goods at their own site. So recommendation process becomes an important strategy for the merchants. In this paper we analyze users' behavior and their interests, and then some reasonable recommendations can be given to the users. We propose an algorithm to classify users into groups based on which the corresponding recommendations are provided. The system will help merchants to make suitable business decision according to customers' personal information.

8. Runhe Huang and Jianhua Ma, *An Object, Session, and Room Persistence in VCR for Enhancing Online Learning Effectiveness*, in CD Proceedings of International Conference on Information Technology Based Higher Education and Training (ITHET2001), July 2001, Kumamoto, Japan.

Abstract — This paper explains what is an object, a session, and a room persistence in a virtual collaboration room, and describes functions of object recording/replaying, session recording/replaying, and object and room persistence in VCR, and finally demonstrates by examples how the functions are used to solve schedule conflicting problems in a synchronous group activity and to support asynchronous group activities as well. Online learning is improved with the functions in terms of effectiveness and efficiency.

9. Runhe Huang and Jianhua Ma, *A Platform Independent Shared Web Browser*, Journal of Internet Technology, Volume 2, No.4, pp301- 308, 2001.

Abstract — The current popular browsers such as Microsoft Internet Explorer and Netscape Communicator allow only an individual to freely navigate on the Web. Our shared Web browser enables multi-users in physically different sites to simultaneously navigate the Web-based virtual world together. Using the shared browser, a group of

users share not only a Web document but also operations on the browser and Web documents. In this article, we present the shared Web browser in details including command server, Web proxy server, and client and show its application in a multimedia collaboration system - VCR (Virtual Collaboration Room) as an object. The shared Web browser has potential applications in many other systems, such as tele-lecturing, tele-conferencing, shopping together in e-commerce, and group virtual tour.

10. Jianhua Ma and Runhe Huang, *Designs and Implementations of University21*, Computer Journal, Vol. 13, No. 2, pp17-45, June 2001.

Abstract — University21 is an integrated educational system (IES) aimed at supporting all teaching, learning and administrating activities in Internet and Web based virtual universities of various scales. It consists of three parts: cyber-campus, facilities, and agents. In this article, we describe the functionality and composition of each part in details and demonstrate how they support to each other. It is emphasized that intelligent software agents can assist people and their work in a virtual university.

11. Timothy K. Shih, Shi-Kuo Chang, Jeffrey Tsai, Jianhua Ma and Runhe Huang, Supporting Well-Engineered Web Documentation Development-A Multimedia Software Engineering Approach towards Virtual University Courseware Designs, Annuals of Software Engineering International Journal, (in printing), 2001.

Abstract — Distance learning has become a very important mechanism for virtual university operation. In order to realize such an operation smoothly, it is necessary to consider distance learning from three perspectives: administration, awareness, and assessment. We are currently implementing a virtual university environment according to these guidelines. In this paper, we propose part of such a supporting environment of the Multimedia Macro-University project. One of the most important focuses is a Web course development paradigm. On the other hand, software development paradigms were developed to support program construction. However, these traditional paradigms do not completely fit the needs of Web document development due to the following reasons. It is therefore necessary to investigate a new software development paradigm for developing Web documents. In this article, we propose such a new paradigm and its supporting environment, as well as software testing/metrics mechanisms for Web documents. The system is implemented as a three-tier architecture, which runs under MS Windows.

12. Timothy K. Shih, Shi-Kuo Chang, Jianhua Ma and Runhe Huang, *Web Learning Assessment and Adaptive Tutoring*, Journal of Applied Systems Studies, Cambridge International Science Publishing, (in printing), 2001.

Abstract — Web-based distance learning is a trend of instruction delivery. One of the most difficult challenges of such a learning mechanism is the assessment of students' learning criteria. It is hard to judge the behavior of a student since the instructor is

separated spatially and temporally from the students. However, it is possible to rely on some Web-based tools to keep track of a student's course attendance, as well as the navigation behavior of that student. In addition, the navigation behavior of an individual can be compared to those of others. Analysis can be conducted. And interactive tutorial can be generated to assist the student of poor score. This paper proposes such a mechanism, as well as its supporting system run on Windows browsers.

13. Qun Jin, Jianhua Ma, Runhe Huang and T.K. Shih, *Design Principles of an Open Agent Architecture for Web-based Learning Community*, in CD Proceedings of World Conference on Education Multimedia, hypermedia & Telecommunications (ED-MEDIA2001), pp829-834, Tampere, Finland, June, 2001.

Abstract — There is an inevitable choice to use various agents to assist or replace human to a certain extent for the work in a virtual learning community. There is a strong need for the development of the designated architecture for integrating and using various agents. This research is focused on developing an open agent architecture that can easily integrate developed agents to a learning system and flexibly modify the agents with permission. This paper describes the design ideas of such desired architecture, demonstrates how the architecture system works, and explains three agents in a Web-based learning system, University21.

14. Runhe Huang, Jianhua Ma and Timothy K Shih, *Integrating Agents into a Virtual University via an Open Agent Architecture*, in Edited Proceeding of Advanced in Educational Technologies, pp1-8, International Conference on Intelligent Multimedia and Distance Education, Fargo, USA, June, 2001.

Abstract — A virtual university is far beyond putting learning materials into a Web site. Like a real physical university, it has enormous work involved with people, environment and facilities. Instead of employing lot of manpower like in a real university, a virtual university can use various agents to assist or replace human to a certain extend for the work involved in a virtual university. As agents are intelligent software programs that can be developed by different parties, how to integrate the developed agents to a virtual university becomes an inevitable issue for the virtual university research society. This paper proposes a so-called open agent architecture that can integrate developed agents to the virtual university system and allows specified people to modify the agents when it is necessary.

15. Jianhua Ma, Runhe Huang and Timothy K. Shih, *Co-Navigation on the World Wide Web over the Internet*, in Edited Proceeding of Intelligent Multimedia Computing and Communications, pp131-140, International Conference on Intelligent Multimedia and Distance Education, Fargo, USA, June, 2001.

