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)
9

(発行年 / Year)
2009-03

No. 9 March 2009

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

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Annals of Faculty of Computer and Information Sciences, Hosei University

Professor

Runhe HUANG

Refereed Publications

1. B.O. Apduhan, K. Takata, J. Ma, R. Huang, "Activity Situation Model and Application Prototype for Lifelog Image Analysis", Int'l Journal of Software Engineering and Its Applications, Vol. 2, No.4, 2008, pp.31-42.
   Abstract - This paper proposes an integrated technique to process the lifelog which is composed of both captured video (called lifelog images) and other sensed data. The resulting structured lifelog images were evaluated using the previous approach and the proposed technique.
2. R. Huang, K. Nakanish, J. Ma, B.O. Apduhan, "An Object-oriented Design and Push Web Server based Framework for Physical Object Interactions and Services", Journal of Software, Academy Publisher, Vol.3, No.8, 2008, pp.34-41.
   Abstract - This article presents our research progress in developing a framework based on the object-oriented design approach and the use of a push web server. With the concept of object abstraction, an object can hide its internal structure from the outside world, which can make the object secure.
3. K. Takata, J. Ma, B.O. Apduhan, R. Huang, N. Shiratori, "Lifelog Image Analysis based on Activity Situation Models Using Contexts from Wearable Multi Sensors", IEEE CS Proc. of the 2nd Int'l Conf. on Multimedia and Ubiquitous Engineering (MUE'08), May 2008, pp.160-163.
   Abstract - This paper is focused on analyses of the lifelog images to find representative images in video scenes using both the pictorial visual features and the individual's context information, and likewise represent the individual's life experiences in some semantic and structured ways for future efficient retrievals and exploitations.
4. T. Kawashima, J. Ma, B.O. Apduhan, R. Huang, Q. Jin, "Robots in Smart Spaces – A Case Study of a u-Object Finder Prototype –", Springer- Verlag Proc. of the 5th Int'l Conf. On Ubiquitous Intelligence and Computing (UIC'08), LNCS 5061, June 2008, pp.61-74.
   Abstract - This paper is focused on a case study of a u-object finding service done by a robot in a smart space. It presents the design and development of the system prototype for a robot to communicate with other devices and can find a tagged object in a smart room. Some preliminary experiments were conducted and the results verified the functionalities of the system.
5. K. Nakanish, J, Ma, B.O. Apduhan, R. Huang, "An Object-oriented Framework for Common Abstraction and Comet-based Interaction of Physical u-Objects and Digital Services", Springer-Verlag Proc. of the 5th Int'l Conf. On Ubiquitous Intelligence and Computing (UIC'08), LNCS5061, June 2008, pp.397-410.
   Abstract - This paper is focused on a ubiquitous framework that maps all physical u-objects and digital services commonly into their corresponding abstracted objects, and enables all the objects to interact based on message exchanges via the Comet Web server using the HTTP protocol which is platform independent.

6. K. Takata, J. Ma, B.O. Apduhan, R. Huang, Q. Jin, "Modeling and Analyzing Individuals Daily Activities using Lifelog", IEEE CS Proc. of Int'l Conf. on Embedded Software and Systems (ICESS'08), July 2008, pp.503-510.
   Abstract - This paper is focused on the activity models and analysis techniques to process lifelog data in order to find what events/states are interesting or important, to summarize the useful records in some semantic ways for efficient retrievals and presentations of past life experiences, and to use these experiences to further improve the individual's quality of life.
7. T. Kawashima, J. Ma, B.O. Apduhan, R. Huang, C. Rong, "A System Prototype with Multiple Robots for Finding u-Objects in a Smart Space", IEEE CS Proc. of the 5th Int'l Conf. on Embedded Software and Systems (ICESS'08), July 2008, pp.229-236.
   Abstract - Moveable robots can be utilized to add flexible location-related service functions to smart spaces. This paper presents design and development of a system prototype with multiple robots with focus on how to manage the multiple robots and their collaborative work in finding RFID tagged u-objects in a smart room.

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Annals of Faculty of Computer and Information Sciences, Hosei University

Professor

Satoru S. KANO

Refereed Publications

1. Kyohei Hashimoto, Satoru S. Kano and Akihide Wada, "Optical delay line for high time resolution measurement: W-type delay line," in Rev. Sci. Instrum. 79, 083108 (2008); Published 15 August 2008

Abstract - We propose and demonstrate a newly designed optical delay line (W-type delay line) that improves the resolution of optical path length, namely, time resolution, by an order of more than 3 in comparison to the spatial resolution of a conventionally used translational stage. Using a conventional mechanical translational stage having a spatial resolution of 1μm, the performance of the W-type delay line was evaluated by interferometric measurements with a diode laser, and the time resolution of 16 as was confirmed.

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Annals of Faculty of Computer and Information Sciences, Hosei University

Professor

Nobuhiko KOIKE

Refereed Publications

1. N. Fujii and N. Koike, "Work in Progress -A Dual Mode Remote Laboratory System Supporting Both Real-Time and Batch Controls by Making Use of Virtual Machines," in Proceedings FIE08 (38th Annual Frontiers in Education Conference), Session T1A-1—2, October 2008, Saratoga Springs, New York.

Abstract - This paper describes a dual mode remote laboratory system for an educational hardware experiment. There are two different approaches, namely real-time and batch modes, which control a laboratory system remotely. In the real-time mode, the spatially distributed hardware and test apparatuses are occupied by users during entire experiment periods exclusively. It gives the users interactive and real-laboratory like test environments, but the physical number of platforms will give the system usage limit. As for the batch mode approach, this mode resolves such shortcomings and achieves efficient equipment sharing among concurrent users, but the response-time is rather sacrificed. As neither of them does solve the problems, new remote laboratory environment which resolves the time restriction and the spatial restriction is proposed. The virtual machine (VM) technology has been employed to resolve these problems. As the VM controller allocates both real-time mode VMs and batch mode VMs dynamically, an efficient sharing of apparatuses and an improved interactivity can be achieved.

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Annals of Faculty of Computer and Information Sciences, Hosei University

Professor

Yamin LI

Refereed Publications

1. Yamin Li, Shietung Peng, and Wanming Chu, "K-Trunk and Efficient Algorithms for Finding a K-Trunk on a Tree Network", Proceedings of the Forty-First Hawai'i International Conference on System Sciences (HICSS-41), January 7-10, 2008. Big Island, Hawaii, CD-ROM.

   Abstract - Given an edge-weighted tree T, a k-trunk is a subtree T_k with k leaves in T which minimizes the sum of the distances of all vertices in T from T_k plus the weight of T_k. In this paper, we first give motivation for using a k-trunk in tree networks. Then we develop efficient algorithms for finding a k-trunk of T. The first algorithm is a sequential algorithm which runs in $O(n)$ time, where n is the number of vertices in T. The second algorithm is a parallel algorithm which runs in $O(\log n)$ time using $O(n/\log n)$ processors on EREW PRAM model.

2. Yamin Li, Shietung Peng, and Wanming Chu, "A Distributed Algorithm for Finding a Tree Trunk and Its Application for Multicast in Mobile Ad Hoc Networks", Proceedings of The IEEE 22nd International Conference on Advanced Information Networking and Applications (AINA 2008), GinoWan, Okinawa, Japan, March 25 - 28, 2008, IEEE Computer Society Press, pp 106-113.

   Abstract - Overlay multicast protocol constructs a virtual mesh spanning all member nodes of a multicast group and employs standard unicast routing to fulfill multicast functionality on application layer. The advantages of this approach are simplicity and flexibility. However, efficiency and stability are the issues that must be addressed as the size of the multicast group grows in the mobile ad hoc networks (MANETs). In this paper, we propose tree trunk for overlay multicast to solve these problems in MANETs. A tree trunk is a path that minimizes the sum of the distances of all vertices to the path plus the length of the path. We give an efficient distributed algorithm for finding a tree trunk in a tree network. We also perform some empirical analysis based on the tree trunk and compare the results with those using spanning tree.

3. Yamin Li, Shietung Peng, and Wanming Chu, "K-tree Trunk and a Distributed Algorithm for Effective Overlay Multicast on Mobile Ad Hoc Networks", Proceedings of the International Symposium on Parallel Architectures, Algorithms and Networks (I-SPAN 2008), Sydney, Australia, May 7-9 2008. IEEE Computer Society Press, pp 53-58.

