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Were a first for the Institute of Information Science, Academia Sinica, Taiwan

Fall/Winter 2011

Message from the Director

The Institute of Information Science (IIS) was established in 1982. We currently have 38 full-time research faculty, 30 post-doctoral research fellows, and slightly more than 300 research associates and specialists. Our research is conducted in eight specialized laboratories: Bioinformatics, Computer Systems, Information Processing and Discovery (iPAD), Multimedia Technology, Natural Language and Knowledge Processing, Network Systems and Services, Programming Languages and Formal Methods, and Computation Theory and Algorithms.

IIS is not a degree-granting academic institution, with the important exception of the international graduate program in bioinformatics, under the auspices of Academia Sinica's Taiwan International Graduate Program. This Ph.D. program was established in 2002 and has enrolled more than 30 students over the last seven years.

Many of our research fellows hold joint faculty appointments at top universities in Taiwan. This allows our institution to play a very significant role in training and fostering advanced research talent in the IT industry and in academia in Taiwan.

DIRECTOR:

Dr. Hsu, Wen-Lian (Acting)

DEPUTY DIRECTORS: Dr. Ko, Ming-Tat Dr. Wang, Hsin-Min

GROUP COORDINATORS: Dr. Sung, Ting-Yi Bioinformatics Lab Dr. Wu, Jan-Jan Computer Systems Lab Dr. Chen, Meng Chang Information Processing and Discovery



The Institute of Information Science has a wide diversity of research projects and large volume of activities. There are always researchers visiting and giving lectures at the institute, many from major research groups abroad. Each month, for example, the IIS Distinguished Lecture Series invites a worldrenowned researcher to visit. These researchers are asked not only to present their major research findings and to offer their views and perspectives on their respective fields, but

also to give advice on how to conduct research and be successful in their respective fields. This extremely successful and popular series is entering its third year this fall.

Almost every week an IIS faculty member will announce his or her research results in a major journal, at a conference, or in a new book. Some outreach programs such as workshops, tutorials, and summer internships are also being conducted through various service groups supervised by institute faculty. Our faculty members are also regularly asked to serve as managers of major funding programs with the National Science Council, or as principle investigators or chief executive officers for national research programs such as the National Communication Program and the National Digital Archives Program. This year, a group headed by Dr. D.T. Lee and Dr. Jane Liu won the fierce competition for the Academia Sinica Thematic Award; their three-year project is to develop key information technologies that could be used to coordinate various activities before, during, and after a major natural disaster such as an earthquake or a massive typhoon. Internet technologies such as social networking will be exploited as part of this. The project will also make use of researchers from the Research Center for Environmental Changes and the Institute of Earth Sciences for help in knowing how to deal with disasters caused by global climate change.

IIS has eight research laboratories. Their research programs cover a wide range of areas, including bioinformatics, network systems, multimedia, computer vision, natural language and knowledge processing, cryptography, Internet gaming, speech processing, cloud computing, data mining, machine learning, programming languages, and formal verification of computer programs. In this issue of IIS newsletter, we highlight the Multimedia Laboratory and its major research programs. We also introduce two major research projects: one is to provide a research platform for location-aware services with human-assisted computation (the PLASH project, page 8), the other is an intelligent automatic comics-generation system for on-line gaming (see page 12).

IIS faculty members continue to receive major awards. For example, Dr. Tyng-Ruey Chuang recently received a Fulbright award to visit the Berkman Center for Internet and Society at Harvard University. This award was based on Dr. Chuang's distinguished outreach service to advocacy groups such as Creatie Commons Taiwan and the Open Source Software Foundry. His activities have even attracted the attention of the office of the nation's president. Dr. Hong-Yuan Liao received an Outstanding Research Award from the National Science Council, and Dr. Chung-Chieh Shih received a 2011 Academia

(iPAD)

Dr. Liao, Hong-Yuan Mark Multimedia Technology Lab Dr. Hsu, Wen-Lian Natural Language and Knowledge Processing Lab Dr. Ho, Jan-Ming Network Systems and Services Lab Dr. Chuang, Tyng-Ruey Programming Languages and Formal Methods Lab

Dr. Tsan-sheng Hsu

Computation Theory and Algorithms Lab

Sinica Career Development Award. Dr. Mi-Yen Yeh also received a Pan Wen Yuan Research Exploration Award that will allow her to conduct joint research at Microsoft Research Asia in Beijing for six months.