Abstract — It is noted that the current popular browsers such as Microsoft Internet Explorer and Netscape Communicator only allow a single user freely navigate on the Web. However, there is increasing demand of co-navigation on the WWW over the Internet, that is, multi-users in different sites can simultaneously navigate the Web-based virtual world together. This paper describes a shared Web browser that enables a group of users share not only a Web document but also operations on the browser and Web documents. To be platform independent, the browser is implemented in Java language under a server-client model. The server program is a Java application and the client program is a Java applet. To overcome Java applet security restrictions, it is indispensable to develop and implement a Web proxy server to access and/or download Web documents in remote Web sites on behalf of clients. The paper also shows how to integrate the browser into VCR (virtual collaboration room).

16. Runhe Huang and Jianhua Ma, *The Design of an Architecture for Incorporating Developed Agents to a Virtual Educational System,* Proceedings of 19th International Conference on Computer Processing of Oriental Languages, pp301-304, Seoul, Korea, May, 2001.

Abstract — This paper proposes an architecture for incorporating developed agents to a virtual educational system. As we know, a virtual educational system is a complex system that is far beyond to put web documents to a web site. In fact, it is involved enormous work with people, virtual environment, and virtual facilities. People may release from heavy work if they can use intelligent agents developed by other parties. However, how to incorporating the developed agents to a virtual educational system becomes problem. It seems an open architecture is needed. This paper describes such architecture with which a virtual educational system can easily and flexibly integrate the developed agents.

17. Jianhua Ma and Runhe Huang, Timothy K. Shih, Qun Jin, *Implementation of a Shared Web Browser Using Java Technology,* Proceedings of 19th International Conference on Computer Processing of Oriental Languages, pp347-352, Seoul, Korea, May, 2001.

Abstract — The shared Web browser is a collaborative tool that enables multi-users in physically different sites to simultaneously view a same Web document over the Internet. Using the browser, a group of users share not only a Web document but also operations such as entering a new URL link, clicking a hyperlink in a Web page, changing a size of the browser, moving the scroll bar, etc. Due to Java security restrictions, the shared browser client, i.e., the applet, cannot directly access and download Web documents from other remote hosts except the host the applet came from. This problem has been solved via a Web proxy server through which clients can access Web documents including HTML, image, and other multimedia files resided in any other remote hosts. This paper is focused on describing the design ideas and implementations of the Web proxy server.

18. Jianhua Ma, Runhe Huang, and R. Nakatani, *Towards a Natural Internet-Based Collaborative Environment with support of Object Physical and Social Characteristics*, International Journal of Software Engineering and Knowledge Engineering, Vol. 11, No. 1, pp37-53, World Scientific Publishing Company, 2001.

Abstract — Objects in this article refer to sharable applications, such as a whiteboard and a video player, used by multi-users who are in different sites and have computers connected to networks. The objects are important elements in our Internet-based desktop collaborative system, called virtual collaboration room. We argue that a natural collaborative environment should be developed in a framework of using both a room metaphor and an object metaphor, i.e., emulating the fundamental characteristics of real rooms and real objects, respectively. This article gives the first systematic specifications of object physical and social characteristics and discusses how to exploit and implement the object characteristics in VCR. A preliminary prototype of platform independent real-time audio/video communications among multiple users is also described. It can be used together with VCR.

Professor

Toshihisa NISHIJIMA

Toshihisa NISHIJIMA was born in Hiroshima, Japan on January 10, 1959. He received the B.E., M.E. and Ph.D. degrees in industrial engineering and management from Waseda University, Tokyo, Japan in 1983, 1985, 1991, respectively. From 1985 to 1987, he was with the Mitsubishi Electric Corporation, Kanagawa, Japan. He joined the Kanagawa Institute of Technology, Kanagawa, Japan as a Research Associate from 1987 to 1993 and the Faculty Engineering, Hosei University, Tokyo, Japan as an Associate Professor from 1993 to 2000. From 2000 to 2001, he was an Associate Professor at the Faculty of Computer and Information Sciences, Hosei University and then a professor since April 2001.

His current research areas include algebraic coding theory, error control systems, and information theory.

He is a member of the IEEE Information Theory Society, Communications Society, Computer Society, the Institute of Electronics, Information and Communication Engineerings of Japan, and the Society for Information Theory and Its Applications of Japan.

Message

I started my academic life in the theory of algebraic error-correcting codes and its applications, and have recently been interested also in information theory. For the past 15 years I have been studying on the asymptotic capability of algebraic error-correcting codes, which are able to prove Shannon's fundamental theorem for noisy channel not by random coding technique but by constructive coding. Now I would like to study on Shannon's channel coding theorem from the viewpoints of both the reliability function in information theory and the asymptotic distance ratio in coding theory. As the final purpose (dream) in my academic life, I will try to challenge the fundamental problems to determine the reliability function for low rates and to clarify relationship between the reliability function and the asymptotic distance ratio.

Publications (January 2001 ~ December 2001)

1. T. Nishijima, "The distance ratio for the ensemble of binary expanded generalized Reed-Solomon codes asymptotically meets Varshamov -Gilbert bound," Proceedings of The 35th Annual Conference on Information Science and Systems Vol. I, p. 141, The Johns Hopkins University, Baltimore, Maryland USA, March 2001.

   Abstract — We get an upper bound on the average probability of undetected error for the ensemble of binary expanded generalized Reed-Solomon codes. From this bound, we simultaneously show that the asymptotic distance ratio for this ensemble meets the Varshamov-Gilbert bound and this ensemble satisfies the expurgated bound.

2. T. Nishijima, "An upper bound on the average probability of an undetected error for the ensemble of binary expansions of concatenated codes with generalized Reed-Solomon outer codes," *IEICE Technical Report*, IT-2001-35, pp.1-6, September 2001.

   Abstract — We derive an upper bound on the average probability of an undetected error for the ensemble of binary expansions of concatenated codes with generalized Reed-Solomon outer codes by applying the technique of proof to get an upper bound on the average probability of an undetected error for the ensemble of all binary linear systematic codes. It is shown in this paper that the average capacity for the ensemble of binary expansions of concatenated codes with generalized Reed-Solomon outer codes is poorer than that for all systematic binary linear block codes.