   Abstract - Overlay multicast protocols construct a virtual mesh spanning all member nodes of a multicast group. It employs standard unicast routing and forwarding to fulfill multicast functionality. The advantages of this approach are robustness and low overhead. However, efficiency and stability are the issues that must be addressed in the mobile ad hoc network (MANET) environment. In this paper, we propose an effective structure for overlay multicast to solve these problems in MANET. Instead of using a spanning tree on the virtual mesh, we introduce a simple structure called k-tree trunk for multicast. A k-tree trunk of a tree is a subtree with k leaves that minimizes the sum of the distances of all vertices to the subtree plus the size of the subtree. The k-tree trunk is more stable and easier to maintain than the spanning tree in MANET. The simulation results show that our approach handles the flexibility and mobility issues in an overlay multicast protocol effectively, especially when the group size is large.

4. Yamin Li, Shietung Peng, and Wanming Chu, "Optimal Algorithms for Finding a Trunk on a Tree Network and its Applications", The Computer Journal. doi:10.1093/comjnl/bxn037. http://comjnl.oxfordjournals.org/. Advance Access published on July 23, 2008.

Abstract - Given an edge-weighted tree T, a trunk is a path P in T which minimizes the sum of the distances of all vertices in T from P plus the weight of path P. In this paper, we give efficient algorithms for finding a trunk of T. The first algorithm is a sequential algorithm which runs in $O(n)$ time, where n is the number of vertices in T. The second algorithm is a parallel algorithm which runs in $O(\log n)$ time using $O(n/\log n)$ processors on EREW PRAM model. We present an application of trunk on mobile ad-hoc networks for efficient multicasting.

5. Yamin Li, Shietung Peng, and Wanming Chu, "Prefix Computation and Sorting in Dual-Cube", Proceedings of the 37th International Conference on Parallel Processing (ICPP-08), Portland, Oregon, USA, September 8-12, 2008, IEEE Computer Society Press, pp.389-396.

Abstract - In this paper, we describe two algorithmic techniques for the design of efficient algorithms in dual-cube. The first uses cluster structure of dual-cube, and the second uses recursive structure of the dual-cube. We propose efficient algorithms for parallel prefix computation and sorting in dual-cube based on the two techniques, respectively. For a dual-cube D_n with 2^{2n-1} nodes and n links per node, the communication and computation times of the algorithm for parallel prefix computation are at most $2n + 1$ and $4n - 2$, respectively; and those of the algorithm for sorting are at most $6n^2$ and $2n^2$, respectively.

6. Yamin Li, Shietung Peng, and Wanming Chu, "An Effective Structure for Algorithmic Design and a Parallel Prefix Algorithm on Metacube", Proceedings of the International Conference on Parallel and Distributed Computing, Applications and Technologies (PDCAT'08), Dunedin, New Zealand, December 1-4, 2008. IEEE Computer Society Press, pp54-61.

Abstract - Metacube is an attractive, hypercube-like interconnection network that can connect an extremely large number of nodes with a small node degree while keeping a relatively short diamemter. A Metacube MC (k,m) connects $2^{(2^k m+k)}$ nodes with only $k+m$ links per node. Metacube can be used to build parallel computing systems of very large scale with a small number of links per node. In this paper, we propose a new presentation of Metacube for algorithmic design on Metacube. Based on the new presentation, we give an efficient algorithm for parallel prefix computation on Metacubes that runs in $2^k m(k+1)+k$ communication steps and $2^{k+1}m+2k$ computation steps.

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Annals of Faculty of Computer and Information Sciences, Hosei University

Professor

Shaoying LIU

Books

1. Shaoying Liu, Tom Maibaum, and Keijiro Araki (Eds.), "Formal Methods and Software Engineering", Springer-Verlag, LNCS 5256, ISBN-10 3-540-88193-X, 2008.

   Abstract - Formal engineering methods are intended to offer effective means for integration of formal methods and practical software development technologies in the context of software engineering. Their purpose is to provide effective, rigorous, and systematic techniques for significant improvement of software productivity, quality, and tool supportability. This volume contains the papers presented at ICFEM 2008, held October 27 - 31, 2008 at the Kitakyushu International Conference Center, Kitakyushu-City, Japan. There were 62 submissions, each of which was reviewed by three Program Committee members. The committee decided to accept 20 papers based on their originality, technical contribution, presentation, and relevance to formal engineering methods.

Refereed Publications

1. Shaoying Liu and Yuting Chen, "A Relation-Based Method Combining Functional and Structural Testing for Test Case Generation" Journal of Systems and Software, Elsevier Science Inc. Vol. 81, No. 2, Feb. 2008, pp. 234-248.

   Abstract - Specification-based (or functional) testing enables us to detect errors in the implementation of functions defined in specifications, but since specifications are often incomplete in practice for some reasons (e.g., lack of ideas, no time to write), it is unlikely to be sufficient for testing all parts of corresponding programs. On the other hand, implementation-based (or structural) testing focuses on the examination of program structures, which allows us to test all parts of the programs, but may not be effective to show whether the programs properly implement the corresponding specifications. To perform a comprehensive testing of a program in practice, it is important to adopt both specification-based and implementation-based testing. In this paper we describe a relation-based test method that combines the specification-based and the implementation-based testing approaches. We establish a set of relations for test case generation, illustrate how the method is used with an example, and investigate the effectiveness and weakness of the method through an experiment on testing a software tool system.

2. Yuting Chen, Shaoying Liu, and W. Eric Wong, "A Review Approach to Detecting Violations of Consistency between Specification and Program Structures", International Journal of Software Engineering and Knowledge Engineering (IJSEKE), World Scientific Publishing Co. Pte. Ltd, 18(8), Dec., 2008.

   Abstract - The application of specification-based program verification techniques (e.g., black-box testing, formal proof) faces strong challenges in practice when the gap between the structure of a specification and that of its program is large. This paper describes a view-based program review approach to addressing these challenges. The essential idea of the approach is first to derive comparable views from specification and program, and then detect and eliminate the violations of structural consistency in the program views on the basis of a set of criteria. We also developed a prototype tool to support the review approach, and conducted a case study to assess the effectiveness of the approach.

3. Shaoying Liu, "Integrating Top-Down and Scenario-Based Methods for Constructing

Software Specifications", In proceedings of 8th International Conference on Quality Software (QSIC 2008), IEEE Press, Oxford, Aug. 12-13, 2008, pp. 105-113.

Abstract - How to construct a complete and consistent software specification by construction is an important issue for software quality assurance, but it is still an open problem. The difficulty lies in the fact that the assurance of the completeness needs user's judgments and the specification keeps changing as requirements analysis progresses. To allow the user to easily make such judgments and to reduce chances for creating inconsistencies due to frequent specification modifications, in this paper we describe an intuitive, formal, and expressive specification method that integrates top-down decompositional and scenario-based compositional methods. The decompositional method is used at an informal level with the goal of achieving a complete coverage of the user's functional requirements, while the compositional method is used to precisely define the functionality of each scenario and to construct complex scenarios by composition of simple scenarios in a formal, intuitive language called SOFL. Combination of the decompositional and compositional processes can facilitate the analyst to complete a specification in a hierarchical structure. We present an example to illustrate how the integrated method is used in practice and describe a software support tool for the method.

4. Shaoying Liu, "Utilizing Formalization to Test Programs without Available Source Code", In proceedings of 8th International Conference on Quality Software (QSIC 2008), IEEE Press, Oxford, Aug. 12-13, 2008, pp. 216-221.

Abstract - How to test a program with no available source code is of great importance for software quality assurance in practice, but still remains a challenge. In this paper, we describe a novel approach to tackling this challenge. Its principal idea is first to formalize the informal requirements into formal operation specifications based upon program interface scenarios, and then utilize the specifications as a foundation for test case generation and test result analysis. We discuss how the formal specifications can be achieved and how formalization benefits the testing. In particular, we focus on the issue of how to test whether all functional scenarios defined in a specification are correctly implemented in the program. We present an example of applying the approach to an IC Card system to demonstrate its usage and to analyze its potential capability and challenges in practice.

5. Shaoying Liu, "Teaching Formal Methods in the Context of Software Engineering", In proceedings of 1st International Conference on Formal Methods Education and Training (FMET 2008), Kitakyushu City, Japan, Oct. 28, 2008, pp. 1-9.

Abstract - Formal methods were developed to provide systematic and rigorous techniques for software development, and they must be taught in the context of software engineering. In this paper, we discuss the importance of such a teaching paradigm and describe several specific techniques for teaching formal methods. These techniques have been tested over the last fifteen years in our formal methods education programs for undergraduate and graduate students at universities as well as practitioners at companies. Our experience shows that students can gain confidence in formal methods only when they learn their clear benefits in the context of software engineering.