At the time of this writing, Academia Sinica's campus in Nangang is finally experiencing the cool autumn breeze after the long, hot days of summer, with purple flowers blooming all around and seemingly thousands of cicadas singing. Despite the heat, however, work goes on at IIS comfortably and with relatively little toll on the environment because after more than a year of planning, design, and construction, IIS now has a new energy-efficient, state-of-the-art machine room that will reduce carbon dioxide emission up to 4200 tons. It will serve IIS and help conserve energy for many years to come — whatever the temperature outside may be.

We hope you enjoy this issue of the IIS newsletter. As always, please give us your comments and feedback.



Dr. **Tyng-Ruey Chuang** receiving a 2011–2012 Fulbright Senior Research Grant.

Dr. Hong-Yuan Liao receiving the Outstanding Research Award 2010 from the National Science Council.



Dr. **Bo-Yin Yang** being promoted to Research Fellow, effective January 18, 2011.

Ms. **Chiou-Feng Wang** being promoted to Research Engineer, effective March 23, 2011.





IIS winning the Academia Sinica 2010 Best Website Award (First Division: Research Institute).



Dr. **Jan-Jan Wu** being promoted to Research Fellow, effective March 14, 2011.

BEST WEBSITE Award

Congratulations to

the IIS Computer Center

Since the institute's logo was finalized in 2005, we have been brainstorming on what kind of website we would like to create. But without extra staff to maintain it, a website risks becoming outdated or abandoned. To help prevent that, we decided to split our content into two categories: active and passive. The active portion will be synchronized with our daily administrative activities. For example, when our human resources department adds a new person to our system, our website will be automatically updated. The passive portion of the site will be updated every two years along with our IIS brochures. Our goal is to create a simple and convenient website to share and introduce

IIS, and to provide a platform to help





About Us People Research Events Recruitment JISE Library Computer Center Internal Affairs CITI

Distinguished Lecture

Recent Research Results

Classifying Textual Components of Bilingual Documents with Decision-Tree Support Vector Machines Authors: X.-R. Lin, C.-Y. Guo, and F. Chang

On Social-Temporal Group Query with Acquaintance Constraint Authors: D.-N. Yang, Y.-L. Chen, W.-C. Lee, and M.-S. Chen

Multiple Kernel Learning for Dimensionality Reduction Authors: Yen-Yu Lin, Tyng-Luh Liu, and Chiou-Shann Fuh

Cost-sensitive Multi-label Learning for Audio Tag Annotation and Retrieval Authors: Hung-Yi Lo, Ju-Chiang Wang, Hsin-Min Wang, and Shou-De Lin

Virtual Contour Guided Video Object Inpainting Using Posture Mapping and Retrieval Authors: C. H. Ling, C. W. Lin, C. W. Su, H. Y. Mark Liao, and Y. S. Chen

DevilTyper: A Game for CAPTCHA Usability Evaluation

Usability Evaluation Authors: Chien-Ju Ho, Chen-Chi Wu, Kuan-Ta Chen, and Chin-Luang Lei



Prof. Wen-mei Hwu The Parallel Revolution in Computational

Science and Engineering Date: Thursday, June 23rd, 2011 10:00am Auditorium 106 at new IIS Building

>>>> Honors & Awards

- Congratulations to Dr. Tyng-Ruey Chuang for receiving the 2011-2012 Fulbright Senior Research Grants
- Congratulations to Dr. Yeh, Mi-Yen for receiving the Pan Wen Yuan Research Exploratin Award 2011
- Congratulations to Dr. Hong-Yuan Liao for receiving the Outstanding Research Award 2010 from National Science Council (NSC)
- Congratulations to Dr. Chun-Chieh Shih for receiving the 2011 Academia Sinica Career Development Award.