3. T. Nishijima, "An upper bound on the average probability of an undetected error for the ensemble of binary expansions of concatenated codes with generalized Reed-Solomon outer codes," Proceedings of The 7th International Conference on Distributed Multimedia Systems, pp. 526-529, Tamkang University, Taipei, Taiwan, September 2001.

   Abstract — We derive an upper bound on the average probability of an undetected error for the ensemble of binary expansions of concatenated codes with generalized Reed-Solomon outer codes by applying the technique of proof to get an upper bound on the average probability of an undetected error for the ensemble of all binary linear systematic codes.

Professor

Alexander PASKO

Alexander PASKO was born in Krasnoyarsk, Russia, on December 18, 1960. He received M.Sc. and Ph.D. degrees in computer science from Moscow Engineering Physics Institute (MEPI, Russia) in 1983 and 1988. He was a researcher at MEPI from 1983 to 1992 and an assistant professor at the University of Aizu (Japan) from 1993 to 1999. His research interests include solid and volume modeling, animation, multidimensional visualization, multimedia, and computer art. He is a member of ACM SIGGRAPH, IEEE and Eurographics Association. He took part in organizing several international conferences and in running academic journals:

- Program committee co-chair of Shape Modeling International '2001 (Genova, Italy)
- Computer graphics session co-chair of Libre Software Meeting (Bordeaux, France), 2000-2001
- Program committee chair of conferences Shape Modeling International '97 and '99 (Japan)
- Program committee co-chair of CSG'98 "Set-theoretic Solid Modeling:
  Techniques and Applications" (UK)
- Guest editor of International Journal of Shape Modeling, 1997, 1999, and 2002
- Editorial board member of Computer Graphics and Geometry journal

Alexander Pasko received the following international awards:

- Bronze Prize of Computer Graphics Grand Prix in STEC (Tokyo, Japan, 1996)
- Best WWW Award Eurographics'96 (Poitiers, France, 1996)
- Prize of Dream Centenary CG Grand Prix (Aizu-Wakamatsu, Japan, 1999).

Message

Geometric images are probably the eldest product of the human brain. In modern logically-oriented life it is extremely important to keep and develop this ability. I am convinced that outstanding achievements in science and technology can only be attained in the balance of logic and geometric reasoning.

There are many ways of modeling geometry by means of computer. In research with my colleagues and students we try to find an approach dealing with geometric objects in the most simple and uniform style. Thus, function representation (F-rep) of geometric objects has been introduced with set-theoretic operations based on the theory of R-functions developed by Russian mathematicians. This representation is independent of the space dimension. That is why time-dependent or animated objects can be described in the same manner, with time being considered as one of the coordinates of space-time. Many unusual geometric operations like blending, metamorphosis and even "hair growing" can be functionally described. Sometimes it seems that we now have "experimental geometry" by analogy with experimental physics, where new results usually have to be explained from the theoretical point of view. This becomes even more complex when dealing with volumetric and multidimensional models. By using more powerful parallel computers and by adding intellect to artificial actors we will get an instrument for future creative work in art and design, medicine and industry. Details on the research and software development can be found at
F-rep site http://wwwcis.k.hosei.ac.jp/~F-rep/
HyperFun site http://www.hyperfun.org

Publications (January 2001 ~ December 2001)

1. A. Pasko, V. Adzhiev, B. Schmitt, Constructive Hypervolume Modelling, Technical Report TR-NCCA-2001-01, National Centre for Computer Animation, Bournemouth University, UK, February 2001, ISBN 1-85899-123-4, 34 p. (accepted to Graphical Models journal).

Abstract — This paper deals with modelling point sets with attributes. A point set in a geometric space of an arbitrary dimension is a geometric model of a real object or process under consideration. An attribute is a mathematical model of a real object or process property of an arbitrary nature (material, photometric, physical, statistical, etc.) defined for any point of the point set.

We provide a survey of different modelling techniques related to point sets with attributes. This survey spans such different areas as solid modelling, heterogeneous objects modelling, scalar fields or "implicit surface" modelling, and volume graphics. Then, on the basis of this survey we formulate requirements to a general model of hypervolumes (multidimensional point sets with multiple attributes).

A general hypervolume model and its components such as objects, operations, and relations are introduced and discussed. A function representation (FRep) is used as the basic model for the point set geometry and attributes represented independently using real-valued scalar functions of several variables. Each function defining the geometry or an attribute is evaluated at the given point by a procedure traversing a constructive tree structure with primitives in the leaves and operations in the nodes of the tree. This reflects the constructive nature of the symmetric approach to modelling geometry and

associated attributes in multidimensional space.
To demonstrate a particular application of the proposed general model, we consider in detail the problem of texturing, introduce a model of constructive hypervolume texture, and discuss its implementation. The well-known concept of solid texturing is extended in two directions: constructive modelling of space partitions for texturing and modelling of multidimensional textured objects.
We implemented a special modelling language and software tools supporting the proposed general model. Several examples of modelling and rendering 3D, 4D (time-dependent), and multidimensional objects with constructive hypervolume textures are provided.

2. A. Pasko, V. Savchenko, A. Sourin, Synthetic carving using implicit surface primitives, Computer-Aided Design, Elsevier, vol. 33, No. 5, April 2001, pp. 379-388.

Abstract — Several techniques of computer-aided synthetic carving are presented. We describe both procedural methods for relief carvings and patterned lattices, as well as interactive carving. Different techniques of depth data generation for relief carving are described: polygon-to-function conversion, pattern dependent interpolation, and ray-casting. All proposed methods are based on using implicit surfaces or more generally the function representation of geometric objects.

3. Y. Ohtake, A. Belyaev, A. Pasko, Dynamic meshes for accurate polygonization of implicit surfaces with sharp features, Shape Modeling International 2001, Genova (Italy, 7-11 May 2001), IEEE Computer Society, 2001, ISBN 0-7695-0853-7, pp. 74-81.

Abstract — The paper presents a novel approach for accurate polygonization of implicit surfaces with sharp features. The approach is based on mesh evolution towards a given implicit surface with simultaneous control of the mesh vertex positions and mesh normals.