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Annals of Faculty of Computer and Information Sciences, Hosei University

Professor

Tetsuo MIZOGUCHI

Books

1. Tetsuo Mizoguchi, "Database", (in Japanese) Kindaikagakusha, ISBN 978-4-7649-0360-9, 2008.

   Abstract - A Database textbook for undergraduate course is published.

Refereed Publications

1. T.Mizoguchi, "ATN Performance" (in English) Working Paper 305, ICAO (International Civil Aviation Organization), the 3rd Working Group Meeting of ATN ICG (Implementation Coordination Group), Chiang Mai, Thailand, Jan.2008

   Abstract - In order to continue the task related to performance, some discussions are provided in the paper. After clarifying the meanings of some terms, the scope of task and the areas related to the task are discussed.
2. T. Mizoguchi, "Performance Indicators for AMHS", (in English)Working Paper 11, ICAO, the 3rd Meeting of ATN Implementation Coordination Group, Nadi, Fiji Islands, May 2008

   Abstract - The performance issues related to the ATN, AMHS in particular, have been discussed in the previous ATNICG meetings as well as the ATNICG WG meetings. It is requested for the ATNICG meeting to develop, establish, adapt, monitor, identify, or analyze some performance indicators. The paper proposes a set of performance indicators for AMHS services.
3. T. Mizoguchi, "AMHS Performance Assessment in the Asia/Pacific Region ", (in English) Working Paper 03, ICAO, the 5th Working Group Meeting of ATN Implementation Coordination Group, Chennai, India, Dec. 2008.

   Abstract - The description on AMHS Performance Assessment in the Asia/Pacific region is drafted and given in the paper. After stating the objectives and scope of the document, the objectives and scope of the AMHS Performance Assessment itself is stated. The aspects of overall AMHS performance are described, followed by an AMHS performance indicators proposal. The AMHS Performance Assessment activities at the State level, the bilateral between States, and the regional/global level are also proposed together with the targets of these proposed performance indicators. Some other issues are also given.

Other Publications

1. T. Mizoguchi, 'A Structured Textbook; Case of Database Lecture', (in Japanese) SIG Digital Document, Information Processing Society of Japan, Jan. 2008,

   Abstract - A lecture note used for an undergraduate course is restructured as a textbook by introducing a structure for describing the subjects in the textbook. The report provides the description structure tailored to the educational purposes in information sciences. The targeted readers and the scope of the textbook are

identified. Based on the scope of the textbook, four basic components of description are decided together with their scopes of description in turn. The explanations for these subjects are structured in a way that the nature of each subject and the rationale for introducing the subject are provided together with its behaviors and uses. Also the connection between subjects in a linear description is considered.

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Annals of Faculty of Computer and Information Sciences, Hosei University

Professor

Kenji OHMORI

Refereed Publications

1. K.Ohmori and T.L.Kunii. "Mathematical Modeling of Ubiquitous Systems," in Proceedings of the First IEEE International Conference on Ubi-media Computing (U-Media 2008). IEEE Computer Society, July 2008, pp69-74.

   Abstract - Ubiquitous systems built in the environment of distributed or parallel computing are more complicated than conventional digital systems. This paper describes how ubiquitous systems are modeled mathematically or in a formal way using the incrementally modular abstraction hierarchy. Firstly, the system requirements represented by event sequences are mathematically expressed by the Cartesian product of actors and events using a fiber bundle. Then, the fiber bundles are lifted by the homotopy lifting property to the set of subspaces, each of which describes the behavior of a part of the system. This property is used for modeling the ubiquitous system in a bottom-up way. Assembling behaviors distributed in parts of the system, the behavior of an actor is defined by the homotopy extension property for modeling the system in a top-down way. Finally, the behaviors of the actors are adjoined together by attaching functions to express the system behavior, which is equivalent to the process obtained by process algebra. The problem of process algebra not having the methodology of how the system is modeled from system requirements to formal description is solved by the proposed incrementally modular abstraction hierarchy.

2. K.Ohmori and T.L.Kunii. "A Pi-Calculus Modeling Method for Cyberworlds Systems using the Duality between a Fibration and a Cofibration," in Cyberworlds 2008. IEEE Computer Society, International Conference of Cyberworlds 2008, Sep. 2008, pp363-370.

   Abstract - Cyberworld systems are characterized by distributed functions and mobile communication. The pi-calculus gives theoretical background for designing and modeling such systems. In this paper, an original method for designing mobile communication systems executed in parallel in the cyberworlds theoretically and systematically is discussed using homotopy theory in the most modern field of mathematics. Homotopy theory gives computer science the theoretical back ground of designing and modeling in the most general way. The homotopy lifting property and homotopy extension property categorizing topological spaces in mathematics are effective in bottom-up / top-down development in computer science. By applying it for designing and modeling complicated systems in the cyberworlds, the paper shows incrementally modular abstraction hierarchy starting with homotopy theory and ending with program codes makes a system development theoretical and systematical.

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Annals of Faculty of Computer and Information Sciences, Hosei University

Professor

Shietung PENG

Refereed Publications

1. Yamin Li, Shietung Peng, and Wanming Chu, "K-Trunk and Efficient Algorithms for Finding a K-Trunk on a Tree Network", Proceedings of the Forty-First Hawai'i International Conference on System Sciences (HICSS-41), January 7-10, 2008. Big Island, Hawaii, CD-ROM.

   Abstract - Given an edge-weighted tree *T*, a *k*-trunk is a subtree *Tk* with k leaves in *T* which minimizes the sum of the distances of all vertices in *T* from *Tk* plus the weight of *Tk*. In this paper, we first give motivation for using a *k*-trunk in tree networks. Then we develop efficient algorithms for finding a k-trunk of T. The first algorithm is a sequential algorithm which runs in O(n) time, where n is the number of vertices in T. The second algorithm is a parallel algorithm which runs in *O*(log *n*) time using *O*(*n*/log *n*) processors on EREW PRAM model.

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   Abstract - Overlay multicast protocol constructs a virtual mesh spanning all member nodes of a multicast group and employs standard unicast routing to fulfill multicast functionality on application layer. The advantages of this approach are simplicity and flexibility. However, efficiency and stability are the issues that must be addressed as the size of the multicast group grows in the mobile ad hoc networks (MANETs). In this paper, we propose tree trunk for overlay multicast to solve these problems in MANETs. A tree trunk is a path that minimizes the sum of the distances of all vertices to the path plus the length of the path. We give an efficient distributed algorithm for finding a tree trunk in a tree network. We also perform some empirical analysis based on the tree trunk and compare the results with those using spanning tree.

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4. Keiichi Kaneko and Shietung Peng, "Node-to-set Disjoint Path Routing in Dual-cube", Proceedings of the International Symposium on Parallel Architectures, Algorithms and Networks (I-SPAN 2008), Sydney, Australia, May 7-9 2008. IEEE Computer Society Press, pp 77-82.

   Abstract - In this paper, we propose an efficient algorithm that finds disjoint paths for node-to-set routing in dual-cube. Dual-cube is a hypercube-like interconnection network with about half of links per node compared with the hypercube containing equal number of nodes. For a dual-cube Dn with 2^{2n-1} nodes and n links per node, a source node s and a set of destination nodes T with $|T| = n$, the algorithm finds n disjoint paths the source to the destinations in $O(n^2 \log n)$ time and the maximum length of the paths is bounded by $3n+3$.

5. Yamin Li, Shietung Peng, and Wanming Chu, "Optimal Algorithms for Finding a Trunk on a Tree Network and its Applications", The Computer Journal. doi:10.1093/comjnl/bxn037. http://comjnl.oxfordjournals.org/. Advance Access published on July 23, 2008.

   Abstract - Given an edge-weighted tree T, a trunk is a path P in T which minimizes the sum of the distances of all vertices in T from P plus the weight of path P. In this paper, we give efficient algorithms for finding a trunk of T. The first algorithm is a sequential algorithm which runs in O(n) time, where n is the number of vertices in T. The second algorithm is a parallel algorithm which runs in $O(\log n)$ time using $O(n/\log n)$ processors on EREW PRAM model. We present an application of trunk on mobile ad-hoc networks for efficient multicasting.