+ More

+ More Info

Recruitment 🞿

TIGP

Research Fellows

▶中文.

our researchers and administrative staff handle their daily activities. During the past couple of years, we have gradually created other subsystems and integrated all our systems so they can communicate with each other more smoothly. As a result of everyone's hard work, IIS received Academia Sinica's 2010 Best Website Award (First Division: Research Institute).

Honors and Awards



Multimedia Technologies Laboratory: Making Life Better via Multimedia

Coordinators: Hong-Yuan Mark Liao (Chair), Wen-Liang Hwang, Tyng-Luh Liu, Chu-Song Chen, and Chun-Shien Lu Multimedia research covers a broad scope of techniques and rich applications, including those working on text, music, video, images, and 3D animation. It has rapidly become a factor affecting our daily life. Together with biotechnology and nanotechnology, multimedia is considered one of the three most promising industries of the twenty-first century.

The IIS multimedia group focuses its research efforts on two main areas: multimedia signal processing and multimedia applications. In the next few years, we will continue to devote our research efforts to advancing the key fields in multimedia, including video forensics, video content analysis and understanding, common pattern discovery, multiclass object recognition, and distributed compressive video sensing.

Here are some key fields.

Video Forensics

Video forensics is one of the most



Original image

problem, motion across the temporal axis, and illumination changes across consecutive frames.

Video Content Analysis and Understanding

Video content analysis and understanding is a very hot research area. Google, Microsoft, Yahoo, and IBM all put great emphasis on this. In the next couple of years, we will focus on some basic issues. For video content analysis, we will cover the issues related to spatialtemporal content extraction and analysis, heterogeneous features extraction, and fusion for compact video representation. We will also address issues related to design of efficient representation schemes and design of valid metrics for performing video retrieval.

attractive research fields in recent years. Due to the rich amount of information that a camcorder can record, police departments frequently use them in crimescene investigations. Collecting evidence from video, however, is very different than doing the same thing using still images. The former is much more difficult than the latter because it has to deal with spatial-temporal problems. A number of critical issues that one may need to face include the low-resolution

Common Pattern Discovery

We will study the problem of finding

Honors and Awards





Inpainted image

common patterns in multiple or in a sequence of images. In this study, we will look for important common features based on unsupervised learning. Unlike existing methods that usually deal with only a single common pattern, we will investigate a more general problem when there are multiple common patterns or even no common patterns occurring in the images.

Multi-class Object Categorization

One major obstacle hindering the advance in developing object recognition techniques has to do with the large infraclass feature variations caused by issues such as ambiguities from background clutter, various poses, different lighting conditions, and possible occlusion. Another difficulty in object recognition is that its current application often deals with a large number of categories. Although there has been significant progress in the design of more robust visual features Distinguished Research Fellow, Academician **Der-Tsai Lee** being selected as the 14th President of National Chung Hsing University



Dr. **Chun-Chieh Shih** receiving the 2011 Academia Sinica Career Development Award.



Dr. **Sheng-Wei Chen** being promoted to Associate Research Fellow, effective January 14th, 2011.



Dr. **Ling-Jyh Chen** being promoted to Associate Research Fellow, effective January 14th, 2011.





Dr. **Chung-Yen Lin** being promoted to Associate Research Fellow, effective March 14, 2011.



Dr. **Huai-Kuang Tsai** being promoted to Associate Research Fellow, effective March 14, 2011.



(cont'd on page 15)

Dr. **Mi-Yen Yen** receiving the Pan Wen Yuan Research Exploration Award 2011. Dr. Sheng-Wei Chen and Dr. Shin-Cheng Mu winning the Academia Sinica 2010 Best Website Award (Third Division: Individual Research Fellow).