4. M. Kazakov, V. Adzhiev, A. Pasko, Fast navigation through an FRep sculpture garden, Shape Modeling International 2001, Genova (Italy, 7-11 May 2001), IEEE Computer Society, 2001, ISBN 0-7695-0853-7, pp.104-113.

Abstract — The function representation (FRep) allows for construction of quite complex shapes such as isosurfaces of real-valued functions composed using the functionally defined primitives and operations. Calculating such functions in the complex cases can be very time-consuming. Extraction and visualization of isosurfaces for them can hardly be imagined interactive. In this paper we present a method of an interactive navigation through a "sculpture garden" containing non-intersecting FRep objects defined in the terms of specialized high-level language HyperFun. Before the actual isosurface extraction and visualization occurs, the objects are voxelized on a regular 3D grid with a possibility of a further adaptive voxelization. Polygonization employs a hierarchical representation of the voxelized data and a view-dependent isosurface reconstruction at the different levels of detail. To speedup the extraction process, an isosurface is constructed only in the visible part of the dataset with its updates performed

incrementally as observer moves. Due to low preprocessing costs required for isosurface mesh construction, it is possible to visualize time-dependent objects, if hardware is capable to calculate updates in real time.

5. B. Schmitt, A. Pasko, C. Schlick, Constructive modelling of FRep solids using spline volumes, Sixth ACM Symposium on Solid Modeling and Applications (June 6-8, 2001, Ann Arbor, USA), D. Anderson, K. Lee (Eds.), ACM Press, 2001, pp.321-322.

Abstract — This paper presents an approach to constructive modelling of FRep solids defined by real-valued functions using Bspline volumes as primitives. A 4D uniform rational cubic Bspline volume is employed to define a 3D solid. While the first three coordinates are used to represent the spatial component of the volume to be sculpted, the fourth coordinate is used as a scalar, which corresponds to a function value or a volume density. Thus, the shape can be manipulated by changing the scalar control coefficients of the spline volume. This modelling process is interactive as the isosurface can be polygonized and visualized in real time. The distance property we obtain, combined with the properties of the spline volumes, allow us to use the resulting 3D solid as a leaf of a constructive modelling tree and to apply to it set-theoretic, blending and other operations defined using R-functions. Additional deformations can be achieved by moving arbitrary points in the coordinate space and applying space mapping at any level of the constructive tree. The final constructive solid is defined by a single real-valued function evaluated by the tree traversing procedure.

6. G. Pasko, A. Pasko, C. Vilbrandt, T. Ikedo, Virtual Shikki and Sazaedo: Shape modeling in digital preservation of Japanese lacquer ware and temples, Spring Conference on Computer Graphics SCCG'2001 (April 25-28, 2001, Budmerice, Slovakia), R. Durikovic, S. Czanner (Eds.), IEEE Computer Society, ISBN 0-7695-1215-1, 2001, pp. 147-154.

Abstract — Issues of digital preservation of shapes and internal structures of culturally valuable objects are discussed. An overview of existing approaches to digital shape preservation as well as corresponding problems is given. Our approach is based on using constructive modeling, which reflects the logical structure of the shapes. We examine and select those mathematical representations of shapes that fit the purposes of long-term digital preservation. Constructive Solid Geometry (CSG) is applied in modeling a Japanese temple Sazaedo with a unique internal structure. Traditional Japanese lacquer ware called shikki is modelled using the function representation (FRep). We describe the Virtual Shikki project aimed to present the virtual shapes and textures of lacquer ware on the Web.

7. B. Schmitt, A. Pasko, V. Adzhiev, C. Schlick, Constructive hypervolume textures, EUROGRAPHICS 2001 (Manchester, UK, September 4-7, 2001), Short Presentations, Ed. J. Roberts, ISSN 1017-4656, 2001, pp. 7-15.

Abstract — The concept of solid texturing is extended in two directions: constructive

modeling of space partitions for texturing and modeling of multidimensional textured objects called hypervolumes. A hypervolume is considered as a point set with attributes of both physical (density, temperature, etc.) and photometric (color, transparency, diffuse and specular reflections, etc.) nature. The point set geometry and attributes are modeled independently using real-valued scalar functions of several variables. Each real-valued function defining geometry or an attribute is evaluated in the given point by a procedure traversing a constructive tree structure with primitives in the leaves and operations in the nodes of the tree. This approach provides a framework for modeling, texturing and visualization of 3D solids, time- dependent and multidimensional objects in a completely uniform manner. We introduced a special modeling language and implemented software tools supporting the proposed approach. The concept of constructive hypervolume textures is independent of the geometry representation. We provide examples of textured Frep and BRep objects as illustrations.

8. C. Vilbrandt, A. Pasko, G. Pasko, J.R. Goodwin, J.M. Goodwin, Digital preservation of cultural heritage through constructive modeling, International Cultural Heritage Informatics Meeting ichim01 (Milan, Italy, September 3-7), D. Bearman and F. Garzotto (Eds.), vol. 1, 2001, ISBN 1-885626-24-X, pp. 183-200.

Abstract — The issues of digital preservation of shapes and internal structures of historical and cultural objects are discussed. An overview of existing approaches to computer modeling of shapes is presented and corresponding problems are considered. We propose a digital preservation paradigm quite different from the currently popular "scan and mesh" approach yielding visible surface models. Our approach is based on constructive modeling that reflects the logical structure of modeled shapes. Constructive Solid Geometry (CSG) and Function Representation (FRep) are examined and practically applied as mathematical representations which fit the purposes of long term digital preservation. Examples of CSG based reconstruction of historical temples and FRep based modeling of traditional lacquer ware are given.

9. V. Savchenko, A. Pasko, Shape Modeling, Encyclopedia of Computer Science and Technology, Volume 45 (Supplement 30), A. Kent, J. Williams (Eds.), Marcel Dekker, ISBN 0-8247-2298-1, December 2001.

Abstract — This is a survey of shape modeling techniques including modeling parametric and implicit surfaces, shape transformations, solid and volume modeling, physics-based, procedural, feature- and constructions-based modeling.