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   Abstract - In this paper, we describe two algorithmic techniques for the design of efficient algorithms in dual-cube. The first uses cluster structure of dual-cube, and the second uses recursive structure of the dual-cube. We propose efficient algorithms for parallel prefix computation and sorting in dual-cube based on the two techniques, respectively. For a dual-cube Dn with 2^{2n-1} nodes and n links per node, the communication and computation times of the algorithm for parallel prefix computation are at most $2n + 1$ and $4n - 2$, respectively; and those of the algorithm for sorting are at most $6n^2$ and $2n^2$, respectively.

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8. Keiichi Kaneko and Shietung Peng, "Set-to-set Disjoint Path Routing in Dual-cube", Proceedings of the International Conference on Parallel and Distributed Computing, Applications and Technologies (PDCAT'08), Dunedin, New Zealand, December 1-4, 2008. IEEE Computer Society Press, pp129-136.

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bounded by $3n+3$.

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Annals of Faculty of Computer and Information Sciences, Hosei University

Associate Professor

Akira SASAKI

Refereed Publications

1. Akira Sasaki, Manabu Ichikawa, Hideki Tanuma and Hiroshi Deguchi, Constructing Tailored Simulations by Domain Specific Extension Approaches, In Proceedings of the Second World Congress on Social Simulation (WCSS2008), 2008, July, Virginia, USA.

   Abstract - This paper shows how to construct "tailored" simulations effectively using general purpose simulation languages or systems. Using such general systems, especially agent-based simulation systems, we can construct various simulations. However, using or customizing a simulation modeled on these versatile systems tends to be difficult for non-modelers or end users. Our approach in this study is to narrow the language gap between end users and modelers, and to introduce domain specific languages (DSLs) as an extension for general simulation languages. We define "relation definition language" as an example of DSL and extend our SOARS (Spot Oriented Agent Role Simulator) language. We will demonstrate that these extension approaches provide us a effective means to constructing tailored simulations.

Other Publications

1. Akira Sasaki and Yasuyuki Suga "A method for generating program editors for domain specific languages" Information Processing Society of Japan, Special Interest Group on Programming, PRO2007-5 (The abstract is shown in Transaction of IPSJ (Programming), p124, Vol.1 No.2, 2008)

   Abstract - We propose a method for generating language-oriented editors. Target languages in this study are domain specific languages that are specialized to supporting tasks in specific domains. Primary users of such languages do not have programming skills. This means we should also offer a programming development tool with the language processor. These tools are expected to be generated from specifications, since the development and maintenance cost of such tools tends to be high. There are several studies on syntax-oriented editors for general purpose programming languages, such as incremental parsing and attribute evaluation techniques. On the other hand, in this study, it is not a program text that a programmer is to edit. Therefore, our approach to generating such tools is based on abstract syntax trees (ASTs) in which text structure is abstracted out. The method for checking of static semantics is based on the attribute grammar formulation. In this presentation, we will show the details of specification, generating algorithms, and evaluation with experiments.

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Annals of Faculty of Computer and Information Sciences, Hosei University

Professor

Yuji SATO

Book Chapter

1. Sato Y.: "Event-driven Hybrid Classifier Systems and Online Learning for Soccer Game Strategies", In Soccer Robotics, Pedro U. Lima (Ed.), I-Tech Education and Publishing, ISBN 978-3-902613-21-9, pp. 375-394, January 2008.

   Abstract - In this section we introduce an idea for autonomous adaptive evolution with respect to the strategies of opponents in games, and we present the results of evaluating this idea. Specifically, we start by introducing a hybrid system configuration of classifier systems and algorithmic strategies. Then, with the aim of implementing real-time learning in mid-game, we introduce a bucket brigade algorithm which is a reinforcement learning method for classifiers, and a technique for restricting the subject of learning depending on the frequency of events. And finally, by considering the differing roles assigned to forwards, midfielders and defenders, we introduce a technique for performing learning by applying differences to the reward values given during reinforcement learning. We pitted this technique against soccer game strategies based on hand-coded algorithms, and as the results show, our proposed technique is effective in terms of increased win rate and the speed of convergence on this win rate.

Refereed Publications

1. Inoue Y., and Sato Y.: "Applying GA for Reward Allotment in an Event-driven Hybrid Learning Classifier System for Soccer Video Games", In Proceedings of the 2008 IEEE Symposium on Computational Intelligence and Games, December 2008.

   Abstract - This paper describes our study applying GA to search the reward values for reinforcement learning in a soccer video game using learning classifier systems. In particular, we report the result of promotion of efficiency by dividing searching space and applying co-evolutionary learning. We have already proposed that acquiring algorithms by using the event-driven hybrid learning classifier system. Moreover, we have proposed that using GA for setting the reward values which have no index for setting. As the result, a probability that the reward values can be set to appropriate value for learning was obtained. By comparison with the technique of searching the reward values all at once, we show a possibility that this technique have effect to improve efficiency of learning the reward values.

2. Ohsaki H., and Sato Y., "On launching AIST Journal Synthesiology: Through discussion with UIUC Japanese researchers", in Synthesiology, Vol.1, No.3, AIST, ISSN 1882-6229, pp.222-228, October 2008. (in Japanese)

   Abstract - This paper presents the discussion with Japanese researchers of computer science at the University of Illinois concerning the launch of journal Synthesiology and the underlying philosophy of AIST. Based on questions and comments that were raised in the discussion, we indicate current problems and issues that must be considered in the future for the journal.

3. N. Kobayashi, Y. Satou, H. Kurata, K, Katayama, T. Kawahara :"Nonvolatile semiconductor memory and method for managing information in information distribution system", Japanese Patent 4028798, July 2008. (in Japanese)

   Abstract - A semiconductor memory in which an area where an authentication key is stored and an access

limitation is placed is resettable and an information distribution system including the same and having a high-degree security function are disclosed. Information about an area where an authentication key is stored and an access limitation is placed is stored in a part of a storage area of the semiconductor memory. Alternatively, an authentication key is stored for each unit of data to be authenticated and an access limitation on stored information is placed. By such a method, encrypted information is stored in an area where access limitation is placed, thereby realizing double information protection.

4. Sato Y., Goldberg D. E., and Sastry K.: "Improving Small Population Performance under Noise with Viral Infection + Tropism", In Proceedings of the 2008 ACM/SIGEVO Genetic and Evolutionary Computation Conference (GECCO-2008), pp. 1143-1144, July 2008.

   Abstract - In this paper we report on the effect of viral infection with tropism on the formation of building blocks in genetic operations. In previous research, we applied genetic algorithms to the analysis of time-series signals with noise. We demonstrated the possibility of reducing the number of required entities and improving the rate of convergence when searching for a solution by having some of the host chromosomes harbor viruses with a tropism function. Here, we simulate problems having both multimodality and deceptiveness features and problems that include noise as test functions, and show that viral infection with tropism can increase the proportion of building blocks in the population when it cannot be assumed that a necessary and sufficient number of entities are available to find a solution. We show that this capability is especially noticeable in problems that include noise.

5. Sato Y., Suzuki R., and Akatsuka Y.: " Dependencies on Player Formation in Event-driven Hybrid Learning Classifier Systems for Soccer Video Games", In Proceedings of the 2008 ACM/SIGEVO Genetic and Evolutionary Computation Conference (GECCO-2008), pp. 1721-1722, July 2008.

   Abstract - In this paper, we discuss dependencies on player formation when using a classifier system in a decision algorithm for agents in a soccer game. Our aim is to respond to the changing environment of video gaming that has resulted from the growth of the Internet, and to provide bug-free programs in a short time. We have already proposed a bucket brigade algorithm and a procedure for choosing what to learn depending on the frequency of events with the aim of facilitating real-time learning while a game is in progress. We have also proposed a hybrid system configuration that combines existing algorithm strategies with a classifier system, and we have reported on the effectiveness of this hybrid system. In this paper, we pit players in several different formations against each other and show that the proposed system is able to learn regardless of the differences in formation. We also show that by performing simulations ahead of time, it is possible to investigate formations that will be effective against an opponent's formation. Finally, by investigating changes in frequency and success rates for each type of play due to changes in formation, we show that it is possible to acquire a team strategy for the current formation through learning..

6. Sato Y., Suzuki R., and Akatsuka Y.: "Formation Dependency in Event-driven Hybrid Learning Classifier Systems for Soccer Video Games", In Proceedings of the 2008 IEEE Congress on Evolutionary Computation (CEC-2008), pp. 1831-1838, June 2008.