Distinguished Lecture Series



Persistent Homology for Images Herbert Edelsbrunner — January 10, 2011 "Using a simulated perturbation of the input voxels, we guarantee that the dual complex is unambiguous, and keeping the oct-tree balanced, we get it geometrically realized in space."

Invariant Image Classification by Multiscale Scattering Stephane Mallat — April 26, 2011 "Adapting the representation of high dimensional data to classification is an outstanding mathematical problem."





Sparse Coding and Dictionary Learning for Image Understanding Jean Ponce — January 24, 2011 "I will present a fast on-line approach to unsupervised dictionary learning and more generally sparse matrix factorization and demonstrate its applications in image restoration tasks."

Transfer Learning in Text, Multimedia and Social Networks Qiang Yang — May 23, 2011 "In this talk, I will give an overview of our recent work on transfer learning."





What is Software Assurance? John Rushby — February 14, 2011 "What assurance actually does is provide evidence for assessing a probability of 'possible perfection."

The Multicore Evolution and Operating Systems M. Frans Kaashoek — June 8, 2011 "In five years, will we need a new operating system design to support such applications or can we engineer existing designs to scale well?"





And Logic Begat Computer Science: When Giants Roamed the Earth Moshe Vardi — March 8, 2011 "This non-technical talk will provide an overview of the unusual effectiveness of logic in computer science."

The Parallel Revolution in Computational Science and Engineering Wen-mei Hwu — June 23, 2011 "In order to achieve strong scaling, many core numerical algorithms and even the higher-level problem definitions need



July	Jiawei Han	University of Illinois at Urbana-Champaign
August	Anil Jain	Michigan State University
September	Deborah Estrin	University of California Los Angeles

October Gernot Heiser Scientia The University of New South Wales

November Hermann Kopetz Vienna University of Technology

Knowledge Discovery, Data Mining, Database Systems Pattern Recognition, Computer Vision, Biometric Recognition Design of network and routing protocols for very large, global networks, Embedded networked sensing systems, with emphasis on environmental monitoring applications, Participatory sensing systems, leveraging the location Web Service Protocols: Modeling, Analysis and Management, Enterprise Services Integration, Process Modeling and Service Oriented Architectures for Pervasive Computing Intersection of real-time systems, fault-tolerant systems, and distributed systems.

BEST WEBSITE AWARD

Congratulations to

Dr. Sheng-Wei Chen

It is to my great pleasure to have received the Personal Webpage Design Award of Academia Sinica in 2010. I am taking this opportunity to share with readers my design philosophy for my web pages: simplicity and multiple viewpoints.

The key to achieving simplicity in website design is like that of composition in photography: to exclude any unnecessary elements. In my web pages, I use a plain white background, the same font for all text, only two font sizes (one for headers, the other for body text), black text (except for hyperlinks), and consistent rules for paragraph indention and numbering. Moreover, the number,

Congratulations to

Dr. Shin-Cheng Mu

Functional programming and programming language theories are popular research topics worldwide, including among students in Taiwan. Unfortunately, there are few resources on such topics in Chinese. This home page is therefore split into two parts. The English section serves as a home page, where I announce my latest work

Sheng-Wei Chen (a.k.a. Kuan-Ta Chen)

English version | Chinese version]

Sheng-Wei Chen (also known as Kuan-Ta Chen) Associate Research Fellow, Institute of Information Science, Academia Sinica Joint Appointed Associate Research Fellow, Research Center for Information Technology Innovation, Academia Sinica Director, Multimedia Networking and Systems Lab

Dr. Sheng-Wei Chen (also known as Kuan-Ta Chen) is an associate research fellow at the Institute of Information Science and the Research Center for Information Technology Innovation (joint appointment) of Academia Sinica. He received his Ph.D. in Electrical Engineering from National Taiwan University in 2006, and his B.S. and M.S. in Computer Science from National Tsing Hua University in 1998 and 2000, respectively. Prior to taking his academic path, he has been active as a programmer specialized in Windows and system programming, a technical writer of four books, a technical lecturer of programming courses, and a shareware developer.