Professor

Yukiko SASAKI ALAM

Yukiko SASAKI ALAM received a B.A. from Aichi Prefecture University in 1970, an M.A. from Ochanomizu University in 1973 both with concentration on English linguistics. She stayed in Bangladesh in 1976-1978 and in Saudi Arabia in 1978-1981, where she studied Bengali and Arabic respectively. She obtained a Ph.D. in Linguistics from the University of Texas at Austin (UT-Austin) in 1986. As her dessertation, *A Theoretical Approach to the Japanese Verbal System with Computational Implications* suggests, her research since then covers two areas: linguistics and machine translation.

She taught Japanese, Japanese linguistics, and linguistics at Dakha University, Bangladesh (1976-1978), University of Texas at Austin (1986-1989), Towson University, Baltimore (1989-1991), Texas A & M University (1991-1996), and San Francisco State University (1996-2000). She also carried out research on various linguistic problems of Machine Translation at Linguistics Research Center, University of Texas at Austin in 1984-1987.

She has written several papers on Japanese, English, Linguistics and Machine Translation, and recently has begun some work on the architecture of an object-oriented model for Universal Grammar-Based Machine Translation (UGBMT), which has been originally proposed by her.

She was Program Chair of the First International Conference on Practical Linguistics of Japanese, held in May, 1998 in San Francisco. (The conference was her brainchild.) She was Co-chair of the Second International Conference on Practical Linguistics of Japanese, held in April, 2000 in San Francisco.

Message

My research interests are towfold: to find out linguistic principles underlying language and thought and to apply the principles to a model of machine translation, which is intended to contribute to the advancement of communication and knowledge transfer among people living in this diversified world.

Publications (January 2001 ~ December 2001)

1. Y. S. Alam, "An Object-Oriented Grammatical Model: Designing an Interlingual MT in Java," Proceedings of the International Conference on Advances in Infrastructure for Electronic Business, Science, and Education on the Internet (SSGRR 2001) Section 32, 12 pages on CD (ISBN 88-85280-61-7), L'Aquila Italy, August 2001.

   Abstract — This paper presents an ongoing work on designing an object-oriented grammatical model for machine translation. The principles of the Java programming language offer a convenient tool for conceptualizing and developing a grammatical model for MT, allowing the current model to maintain a transparent mechanism of translation. The proposed model also implements linguistic principles and analyses such as the idea that the word order of a language is operated by such simple functional notions as a head, a complement, a modifier and a specifier. Pseudo code is used to give a clear picture of the design of the model.

2. Y. Sasaki Alam, "'Moyashita keredo Moenakatta' no wa Naze: Yowai Tassei Dooshi to Tsuyoi Tassei Dooshi ('Why does the Japanese language accept such an expression as "I burnt it, but it didn't burn": Weak Accomplishment Verbs and Strong Accomplishment Verbs"," *Gengogaku to Nihongo Kyoiku II: New Directions to Applied Linguistics of Japanese*, pp. 57-74, Kurosio Publishers, Tokyo, 2001.

   Abstract — This paper focuses on the debated issue as to why Japanese accepts such an expression as *I burnt it, but it didn't burn* while English does not, and demonstartes that the cause of the difference in acceptance is that accomplishment verbs divide into strong ones denoting both activity and the resulting state and weak ones implying activity but without the resulting state, and that Japanese accomplishment verbs are often interpreted as weak ones because of the weak grammatical restrictions on the specificity of noun phrases.

3. M. Minami and Y. Sasaki Alam (eds.), *Gengogaku to Nihongo Kyoiku II: New Directions to Applied Linguistics of Japanese*, 343 pages, Kurosio Publishers, Tokyo, 2001.

   Abstract — This volume is a collection in book form of most papers presented in the 2nd International Conference on Practical Linguistics of Japanese, held in San Francisco in April, 2000. It contains papers by internationally renouwed linguists such as Masayoshi Shibatani, Yukinori Takubo and Yasuhiko Tohsaku. The topics cover phonology, morphology, syntax, semantics, pragmatics and discourse grammar. This volume presents linguistics research results in a form applicable to those who might apply them in practical fields such as teaching of Japanese as a foreign language and in language technology

Professor

Vladimir SAVCHENKO

Vladimir SAVCHENKO was born in Taganrog city, Russia, May 15, 1947. He came to Hosei University from the University of Aizu (Japan) where he was a head of Shape Modeling Lab and undergraduate/graduate teacher. Before 1993 he was deputy director and a head of Computational Mechanics Lab at the Scientific Institute of System Analysis of the Russian Academy of Sciences (Moscow). Up to 1987 he was senior research assistant at the Institute of Applied Mathematics of Russian Academy of Sciences.

Education:
Institute of Applied Mathematics, Moscow, Russia
Ph.D., Theoretical Mechanics, 1982-1985
Moscow Aviation Institute, Department "Space crafts", Moscow, Russia MS, Mechanical Engineering, 1965, Sept., 1971, Feb.

His research interests: Geometric Modeling, Computer Graphics, Physically based simulation, Artificial Life, Parallel processing, Haptic Visualization.

He is a member of the IEEE Computer Society

He received the awords:
Bronze Prize Computer Graphics Grand Prix in STEC, Tokyo, Japan, 1996
Best WWW Award EUROGRAPHICS'96, Poitiers, 1996
Government order "Znak Pocheta", 1985
Government medal "Za Trudowoe Otlichie", 1975

Message

Shape modeling is an interdisciplinary area composing theoretical and experimental results from mathematics, physics, computer graphics, computer-aided design, computer animation, and others fields. Shape modeling and mathematical simulation stand side by side, and one upholds the other. The heart of my work was solving applied problems of mathematical simulation. In general, I am interested in a problem of mathematical simulation which includes three main parts: mathematical model, numerical method and programming realization.

Now I am involved in a number of projects, such as Applications of genetic algorithms in shape modeling, Converting elevation contours to a grid, Java implementation of Turtle Graphics in 3-D, Designing client/server applications dealing with geometric modeling, Image/Surface retouching.