   Abstract - In this paper, we discuss dependencies on player formation when using a classifier system in a decision algorithm for agents in a soccer game. Our aim is to respond to the changing environment of video gaming that has resulted from the growth of the Internet, and to provide bug-free programs in a short time. We have already proposed a bucket brigade algorithm and a procedure for choosing what to learn depending on the frequency of events with the aim of facilitating real-time learning while a game is in progress. We have also proposed a hybrid system configuration that combines existing algorithm strategies with a classifier system, and we have reported on the effectiveness of this hybrid system. In this paper, we pit players in several different formations against each other and show that the proposed system is able to learn regardless of the differences in formation. We also show that by performing simulations ahead of time, it is possible to investigate formations that will be effective against an opponent's formation. Finally, by investigating changes in frequency and success rates for each type of play due to changes in formation, we show that it is possible to acquire a team strategy for the current formation through learning.

7. Goto R., Sato Y., Miura J., and Yukita S.: "The Analysis of the Time-Series Signals with Genetic Algorithms Involving the Dynamic Bit Range Control for the Genetic Operations", In Proceedings of the 13th Intl. Symposium on Artificial Life and Robotics

(AROB-2008), pp. 638-641, February 2008.

Abstract - Problems on multi objective optimization, time series prediction, the analysis of noisy observation data and the implicit functions are all crucial in the consideration of real world issues. In this paper, we report the analysis for the characteristics of the time series periodic signals with genetic algorithms (GA) involving the dynamic range control for the genetic operations of GA. Subjects of this research have the same kinds of above problems. Analysis for the characteristics of the time series periodic signals means analyzing frequency components, the amplitudes and the phases of each frequency of the signals. As the time series prediction analysis is desired to converge as quickly as possible, we applied the dynamic bit range control for the genetic operations of GA. As the results of simulations, we could prove that GA has the applicability for the analyzing the characteristics of the noisy time series periodic signals and the dynamic bit range control for the genetic operations is effective for the early convergence of GA.

Other Publications

1. Sato Y., Goldberg D. E., and Sastry K.: "Improving Small Population Performance under Noise with Viral Infection + Tropism", In Illinois Genetic Algorithms Laboratory Technical reports (IlliGAL Report 2008-002), pp. 1-14, January 2008.

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Annals of Faculty of Computer and Information Sciences, Hosei University

Professor

Hiroshi HANAIZUMI

Refereed Publications

1. H. Hanaizumi, M. Akiba, H. Yamano and T. Matsunaga, "A Pan-Sharpening Method for Coral Reef Monitoring with Higher Accuracy," in Abstract Book of 11th Int. Coral Reef Symposium, pp.428, July 2008

   Abstract - A pan-sharpening method was proposed as the first step for building a global monitoring system for temporal change of coral reef with high accuracy and low cost. Firstly, low spatial resolution multi-spectral image was enlarged (increasing number of pixels) and co-registered onto panchromatic image. Based on multiple regression analysis, brightness information of the enlarged multi-spectral image was replaced with that of the panchromatic image so that all spectral density scatter-diagrams gave us linear shapes along the identical line (unity gradients and zero y-intercept). The method was characterized by its simplicity and faithfulness in preserving color information.
2. H. Hanaizumi, M. Akiba, H. Yamano and T. Matsunaga, "A method for detecting change in coral reef using pan-sharpened satellite images," in Proc. SPIE Asia Pacific Remote Sensing 2008, **7149**-31, November 2008

   Abstract - A method was developed for global monitoring of temporal change of coral reef using pan-sharpened color images with higher accuracy and lower cost. The method consisted of 3 blocks; image co-registration for removing complex discrepancy due to parallax among original color image and panchromatic one, pan-sharpening with preserving color information, and change detection with suppressing noise such as sea waves. The method was successfully applied to an actual FORMOSAT2 multi-temporal data set.

Other Publications

1. H.Hanaizumi, "A Method for Extraction of Corresponding Point Pairs among Lung Vessels In Multi-Temporal Helical CT Data," in IEICE Technical Report, **107**-461, pp.7-12, January 2008
2. S.Okamoto, H.Hanaizumi and R.Hagiwara, "An Object Tracking System using PC Controlled Cameras Connected with Network," IEICE Technical Report, **108**-324, pp.53-58, November 2008

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Annals of Faculty of Computer and Information Sciences, Hosei University

Professor

Munetake ICHIMURA

Refereed Publications

1. Munetake Ichimura,
   "Barriers of Studying Introductory Physics for College Students" in Suuri Kagaku (Mathematical Science), 46, No.5 (2008) pp.11-16 (in Japanese)
   Abstract - I discussed what are hard barriers for university students, especially those in the non-physics and -engineering courses, to learn introductory physics (and mathematics). I considered what makes the students lose willingness to enjoy physics. Discussions are based on my experience of teaching physics and mathematics at Hosei University and University of Tokyo.

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Annals of Faculty of Computer and Information Sciences, Hosei University

Professor

Tsuneo IKEDO

Refereed Publications

1. S. Yamaguchi and T. Ikedo
   "Shadow Antialiasing with Virtual Projection Space" Journal of IPSJ, Vol.49 No.9, pp 3291-3301, Sept. 2008
   Abstract -This paper proposes an antialias technique on shadows in complex geometry used silhouette-line information. Formatting the silhouette-line information by mathematical expression and packaging these in specific buffer structures, a small-sized physical buffer enables the high quality shadow-casting in available ranges of 64-65,536 times wider than the ordinary 2-dimensional shadow buffer.

Other Publications

Patent Applications:

1. T. Ikedo, "Realtime Omnidirectional Shadow Casting Renderer" P01, Appl. Dec.30, 2008
   Abstract - A realtime shadow renderer to cast the shadows of occluders to omnidirections under two pass algorithm is proposed. With defining the shadow polygon buffer in polar coordinate, it enables the shadow projection in the environment that the light-source locates among the objects without any additional computation cost.

Invited Lectures:

1. Tsuneo Ikedo, "New Technologies Incubated in University" JST hall (Ichigaya), Aug. 29, 2008, Japan Science and Technology Agency

URL:

Parims Website http://www.parims.org

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Annals of Faculty of Computer and Information Sciences, Hosei University

Professor

Katunobu ITOU

Refereed Publications

1. Tomoyosi Akiba, Kiyoaki Aikawa, Yoshiaki Itoh, Tatsuya Kawahara, Hiroaki Nanjo, Hiromitsu Nishizaki, Norihito Yasuda, Yoichi Yamashita, and Katunobu Itou, "Test Collections for Spoken Document Retrieval from Lecture Audio Data," in Proceedings of LREC '08, May 2008, pp1572-1577.

   Abstract - The Spoken Document Processing Working Group, which is part of the special interest group of spoken language processing of the Information Processing Society of Japan, is developing a test collection for evaluation of spoken document retrieval systems. A prototype of the test collection consists of a set of textual queries, relevant segment lists, and transcriptions by an automatic speech recognition system, allowing retrieval from the Corpus of Spontaneous Japanese (CSJ). From about 100 initial queries, application of the criteria that a query should have more than five relevant segments that consist of about one minute speech segments yielded 39 queries. Targeting the test collection, an ad hoc retrieval experiment was also conducted to assess the baseline retrieval performance by applying a standard method for spoken document retrieval.

Other Publications

1. K. Yamano, and K. Itou, "Detecting Scenes in Lifelog Videos based on Probabilistic Models of Audio data," in Proceedings of Acoustics '08, the second ASA-EAA joint conference, June 2008, 4pSPc4.

   Abstract - Life-log videos must be detected every scene to use them effectively. Scene are detected by colors changing, however, only using color cannot obtain enough accuracy. This paper proposes a detecting method using audio data and using power spectrums and its envelopes as features. Distinction experimentations were carried out with the data recorded in railway stations. The average distinction rates were 39.3% in the pattern distance using average power spectrums, 35.0% in the pattern distance using average power spectrum envelopes, 67.9% in the probabilistic models using seven shots and 86.3% the probabilistic models using three shots. In addition, detection experimentations were carried out using actual data. The average precision was 75.9%, and the average recall was 75.2%.

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Annals of Faculty of Computer and Information Sciences, Hosei University

Professor

Jianhua MA

Book

1. Y. Zhang, L.T. Yang, J. Ma, "Unlicensed Mobile Access Technology: Protocols, Architectures, Security, Standards and Applications", CRC Press, ISBN-10: 1-4200-5537-2, 2008,

   Abstract - This book provides a complete cross-reference source for unlicensed mobile access (UMA) technology and UMA-relevant technologies. It presents a fundamental introduction with definitions of concepts, explanations of protocols and emerging standards, as well as detailed discussions of applications. It covers important topics such as system/network architecture, capacity, mobility management, vertical handoff, and routing.