His research interests include Internet & Multimedia Quality of Experience (QoE) management, Internet measurement, network security, and online games. Much of his recent work focused on QoE-aware multimedia system design, AI-hard problem solving using human computation, and the combination of both directions. He received the Best Paper Award (with leng-Fat Lam and Ling-Jyh Chen) in IWSEC 2008 and K. T. Li Distinguished Young Scholar Award from ACM Taipei/Taiwan Chapter in 2009. He also received the Outstanding Young Electrical Engineer Award from The Chinese Institute of Electrical Engineering in 2010. He is a member of ACM, IEEE, IICM, and CCISA.

News

- Our work is Server Consolidation Beneficial to MMORPG? A Case Study of World of Warcraft was featured by IEEE Spectrum its August 2010 issue.
- NetGames 2010 (where I serve as a TPC co-chair) website is online.
- Multimedia researchers can now evaluate the performance (in the sense of user satisfaction) of your multimedia processing algorithms on our online Quadrant of Euphoria system.
- Our work Fighting Phishing with Discriminative Keypoint Features was featured by MIT Technology Review in its Sep/Oct 2009 issue.

size, and location of images are precisely planned.

Multi-viewpoints refers to multiple views of the same content. For example, I provide five presentations of my publication list: selected works, recent works, a list categorized by topic, a chronological list, and a full list. Because we cannot know the intention of every visitor to our web pages, providing multiple views helps enable readers to find their targeted information more easily. In addition, I can provide cross references between the multiple views, so that visitors can change their viewpoints effortlessly and focus on surfing the content of the web pages without the fear of getting lost.



Blog

Calculating Programs from Galois Connections

December 10, 2010

One is often amazed that, once two functions are identified as a Galois connection, a long list of nice and often useful properties follow from one concise, elegant defining equation. But how does one construct a program from a specification given as a Galois connection? ... [14 comments...].

Evaluating Simple Polynomials

July 12, 2010

I had a chance to show the students, in 25 minutes, what functional program calculation is about. The student have just been exposed to functional programming a week ago in a three-hour course, and I have talked to them about maximum segment sum way too many times. ... [11 comments...].



中文訪客請參觀小眾計算學與嵐達網! Research

GADT Galois Connection Greedy

Theorem Haskell HaXML Imperative

Programs Indirect Equality List Homomorphism Logic Logic Programming Optimisation Problems Program Derivation Program

Agda Approximation Bidirectional Updating Burrows-Wheeler Transform Concurrency Converse-of-a-Function Theorem Curry-Howard Data Structure Dependent Type Fibonacci

and thoughts, while the Chinese section contains tutorials for local students.

The name "niche computing science" deliberately uses the term "computing" instead of "computer". It is a "niche" science since programming language theory is not yet well known in Taiwan, though it does have some dedicated

Sum of Squares of Differences

July 11, 2010

Given an array of integers having at least two elements, compute the sum of squares of the

fans.

information such as my affiliations and

The home page is a mixture of a contacts. blog, allowing frequent updates, and an ordinary home page with static

Best Website Award



PLASH: A Platform for Location Aware Service with Human Computation



Recent advances in ICT technologies and a steep drop in prices has helped the broad and rapid deployment of various wireless networks. While voice service dominates wireless service, Internet access and multimedia service have gradually gained popularity, boosting the wirelessrelated industry. The rapid deployment of new network infrastructure — from GSM, GPRS, WiFi, EDGE, and WCDMA, to WiMAX and LTE — cannot be sustained if no new services attract more users to spend even longer online. It is clear now people are aware that ICT should support meaningful applications, not be just a fancy communication tool. The introduction of new services is especially important to the wireless and related industries when infrastructure upgrades are unlikely.