This projects has been initiated by previous investigations in the field of computer graphics, shape modeling and by recent advance in Java programming. Java provides the right programming paradigm to make use of the distributed machines to speed up calculations. Designing client/server applications may lure students into writing very sophisticated programs, development of collaborative Internet-based computer graphics and shape modeling applications.

Hobbies

Classic music (Tchaikovsky, Beethoven). American country music. Japanese music (Kitaro) and songs (Tanimura).

Water and alpine skiing

Publications (January 2001 ~ December 2001)

1. V. Savchenko and L. Schmitt, Reconstructing Occlusal Surfaces of Teeth Using a Genetic Algorithm with Simulated Annealing Type Selection, 6th ACM Symposium on Solid Modeling and Applications, Sheraton Inn, Ann Arbor, Michigan, June 4-8, 2001, 39-46

Abstract — In this paper, we present an application of numerical optimization for surface reconstruction (more precisely: reconstruction of missing parts of a real geometric object represented by volume data) by employing a specially designed genetic algorithm to solve a problem concerning computer-aided design in dentistry. Using a space mapping technique the surface of a given model tooth is fitted by a shape transformation to extrapolate (or reconstruct) the remaining surface of a patient's tooth with occurring damage such as a "drill hole." Thereby, the genetic algorithm minimizes the error of the approximation by optimizing a set of control points that determine the coefficients for spline functions, which in turn define a space transformation. The fitness function to be minimized by the genetic algorithm is the error between the transformed occlusal surface of the model tooth and the remaining occlusal surface of the damaged (drilled) tooth. The algorithm, that is used, is based upon a proposal by Mahfoud and Goldberg. It uses a simulated-annealing type selection scheme, which is applied sequentially (pair-wise, or one-by-one) to the members in the parent generation and their respective offspring generated by mutation-crossover. We outline a proof of convergence for this algorithm. The algorithm is parallel in regard to computing the fitness-values of creatures.

2. V. Savchenko, Y. Uchikoshi, E. Ohbuchi, T. Ikedo, Java Implementation of Turtle Graphics for 3-D Volume Objects, International Conference on Imaging Science, Systems, and Technology, Las Vegas, Nevada, June 25-28, 2001, 465-471.

Abstract — In the paper we study the possibility of using volume modeling in a Java environment, applying the turtle graphics approach to imitate of painting/engraving operations. In particular, Java classes and methods were developed and tested for engraving operations that are considered as a straightforward extension of the turtle graphics approach.

3. N. Kojekine, V. Savchenko, D. Berzin, I. Hagiwara, Software Tools for Compactly Supported Radial Basis Functions, CGIM 2001, IASTED Fourth International Conference on Computer Graphics and Imaging, Honolulu, Hawaii, August 13-16, 2001, 234-239

Abstract — In this paper the use of compactly-supported radial basis functions for surface reconstruction is described. To solve the problem of reconstruction or volume data generation specially designed software is employed. Time performance of the algorithm and numerical error estimation of the reconstruction are also investigated. Thanks to the efficient octree algorithm used in this study, the resulting matrix is a band diagonal matrix that reduces computational cost and permits handling large data sets.

4. V. Savchenko and S. Sedukhin, Pattern Dependent Reconstruction of Raster Digital Elevation Models from Contour maps, VIIP 2001, IASTED International Conference on Visualization, Imaging, and Image Processing, Marbella, Spain, September 3-5, 2001, 237-244

Abstract — Raster digital elevation models or regular grids are used basically for the description of terrain surfaces. They serve to evaluate them at any desired set of positions. An implementation of 2-D sample-based interpolation for approximation of raster digital elevation data is considered. The approach couples the minimization of a terrain roughness specified by a limited number of contour maps and the supplement of fractal-based surface erosion to mimic appearance of natural terrain surfaces.

5. V. Savchenko, Shape Modeling Based on Energy Minimized Splines, Third International Conference on Actual Problems of Information Technologies and Remote Sensing of Siberia, Ugra Research Information Technology Institute, Khanty-Mansiysk, Russia, June 14-16, 2001.

Abstract — The paper discusses an approach of using spline technique and presents applications of finite element methods and so called radial based functions for surface reconstruction and modification.

Professor

Toru WAKAHARA

Toru WAKAHARA received the B.E. and M.E. degrees in applied physics and the Ph.D. degree in mathematical engineering and information physics from the University of Tokyo, Tokyo, Japan, in 1975, 1977, and 1986, respectively. From 1977 to 1986, he was with the Basic Research Laboratories, Nippon Telegraph and Telephone Corporation (NTT), Tokyo, Japan, where he was engaged in research of on-line handwriting recognition. From 1987 to 2000, he was with the Human Interface Laboratories, Cyber Space Laboratories, and Cyber Solutions Laboratories, NTT, Kanagawa, Japan, where he was engaged in research and development of machine-printed multi-font character recognition system, advanced handwritten character recognition system, pen-based interface, and biometric person authentication system. From 1991 to 1993, he was posted to the Institute for Posts and Telecommunications Policy (IPTP), Ministry of Posts and Telecommunications, Japan, where he conducted the first, second, and third IPTP character recognition competitions and studies on multi-expert system for handwritten 3-digit postcode and postal address recognition. Since April 2001, he has been a professor of the Faculty of Computer and Information Sciences, Hosei University.

His research interests include learning and generalization in pattern recognition, intelligent image processing, human visual perception, and human-machine interaction.

He is a member of the IEEE Computer Society and the Institute of Electronics, Information and Communication Engineers of Japan (IEICE).

He received a Special Achievement Award in 1994 from the Institute for Posts and Telecommunications Policy (IPTP), Ministry of Posts and Telecommunications, Japan.

Message

Having a lively intellectual curiosity in your study and research is most essential to taking a genuine delight in your academic life. In order to activate such curiosity, you have to think over what is an important problem worthy to be focused your energy on. In other words, finding a good problem is most valuable, and its solution is another thing.