Refereed Publications

1. R.Y. Shtykh, Q. Jin, S. Nakadate, N. Kandou, T. Hayata, J. Ma, "Mobile SNS from the Perspective of Human Self-Extension", Chapter XLVIII, Handbook of Research on Mobile Multimedia, Second Edition, IGI Global, 2008, pp.688-701.

   Abstract - This paper is devoted to the emerging of new mobile multimedia with the evolution of mobile SNS, and discusses challenges and issues that have to be addressed in order to realize a mobile social networking breakthrough.

2. Z. Yu, X. Zhou, Z. Yu, J. Park, J. Ma, "iMuseum: A Scalable Context-Aware Intelligent Museum", Journal of Computer Communications, Elsevier, Vol.31, No.18, 2008, pp.4376-4382.

   Abstract - This paper proposes a scalable context-aware intelligent museum system called iMuseum. The system is based on a new context model, 2*3CM (2 Sets and 3 Layers Context Model) that integrates the advantages of ontology-based model and hierarchical model. The iMuseum system has two novel features: distributed acquisition of context knowledge on demand and centralized sharing of context knowledge with double-repository.

3. B.O. Apduhan, K. Takata, J. Ma, R. Huang, "Activity Situation Model and Application Prototype for Lifelog Image Analysis", Int'l Journal of Software Engineering and Its Applications, Vol. 2, No.4, 2008, pp.31-42.

   Abstract - This paper proposes an integrated technique to process the lifelog which is composed of both captured video (called lifelog images) and other sensed data. The resulting structured lifelog images were evaluated using the previous approach and the proposed technique.

4. R. Huang, K. Nakanish, J. Ma, B.O. Apduhan, "An Object-oriented Design and Push Web Server based Framework for Physical Object Interactions and Services", Journal of Software, Academy Publisher, Vol.3, No.8, 2008, pp.34-41.

   Abstract - This article presents our research progress in developing a framework based on the object-oriented design approach and the use of a push web server. With the concept of object abstraction, an

object can hide its internal structure from the outside world, which can make the object secure.

5. B. Dai, F. Wang, J. Ma, J. Liu, "Enhanced Chord-Based Routing Protocol Using Neighbors' Neighbors Links", IEEE CS Proc. of the 22nd Int'l Conf. on Advanced Information Networking and Applications (AINA'08), March 2008, pp.463-466.
   Abstract - This paper proposes a more efficient Chord-based routing protocol using neighbors' neighbor links for lookup in a dynamic peer-to-peer system with frequent node arrivals and departures to shorten both logical path length and physical end-to-end path latency.
6. C. Huang, B. Huang, Y. Mo, J. Ma, "SRPTES: A Secure Routing Protocol Based on Token Escrow Set for Ad hoc Networks", IEEE CS Proc. of the 22nd Int'l Conf. on Advanced Information Networking and Applications (AINA'08), March 2008, pp.583-589.
   Abstract - This paper presents a novel secure routing protocol based on token escrow set (SRPTES), which employs tokens with limited lifetime to control the trust relationships between neighboring nodes, and provides secure routing and packet forwarding services through the valid token.
7. K. Takata, J. Ma, B.O. Apduhan, R. Huang, N. Shiratori, "Lifelog Image Analysis based on Activity Situation Models Using Contexts from Wearable Multi Sensors", IEEE CS Proc. of the 2nd Int'l Conf. on Multimedia and Ubiquitous Engineering (MUE'08), May 2008, pp.160-163.
   Abstract - This paper is focused on analyses of the lifelog images to find representative images in video scenes using both the pictorial visual features and the individual's context information, and likewise represent the individual's life experiences in some semantic and structured ways for future efficient retrievals and exploitations.
8. T. Kawashima, J. Ma, B.O. Apduhan, R. Huang, Q. Jin, "Robots in Smart Spaces – A Case Study of a u-Object Finder Prototype –", Springer- Verlag Proc. of the 5th Int'l Conf. On Ubiquitous Intelligence and Computing (UIC'08), LNCS 5061, June 2008, pp.61-74.
   Abstract - This paper is focused on a case study of a u-object finding service done by a robot in a smart space. It presents the design and development of the system prototype for a robot to communicate with other devices and can find a tagged object in a smart room. Some preliminary experiments were conducted and the results verified the functionalities of the system.
9. K. Nakanish, J, Ma, B.O. Apduhan, R. Huang, "An Object-oriented Framework for Common Abstraction and Comet-based Interaction of Physical u-Objects and Digital Services", Springer-Verlag Proc. of the 5th Int'l Conf. On Ubiquitous Intelligence and Computing (UIC'08), LNCS5061, June 2008, pp.397-410.
   Abstract - This paper is focused on a ubiquitous framework that maps all physical u-objects and digital services commonly into their corresponding abstracted objects, and enables all the objects to interact based on message exchanges via the Comet Web server using the HTTP protocol which is platform independent.
10. H. Eto, T. Dohi, J. Ma, "Simulation-Based Optimization Approach for Software Cost Model with Rejuvenation", Springer-Verlag Proc. of the 5th Int'l Conf. on Autonomic and Trusted Computing (ATC'08), LNCS5060, June 2008, pp.204-218.
    Abstract - Software rejuvenation is particularly useful for counteracting the phenomenon of software aging. In this paper a reinforcement learning algorithm has presented to estimate the optimal rejuvenation schedule adaptively and examine its asymptotic properties through a simulation experiment.
11. K. Takata, J. Ma, B.O. Apduhan, R. Huang, Q. Jin, "Modeling and Analyzing Individuals Daily Activities using Lifelog", IEEE CS Proc. of Int'l Conf. on Embedded Software and Systems (ICESS'08), July 2008, pp.503-510.

Abstract - This paper is focused on the activity models and analysis techniques to process lifelog data in order to find what events/states are interesting or important, to summarize the useful records in some semantic ways for efficient retrievals and presentations of past life experiences, and to use these experiences to further improve the individual's quality of life.

12. T. Kawashima, J. Ma, B.O. Apduhan, R. Huang, C. Rong, "A System Prototype with Multiple Robots for Finding u-Objects in a Smart Space", IEEE CS Proc. of the 5th Int'l Conf. on Embedded Software and Systems (ICESS'08), July 2008, pp.229-236.
Abstract - Moveable robots can be utilized to add flexible location-related service functions to smart spaces. This paper presents design and development of a system prototype with multiple robots with focus on how to manage the multiple robots and their collaborative work in finding RFID tagged u-objects in a smart room.
13. C. Hsu, J. Zhan, W. Fang, J. Ma, "Towards Improving QoS-Guided Scheduling in Grids", IEEE CS Proc. of the Third ChinaGrid Conference (ChinaGrid'08), August 2008, pp. 89-95.
Abstract - This paper presents two optimization schemes, makespan optimization rescheduling (MOR) and resource optimization rescheduling (ROR), which are based on the QoS Min-Min scheduling technique, for reducing overall execution time without increasing resource need.
14. X. Yu, S. Yu, Y. Liu, J. Ma, "Streaming Media Intrusion Detection through Interacting Protocol State Machines", IEEE CS Proc. of the Int'l Conf. on Future Generation Communication and Networking (FGCN'08), December 2008, pp.441-444.
Abstract - In this paper, we propose a streaming media intrusion detection approach based on state transmission analysis and session management in the application layer. The proposed approach is quantitatively evaluated, and the result shows the good performance in terms of fairly short delay in intrusion detection.

Other Publications

1. J. Ma, "From Trusted Computing to Ubisafe Computing", Keynote Speech, Int'l Symposium on Trusted Computing (TrustCom'08), November 2008.
2. J. Ma, "Context-Aware Services in Smart Spaces with Robots", Keynote Speech, IEEE Asia-Pacific Services Computing Conference (APSCC'08), December 2008.
3. J. Ma, "Spacelog Concept and Issues for Novel u-Services in Smart Spaces", Keynote Speech, Int'l Conference on Future Generation Communication and Networking (FGCN'08), December 2008.