Accordingly, PLASH (Platform for Location Aware Service with Human Computation) has been proposed as a platform to allow fast deployment of various location aware services. PLASH applies Web2.0 and human computation to consolidate the intelligence and efforts of the general public, which is the main difference from traditional intelligent transportation system and location aware services, Therefore, the main concerns of design are different from those of previous systems. In PLASH, users are also participants and contributors. PLASH will investigate the application of human computation in wireless service.



The PLASH Operating Model. (Fig. 2)



PLASH GUI for application development environment: Interface Builder, Interface Logic, and Customized Service. (Fig. 3)

PLASH consists of a multi-layered platform and application systems (see Fig. 1). The platform includes a communication layer supporting V2I (vehicle to infrastructure) and V2V (vehicle to vehicle) communication; a data layer responsible for data representation, storage, and access; and a service layer providing basic services that application systems perform jobs via those basic services. Each layer of the platform communicates via APIs to provide modularization and extensibility. In addition, PLASH allows application builders to develop and contribute their mature applications as a service accommodated in the service layer for others to expand and create more sophisticated applications.

The operating model is divided into two parts: PLASH Application and PLASH Platform, as shown in Fig. 2. Various communication protocols are used to communicate between different layers. HTTP/ RESTful (REpresentational State Transfer) is used between the presentation layer, the logic layer, and the access managers in the service layer. Java Message Service (JMS) is used within different components in the service layer between the access managers and the fundamental services; and Java Database Connectivity (JDBC) is used to communicate between the service layer and different databases in the data layer.



Map'n Track Friends in Android, iPhone, and a Web browser. (Fig. 4)

To ease the tasks of developing and deploying applications, the platform provides an environment for application builders. In this application-development environment, builders are able to use our Application Specification Language (ASL) and our Graphical User Inter-

face (GUI) to mash-up, create, and share applications/services. In the PLASH application development environment, application builders can design their application layout

(cont'd on page 10)



Activities

May 27, 2011

Qt Conference

Open Source Software Development and Smart Phone Applications



Short Course Introduction to Heterogeneous Computing Science and Engineering June 24, 2011

Prof. Wen-Mei Hwu

Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign



The Alarms Project: A Hardware/ Software Approach to Addressing Voltage Emergencies January 12, 2011 Prof. David Brooks

Dept. of CS, Harvard University

Short Course Digital Speech Processing and Applications June 28–30, 2011 Prof. Chin-Hui Lee

School of ECE, Georgia Tech

(cont'd from page 9)

using the interface builder, create different tasks using interface logic, and mash-up different services using our customized service constructor (see Fig. 3). Furthermore, the PLASH application development environment simplifies not only application builders' tasks and development but also intergradations of sub-projects of the PLASH project. To demonstrate the platform and to collect useful location information from voluntary users, we created a number

of applications. One of these is "Map'n

Track Friends," which is for Android, iPhone, and Web browsers (see Fig. 4). It is a location service application that allows users to share and track their own locations, as well as those of friends, family members, and colleagues. Several researchers and professors including Meng Chang Chen, Jan-Ming Ho, Ling-Jyh Chen, De-Nian Yang, Sheng-Wei Chen, Wang-Chien Lee, and Mi-Yen Yeh — are involved in PLASH project to further contribute novel technologies to support the project's goals. Those technologies include the Comfort Measuring System for Public Transportation Systems; Location Trajectories Access, Storage, and Application; Travel Route Suggestion Based on Human Computation; Location-Aware Community Common Experience Integration and Summarization System; Data Sharing and Analysis on Taipei e-Buses and Taxis; Trajectory Urban Traffic Mining; and Traffic Modeling and City Travel Route Planning. For more about PLASH, see http://

ants.iis.sinica.edu.tw/plash/.

Annual Field Trip

Our annual field trip took place July 21–22. We visited the Guanwu Forest Recreation Area and also traveled to the Lavender Forest of Hsinchu County. Everyone left their troubles behind and enjoyed these beautiful areas.



Lavender Garden: choose your favorite mailbox.



Create your own souvenir from straw.