Publications (January 2001 ~ December 2001)

1. Y. Kimura, T. Wakahara, and M. Sano, "Dictionary Learning by Adding Hyperspherical Templates," The Journal of the IIEEJ, Vol. 30, No. 1, pp. 11-20, January 2001 (in Japanese).

   Abstract — We present a new dictionary learning method in pattern recognition that generates a hyperspherical template with a small radius for each erroneous pattern embedded in the high dimensional feature space with decision boundaries of Voronoi regions. In recognition experiments on handwritten Kanji characters the proposed dictionary learning method shows a marked improvement in recognition accuracy with no over-learning effect.

2. A. Suzuki, A. Shio, T. Wakahara, and S. Ohtsuka, "Using a Least Squares Filter to Improve the Binarization of Stripy Patterns," Proc. of International Workshop on Advanced Image Technology 2001 (IWAIT2001), pp. 45-48, Tajeon, February 2001.

   Abstract — This paper describes a new method that can improve the stability of binarization of degraded stripy patterns like wood rings or fingerprints while suppressing noise effectively. The proposed method utilizes the least squares filter via FFT as applied to each small block of the original image in order to enhance the local dominant frequency components of stripy patterns. Experimental results demonstrate the superiority of the proposed method over existing techniques.

3. Y. Kimura, T. Wakahara, M. Sano, and A. Suzuki, "On-Line Recognition for Degraded Character Patterns Using Inter-Stroke Distance and Structural Information," The Journal of the IIEEJ, Vol. 30, No. 2, pp. 85-94, March 2001 (in Japanese).

   Abstract — We propose a new on-line character recognition method that combines the inter-stroke distance information with the relative structural information of constituent strokes by means of a weighted discriminant function. These two kinds of information play a complementary role in discriminating similar shaped but different characters. The proposed method realizes the reduction of the error rate by half in the extensive experiments of free-style Japanese handwritten character recognition.

4. T. Wakahara, Y. Kimura, and A. Tomono, "Affine-Invariant Recognition of

Gray-Scale Characters Using Global Affine Transformation Correlation," IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. 23, No. 4, pp. 384-395, April 2001.

Abstract — This paper describes a new, promising technique of gray-scale character recognition that offers both noise tolerance and affine-invariance. The key ideas are the use of normalized cross-correlation as a matching measure and the application of global affine transformation (GAT) to the input image so as to achieve affine-invariant correlation with the target image. Recognition experiments show the high recognition accuracy against a wide range of rotation, scale change, and translation under random Gaussian noise as applied to gray-scale images of numerals.

5. M. Mori and T. Wakahara, "Handwritten Kanji Character Recognition Using Relative Direction Contributivity," The Transactions of the IEICE, Vol. J84-D-II, No. 7, pp. 1360-1368, July 2001 (in Japanese).

Abstract — In handwritten Kanji character recognition stroke directional features are effective. However, they are not robust against slanting, rotation, and the fluctuation of stroke direction. We propose new features that express the relative position and angle information based on directional features of adjacent strokes. Recognition experiments using the public database of ETL9B and artificially generated characters subject to heavy geometrical distortion show the substantial improvement in recognition rates.

6. T. Wakahara, Y. Kimura, and M. Sano, "Handwritten Japanese Character Recognition Using Adaptive Normalization by Global Affine Transformation," Proc. of 6th International Conference on Document Analysis and Recognition (ICDAR'01), pp. 424-428, Seattle, September 2001.

Abstract — This paper describes a new character recognition system with a category-dependent normalization technique that compensates for shape distortion between an input pattern and each reference pattern using global affine transformation (GAT). GAT adaptive normalization is applied to a set of candidate categories of the input pattern output by the basic OCR. Then, each adaptively normalized input pattern is fed again to the basic OCR. Recognition experiments using totally unconstrained handwritten characters demonstrate the substantial reduction of error rates.

Professor

Kenji YOSHIDA

Kenji YOSHIDA was born in Fukui, Japan on November 11, 1954. He received the B.A. degree in the faculty of science and engineering from Science University of Tokyo. After graduated from Science University of Tokyo, he entered Taisei construction, Inc. where he engaged in study & development of CG simulation technology for landscape design. He acquired the degree of Dr. of Engineering at Nihon University in 1992. Established Visual Science Laboratory in 1991 and got to start more research & development about CG/VR technology. Since then, he produced and developed many advanced digital contents such as virtual reality idol "DK-96: Kyoko Date", Daiei film "Gamera 3" and etc.. In Apr. 1992 he was invited as a lecture at Tokyo Zokei University and next year he promoted to be an assistant professor. In Oct. 1994 he opened the world's biggest multimedia school, "Digital Hollywood". Recently, he established a network engineering school "int" in Nov. 1998 to train engineers who deal in network system and strategic information system. From April 2000, he holds concurrently a professor at Faculty of Computer and Information Science, Hosei University.

Message

New creation is always born by keeping go on challenging.
My hobby is scuba diving and ski.

Publications (January 2001 ~ December 2001)

1. K. Yoshida and R. Matsumoto, "Japanese cartoon will miss the digitalization trend.," Mobile! 2001 Spring, p. 62.

   Abstract —"MANGA" and "ANIME", the world-famous Japanese contents, are getting worldwide. This internationalization is good stimulation for animation making people. However, the budget for TV animation in Japan is suppressed by the rate determined by Mr. Osamu Tezuka in good old days. Such restriction and also closed thinking for Japanese market deteriorates the quality of Japanese animation. The worldwide Internet business will break the restriction, and will lead Japanese animation to the higher level.

2. K. Yoshida, "The third CG golden age, big boom of CG animation, is coming soon," CG i Cupid, vol6, page36, June 2001.

   Abstract — The third CG golden age will be the age of TV animation by computer graphics, and it is coming soon. However, CG creators in Japan are not enough. The skill to make movies with enough quality in limited time and budget is required. Communication with other member of the team is also important. Finally, talent to "animate" the CG character is essential. Practical education is necessary to prepare for the third CG golden age.