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Annals of Faculty of Computer and Information Sciences, Hosei University

Professor

Toshihisa NISHIJIMA

Refereed Publications

1. T. Kohnosu, K. Tokiwa, and T. Nishijima, "Convergent Points of Asymptotic Distance Ratio of Some Justesen Codes", IEICE Transactions on Fundamentals of Electronics, Communications and Computer Science, Vol. J91A No.5, pp. 587-590, May 2008.
   Abstract - By using a feature structure of the Justesen code, the weight distributions for the families of the Justesen codes having low code rates are explicitly given by Kolev and Kohnosu–Tokiwa. However, an asymptotic evaluation to these families is not given in those papers. Then, the convergent points of the asymptotic distance ratio that those families have are specified on the basis of not a lower bound but minimum weights obtained from those weight distributions. Comparing with the lower bound on the asymptotic distance ratio for Justesen codes, the location of the asymptotic ability that those families have is clarified in this report.
2. T. Nishijima, "An Upper and a Lower Bound on the Probability of an Undetected Error for Binary Expansions of Generalized Reed-Solomon Codes", IEICE Transactions on Fundamentals of Electronics, Communications and Computer Science, Vol. J91A No.6, pp. 676-684, June 2008.
   Abstract - By utilizing certain characteristic structure of the Hamming weight distribution of maximum distance separable codes, we can get weight enumerators to compute an upper and a lower bound on the probability of an undetected error for binary expansions of generalized Reed-Solomon (GRS) codes. Also, values of the average probability of an undetected error are computed by using the average weight distribution for an ensemble of binary expansions of all codewords of all GRS codes for some given concrete code parameters. By comparing these values with values of the upper and the lower bound computed by using the proposed weight enumerators, the effectiveness of those weight enumerators is shown in this paper.

Other Publications

1. T. Nishijima, K. Tokiwa, and T. Kohnosu, "Some Properties of the Binary Weight Enumerators for Randomly Shifted Codes and Wozencraft's Ensemble", Technical Report of IEICE, IT2008-35, pp. 91-94, Sept. 2008.
2. T. Endo, T. Nishijima, K. Tokiwa, and T. Kohnosu, "Classification of the Binary Weight Enumerator of Primitive Reed-Solomon Codes", Technical Report of IEICE, IT2008-36, pp. 95-98, Sept. 2008.
3. T. Nishijima, K. Tokiwa, and T. Kohnosu, "Specifying Primitive Reed-Solomon Codes in the Ensemble of Generalized Reed-Solomon Codes", in Proceedings of the 2008 Symposium on Information Theory and Its Applications, pp. 724-726,

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Professor

Yukiko SASAKI ALAM

Refereed Publications

1. Yukiko Sasaki Alam, "Algorithms for Identifying the Multiple Syntactic Categories and Meanings of the Word *Over," Journal of Computers,* Volume 3, Number 1, January 2008, pp. 15-21.

   Abstract - The word *over*, among others, is associated with a great variety of syntactic categories and meanings. Although *over* has received attention from scholars in different frameworks for various aspects, there is little research, to my knowledge, to take a comprehensive approach to both syntax and semantics of the word *over*. This article proposes algorithms for identifying from the context a case of *over* with one of four syntactic categories and with one of seventeen meanings. The test was carried out manually on five hundred instances of *over* from British National Corpus. The results are promising, with 95 percent of the classification of the instances being correct. This study, while taking an idealistic approach, brings to light methods that may stretch the limits of natural language processing.

2. Yukiko Sasaki Alam, "A Rule-based Morpho-semantic Analyzer of the Japanese Verb Phrases of Simple Sentences," in Proceedings of the 22nd Pacific Asia Conference on Language, Information, and Computation (PACLIC 22), November 2008, pp. 101-112.

   Abstract - This paper presents the design and algorithms of a morpho-semantic analyzer to parse the Japanese verb phrases of simple sentences. This parser aims to understand the whole semantics of verb phrases by parsing them into semantic units, and thus differs from existing morphological analyzers that primarily segment sentences into morpho-phonemes, labeled with the classifications. Unlike other statistically aided morphological parsers, the algorithms used are based on rules derived from linguistic analysis. The present system can identify the syntactic category of the head word of a verb phrase, and, if it is a verb, the conjugation group, even when not listed in the dictionaries of the system. This ability of the system enables quick access to the dictionary in the category of the head word. The design is object-oriented, modeling linguistic constructions and the components, and it is thus easy to grasp the structures and algorithms, enhancing scalability, maintainability and portability. The system can be embedded in a larger system, and be used when the larger system starts parsing verb phrases.

Demonstration:

Yukiko Sasaki Alam, "Developing a Modular Parsing System for Semantic Analysis of Japanese: the Verb Phrase Module", at Coling 2008 Workshop on Grammar Engineering Across Frameworks, Manchester, 24 August, 2008.

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Annals of Faculty of Computer and Information Sciences, Hosei University

Professor

Vladimir SAVCHENKO

Refereed Publications

1. V. Savchenko, M. Savchenko, O. Egorova, I. Hagiwara, "Mesh Quality Improvement: Radial Basis Functions Approach", International Journal *of Computer Mathematics,* Tailor & Francis Group, Vol. 85, No. 10, 2008, pp. 1589-1607.
   Abstract - In this paper, we present a novel simple method, based on an implementation of space mapping technique, for improvement of the quality of tetrahedral and hexahedral meshes. The same approach is used for surface meshes where geometry of the initial surface mesh is preserved by a local mesh improvement such that new positions of the interior nodes of the mesh remain on the original discrete surface. The proposed method can be used in a pre-processing stage for subsequent studies (finite element analysis, computer graphics, etc.) by providing better input parameters for these processes. Experimental results are included to demonstrate the functionality of our method.
2. D. Yamazaki and V. Savchenko, A Software System for Filling Complex Holes in 3D Meshes by Flexible Interacting Particles, Journal of *Computational Science and Technology*,Vol.2(2008), No.4, pp. 655-668
   Abstract - 3D meshes generated by acquisition devices such as laser range scanners often contain holes due to occlusion, etc. In practice, these holes are extremely geometrically and topologically complex. We propose a heuristic hole filling technique using particle systems to fill complex holes with arbitrary topology in 3D meshes. Our approach includes the following steps: hole identification, base surface creation, particle distribution, triangulation, and mesh refinement. We demonstrate the functionality of the proposed surface retouching system on synthetic and real data.
3. O. Egorova, M.Savchenko, V. Savchenko, I.Hagiwara, Adaptation of spine theory to hexahedral meshing, In Proc. of the 7th WSEAS International Conf on System Science and Simulation in Engineering (ICOSSSE '08), Italy, 2008, pp.105-113.
   Abstract - In this paper we suggest a new concept for hexahedral meshing, based on the developed mathematical model *HMGM* – Hexahedral Mesh Growth Model. Our approach is based on spine (subpolyhedron) encoding of a 3-manifold of the inner part of the model, instead of usual graph representation of hexahedral mesh. The idea of this proposal is to combine geometry and topology in one step of mesh generation. It provides geometrically qualitative and topologically optimal hexahedral mesh for a given quadrilateral mesh, which enclose an arbitrary volume to be meshed. It is known from a spine theory that each 3-manifold can be encoded with a spine, which describes main properties of this manifold. Moves on spine are considered as an essential part of the problem. These moves can change spine components or their number, but they still keep the spine as an encoding spine for the same manifold. At present stage of *HMGM* development we do some mesh collapses for a given hexahedral mesh to receive spines experimentally. Thereby we describe inner membranes construction. Complexity of a spine must correspond to complexity of constructed molecule for a given surface. Then connection of the outer part with inner will be appropriate.

Other Publications

1. M. Savchenko, O. Egorova, L. Diago, I. Hagiwara, J. Shinoda, V. Savchenko, Mesh

Segmentation by Applying Paltonic Solids, , In Proc. of 21st Computational Mechanics Conference, Okinawa, Japan, 2008, pp. 375-376.

Award:

Tejima Industrial and Educational fund prize for invention, Tokyo Institute of Technology, Japan, 2008
"Quasi-statistical approach for surface mesh improvement "

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Annals of Faculty of Computer and Information Sciences, Hosei University

Professor

Toru WAKAHARA

Refereed Publications

1. Toru Wakahara, "Global/Local Affine Transformation Correlation for Handwritten Character Recognition as Distortion-Tolerant Matching," in Proceedings of the 11th International Conference on Frontiers in Handwriting Recognition, Montreal, August 2008, pp. 141-146.