January 24, 2011

World Wide Web

Consortium (W3C)

New IIS Building,

Auditorium 106

The World Wide Web

Consortium (W3C) is an

international community that

develops standards to ensure

the long-term growth of

the Web.

林道 1.2KAwa 计的 MBG 9 10

Lesinan forest road 12X entrance 2800M Approx. 60-milli by walking 住五犹巨木 Gianttree No.5。

Path to Ancient Tree no. 5. **Old mansion.**



Former residence of Mr. Chang Hsueh-lianh.

Suspension bridge in the Guanwu Forest Recreation Area.







Automatic Storytelling in Comics



Online games are booming, as they enable people to entertain and fulfill themselves in a virtual world. In a massive multiplayer online role playing game (MMORPG), many players not only participate in the game world day and night, but also share and preserve their gaming adventures with others via blogs and forums. Media such as video, screenshots, and text are the most popular formats used by players to preserve and share their gaming experiences. However, these media have some drawbacks.

The video format, for example, is not only storage consuming but also a weak form for narration because it records every detail of a player's journey during a certain period. Although video clips can be made more appealing through film editing such as Machinima, the task requires so much effort that the format is unsuitable for daily use. On the other hand, screenshots generally do not contain much context about the player's status and so are insufficiently vivid to narrate a story. Screenshots, however, can be reformatted into comics, which lighten storage requirements and are a pleasing way to share experiences online. Comics not only provide a condensed view of a long story in a few pages, but also identify important frames through the use of differing sizes, slants, and display regions on a page. Producing comics, however, also takes a lot of time and effort. Therefore,



An example of the three-layer scheme where layers from the bottom are, the image, the mask of the image, and other attachments respectively.



we propose a system that utilizes the comic format to summarize and preserve a player's notable game experiences for storytelling.

Developing an automatic comicgeneration system raises many challenging problems. Technically, our major concerns are how to choose important frames and create the comic layout with adequate word balloons and onomatopoeic sounds. We believe potential users would like to be able to generate comics in a fully automatic manner but still have the option to be involved in the process of creation.

Our system is the first work that renders storytelling comics from games without modifying the games' core engine. We designed an efficient comiclayout algorithm and provide a user interface with interactive editing functions for users to create and customize their own materials into comics. We chose World of Warcraft (WoW), an MMORPG, as the testing platform for our prototype system.

which represents a partial summary of a WoW player's game play, illustrates the diversity of region sizes and provides a visually rich appearance, such as the slants on edges of the regions. The system also retrieved the chat messages and combat logs that occurred as the game's screenshots were being recorded. As the figure shows, our system adds not only the chat messages in text balloons but also indicates sound effects of combat, making the comic more interesting. We plan to publicly release our system in the near future, and make it a platform for experience sharing and storytelling among players in the virtual community.

For more information, visit our website at http://mmnet.iis.sinica.edu.tw or contact the project investigator, Dr. Sheng-Wei Chen, at swc@iis.sinica.edu.tw.





Comic Pages

(b) User Interface

Overview of the methodology. The interface generates comics from the collected materials.

The figure shows a WoW comic page generated by our system. The page,







Dr. Yu-Fang Chen and His Research in Software Verification



The opening of the Infinity 2010 Workshop in Singapore



Dr. Yu-Fang Chen has been an assistant research fellow at IIS since November 2009. His main research interest is software verification, especially creating tools to help programmers debug their programs and ensure their work entirely correct.

Assertion is a frequently used tool to debug a program and is supported by most modern programming languages. For example, if a programmer believes that the value of a variable x should be larger than 5 after the execution of some loop, he can put the statement "assert(x>5)" immediately after the loop.