3. K. Yoshida, "Secret of creativity which gives the superiority in the Net-Venture," Dokuritsu-Ou, vol33, page 28, 2001

   Abstract — It is said that Information Technology is essential for venture business. On the other hand, you can easily find a number of huge IT facilities working without efficiency. How to use a computer is important rather than using a computer. A big company has advantage in mass business. Then, a small company should concentrate in small business, such as B to C business.

Professor

Shuichi YUKITA

Shuichi YUKITA was born in Chiba, Japan on January 12, 1954. He received the B.S. degree in physics, M.S. degree in mathematics from Tokyo University, Tokyo, Japan in 1976 and 1978, respectively. He received the Ph.D. degree in information science from Tohoku University, Sendai, Japan in 2000. From 1983 to 1987, he was with Toyo University, Saitama, Japan. From 1987 to 1993, he was with Wakkanai-Hokusei junior college, Hokkaido, Japan. From 1993 to March/2000, he was with the University of Aizu, Fukushima, Japan. In April 2000, he joined the Faculty of Computer and Information Sciences at Hosei University, Japan, as an Associate Professor, and then a Professor since April 2001.
His current research areas include cellular automata theory, algorithmic mathematics, and mathematical visualization. He is a member of the IEEE Computer Society, IEICE, IPSJ, Mathematical Society of Japan, and JSIAM.

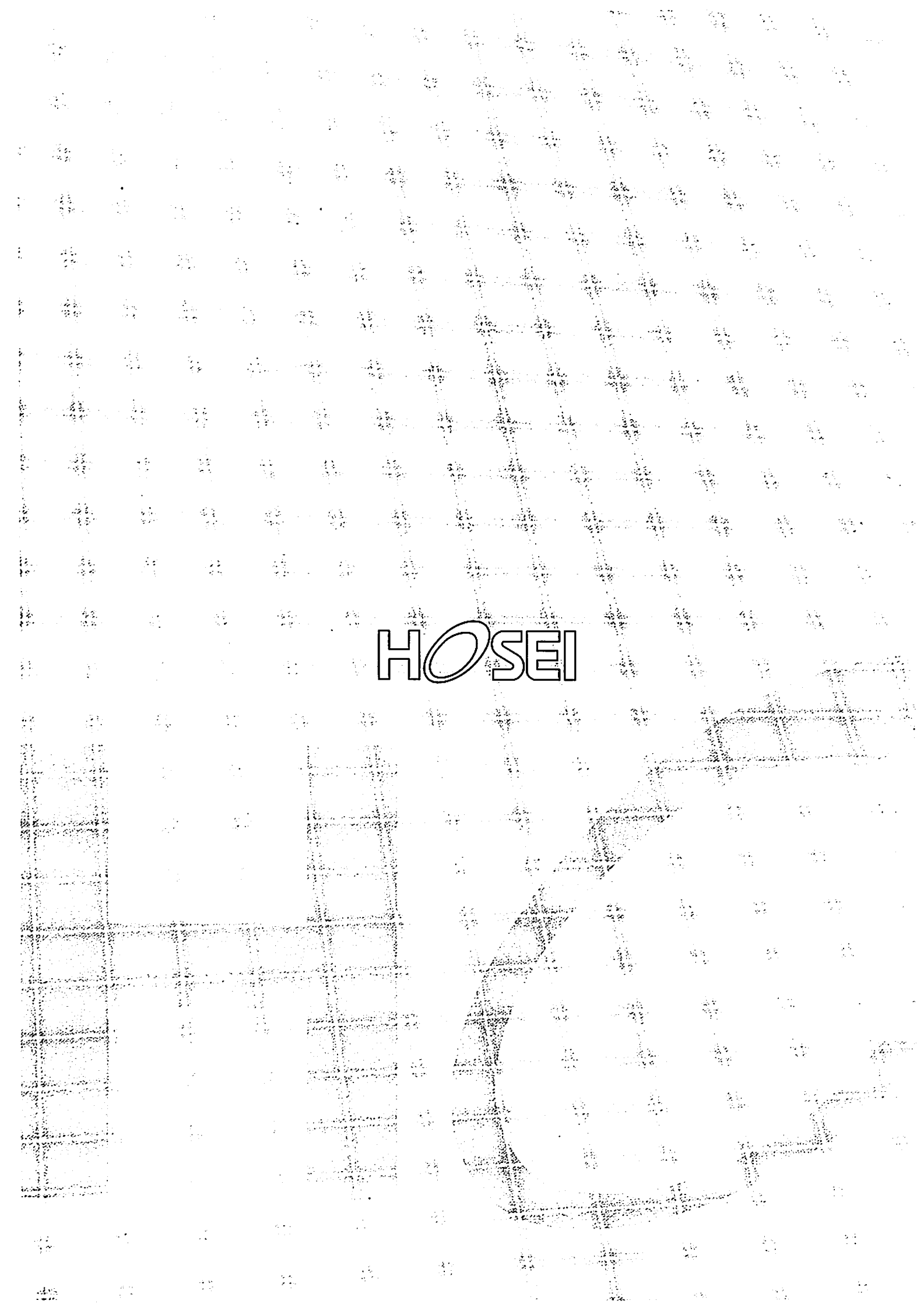
Message

Find your own winning way in the game of theoretical thinking that involves lots of mathematics and scientific discovery. While playing this game, we apply the dialogue engineering (or dialectical) technique. Dialogue may be sometimes monologue, where dialogue occurs between one and oneself, and , of course, dialogue may be actual dialogue in seminar talks and other presentations. My main research theme can be termed as dialogue engineering.

Publications (January 2001 ~ December 2001)

1. S. YUKITA, "Linear Cellular Automata on Cayley Graphs," Japan J. Indust. Appl. Math., Vol. 18, No. 1, pp. 15-24, February 2001.

   Abstract — Linear cellular automata on Cayley graphs of some class of groups are studied. The injectivity and surjectivity of parallel maps are shown to be determined by their local maps. The main theorems are non-Euclidean extensions of Ito, Osato, and Nasu's results on the injectivity and surjectivity of linear cellular automata The proofs are based on Machi and Mignosi's Garden of Eden theorem and properties of unique product groups. Examples of groups that allow the Ito-Osato-Nasu type theorem and of groups that do not are given.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