   Abstract - This paper addresses the problem of distortion-tolerant matching for handwritten character recognition assuming that there is a limited quantity of data. As compared with statistical/probabilistic techniques based on a large sample size, every distortion-tolerant matching technique requires a kind of deterministic models for handwriting deformation. Those models might be parametric or non-parametric. We propose a hierarchical use of global/local affine transformation correlation featuring parametric deformation models that determine optimal affine parameters in global or local areas between input and template images to yield the maximum correlation value. In experiments made on the handwritten numeral database IPTP CDROM1B we prepare only a single template for each digit against a variety of handwriting deformation. Matching experiments have shown that the proposed method greatly increases the correlation value between each input image and its correct category's template. Also, recognition experiments have achieved a much higher recognition rate of 94.6% than that of 85.8% obtained by the rigid template matching based on a simple correlation.

2. Toru Wakahara, "Figure-Ground Discrimination and Distortion-Tolerant Recognition of Color Characters in Scene Images," in Proceedings of the 19th International Conference on Pattern Recognition, Tampa, December 2008.

   Abstract - This paper proposes a new technique of figure-ground discrimination of color characters in scene images following two steps. The first step is temporary binarization by selecting one optimal projection axis in the RGB color space and a threshold value along the axis using Otsu's criterion as a two-class classification problem. The second step is figure-ground determination based on the figure-to-ground ratio on the image periphery and common characteristics that a character pattern should have. Next, regarding distortion-tolerant character recognition under the condition of a small sample size we compare our global affine transformation (GAT) correlation method against the well-known tangent distance, where both methods use only a single template for each of 62 alphanumeric characters. Experiments are made on a total of 698 character images extracted from the ICDAR 2003 robust OCR dataset. The proposed figure-ground discrimination method achieves a correct binarization rate of 75.3%. Next, in recognition of correctly binarized characters the GAT correlation method and the tangent distance realize correct recognition rates of 94.1% and 91.6%, respectively. Moreover, the GAT correlation method is found to outperform the tangent distance in robustness against rotation at an angle of more than 20 degrees.

Other Publications

1. [Special Talk] Toru Wakahara, "Reconsideration of Deterministic Character Deformation Model," IEICE Technical Report, PRMU2007-223, pp. 55-60, February 2008.

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Annals of Faculty of Computer and Information Sciences, Hosei University

Professor

Kenji YOSHIDA

Other Publications

1. Kenji Yoshida, "Mobile G Scanner," "Grid Screen Panel," "Grid Map," and "Paper Touch Panel" in Automatic Identification, Japan Industrial Publishing Co., Ltd., May 2008 – August 2008.
2. Patents acquired: "Medium on which dot pattern is printed," "Reading method of dot pattern," "Medium on which dot pattern is printed," "Information input assisting sheet, information processing system using information input assisting sheet and information related to print output system using information input assisting sheet," "Dot pattern reading unit and mouse comprising it," "Remote control," "Projected image and moving control system, and information processing and display system," "Dot pattern," "Card surface reading/instruction executing method," "Card having dot patterns," "Information output apparatus," "Input device of apparatus using dot pattern, receiver of controlled apparatus, terminal, and paper controller," "Printing structure of medium surface on which dot pattern is formed by printing," "Icon formed on medium," and "Printing method of dot pattern using half tone dot and printed material," March 2008 – December 2008

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Annals of Faculty of Computer and Information Sciences, Hosei University

Professor

Shuichi YUKITA

Refereed Publications

1. Noriko Kitani and Shuichi Yukita, "Mathematical Ontology And A software Tool For Semantic Retrieval Of Exercise Problems," (to appear) in The International Symposium on Web and Mobile Information Services, March 2008.

   Abstract - A huge number of entrance examination questions are accumulated in databases at various educational institutions and companies in education industry. These questions are valuable resources of teaching materials at schools. However, these resources are not accessible at the semantic level, that is, we can not retrieve right data by specifying concepts or teaching goals independent of the way of presentation and terminology. Though such problems in various fields are successfully tackled by introducing ontology technologies, little is accomplished in the educational domain. In this paper, we introduce an example of ontology in the field of mathematics education and present a problem searching tool based on the ontology to prove the effectiveness of our semantic approach.

2. Jun Futagawa and Shuichi Yukita, "S2Directory – A Framework for Object-Directory Mapping with Dynamic Implementation Injection," (to appear) in Proceedings of the 22nd International Conference on Advanced Information Networking and Applications, March 2008.

   Abstract - Object models adopted in the object oriented software development reflect complex relations that exist between various entities in the real world. On the other hand, directory models adopted in directory service technologies map various relations into tree structures. Therefore, developing directory services by object oriented languages require writing lengthy procedures that bridge the gaps between object models and directory models. To overcome this drawback, in this paper, we propose a new technology named Object-Directory Mapping. We also present a Java based framework S2Directory to prove the effectiveness of the concept of Object-Directory Mapping. Implementation details are also given together with new dynamic implementation injection techniques.

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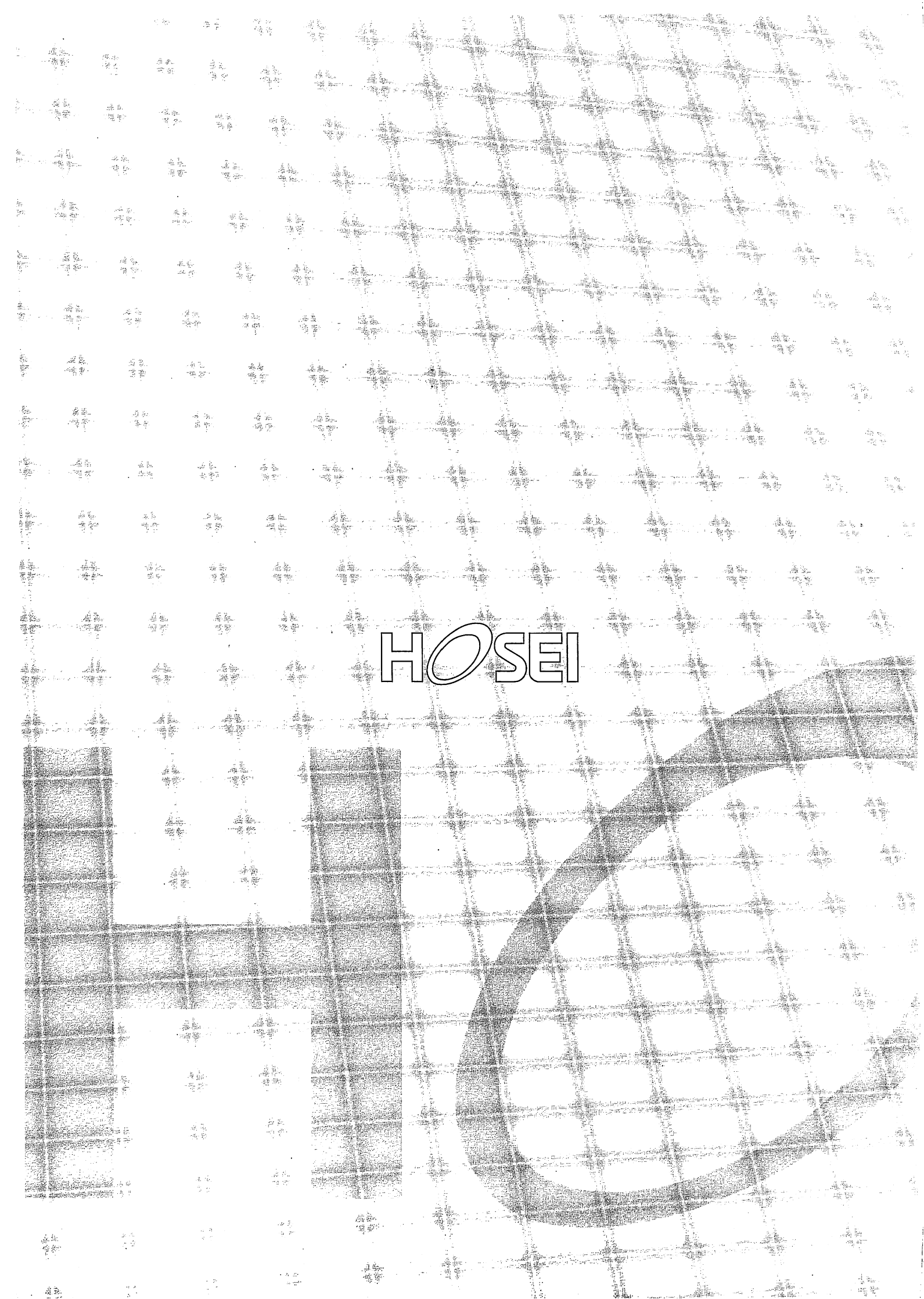
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