A picture taken in ETAPS 2011, Saarbrucken, Germany. (Starting from the left, Yih-Kuen Tsay, Farn Wang, Bow-Yaw Wang, Yu-Fang Chen, and Ming-Hsien Tsai). Later, if one executes the program and the value of x is not larger than 5 when the assertion is reached, the program will terminate automatically with an assertion error message. So the programmers will notice that program behaves differently than expected. However, in a properly tested program, a bug (assertion failure) happens very rarely and is very difficult to be revealed by doing more testing. Model checking of assertions is an example of an interesting topic in software verification. It does an exhaustive search of the program states in order to ensure that assertion will not be violated under any environment (e.g., arbitrary user input). If it is possible to violate the assertion, the model checker will return a program trace to the violated assertion. This trace can be used by the programmer to fix his program. If the model checker reports that the program is safe, then the programmer can remove those checked assertions.

Although enumerating all possible cases to check appears impossible and may be

Using different mathematical theories to speed up the check is the most interesting and challenging part.



Keynote speech of Infinity 2010, co-chaired by Yu-Fang Chen and Ahmed Rezine.

Spotlight

nt main () int a=10 while(a>5){ a--: assert(a<5); return 0;

An example of assertion in C.

so in the worst cases, in practice model checking has been used to examine -millions of lines of code. This is the most interesting and challenging part of such research: using different mathematical theories to speed up the check.

Besides assertion checking, we are also interested in applications such as equivalence checking of the IO behaviors of two programs and program synthesis from specifications. All of those are hot topics in software verification. The latest research results can be found in the proceedings of conferences such as CAV, TACAS, SAS, CONCUR, and VMCAI. Recently, many software verification papers have also appeared at programming language conferences such as POPL and PLDI.

(cont'd from page 4)

and their corresponding similarity measures, the general conclusion is that no single feature is sufficient for handling

cluding DVC) are usually designed to reduce encoding complexity to domain (e.g., DCT or DWT). By intethe order of that for still image/ grating the respective characteristics of DVC and CS, we are investigating a intraframe video encoding. Recently, distributed compressive video sensing with the advent of a single-pixel camera, compressive sensing (CS) (DCVS) framework to directly capture has been applicable to directly compressed video data efficiently, where almost all computation burdens can be capture compressed image data efficiently. The compressed im-age can be reconstructed using some low-complexity en-coder. CS reconstruction algorithms at the decoder if the image has sparse re-

presentation (compressible) in some shifted to the decoder, resulting in a very

diverse objects of broad categories. Taking all this into account, we aim to establish a general framework for addressing object recognition over large and broad categories.

Distributed Compressive Video Sensing

Low-complexity video codecs (in-

The Ninth Asian Symposium on Programming Languages and Systems, APLAS 2011

December 5-7, 2011 Kenting, Taiwan http://flolac.iis.sinica.edu.tw/aplas11/

APLAS aims at stimulating programming language research by providing a forum for the presentation of latest results and the exchange of ideas in topics concerned with programming languages and systems. APLAS is based in Asia, but is an international forum that serves the worldwide programming language community.



First International Conference on Certified Programs and Proofs December 7-9, 2011, Taiwan http://formes.asia/cpp

CPP is a new international forum on theoretical and practical topics in all areas, including computer science, mathematics and education, that consider certification as a essential paradigm for their work.

MACHINE ROOM

IIS Machine Room Going Green

In order to help save our planet, the machine room that we had

asked professional engineers to design that fit both Tier 2 (TIA-942) regulation and our goal to be environmentally friendly had finally complete.

The new machine room is brightly light and well organized. It definitely helped create a more stable, dependable and safe environment.



More importantly, when the PUE droped from 2.22 to 1.56, we had successfully reduce 1415 tons of CO_2 per year, equivalent to creating 3.8 Da'An Forest Park (approximately 64 acres). In terms of electricity bill, we had saved NTD 7 million per year. Effectively reduce our cost and at the same time taking care of the environment while doing research.









Institute of Information Science Academia Sinica

128 Academia Road, Section 2, Nangang 115, Taipei, Taiwan tel.: +886-2-2788-3799 www.iis.sinica.edu.tw **Publisher:** Director Wen-Lian Hsu **Editors:** Pei-Chi Wang and Huey-Chyi Chris Tseng