# The ICSI GAZETTE

featured research:

framenet

The FrameNet project is one of the longest-running projects at ICSI. Led by Professor Charles Fillmore and Dr. Collin Baker, FrameNet researchers are creating "an online lexical resource for English, based on frame semantics and supported by corpus evidence." The theories of frame semantics used in the FrameNet project originated with Professor Charles Fillmore, while at UC Berkeley, prior to his work at ICSI.

Frame semantic theory categorizes words and ideas based on frames that the words evoke. Some frames are quite simple, such as the Placing frame, which involves an object, the location where it goes, and a word that suggests the object is being put in its place - for example, *put*, *lay*, *shelve*, or *file.* In the sample sentence below, the words highlighted in black are frame-evoking words. *Though*t evokes the Awareness/Cognition frame, *might* evokes the Likelihood frame, and *die* evokes the Death frame. The color-highlighted words are elements of the frame. In the Cognition frame, for example, there is the person who is thinking - *I* - and the thought - *that I might die.* In the Likelihood frame, *I die* is the thing that might happen. In the Death frame, *I* is the person who may die.

In the mapped image below, the relationship between the frame evoking words and their frame elements is shown in more detail, using the same sentence.
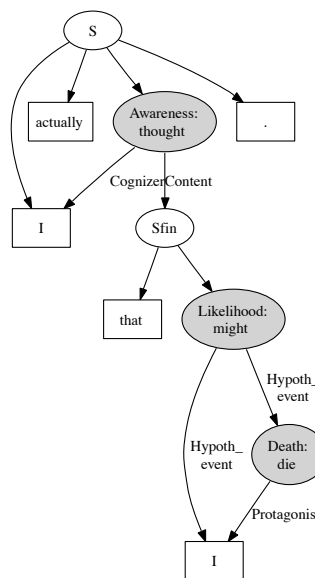
QuakeSem: 1228932 Thu Aug 9 13:51:45 2007

FrameNet annotators strive to document "the range of semantic and syntactic combinatory possibilities (valences) of each word in each of its senses, through computer-assisted annotation of example sentences". These fully annotated examples are displayed automatically and are being used in a variety of artificial intelligence and Natural Language Processing (NLP) applications. When using computers to extract semantic information for NLP tasks, FrameNet's semantic mapping provides a means for the computer to extract meaning from a string of words. Currently, the FrameNet database contains over 10,000 lexical units (word senses), of which more than 6,100 are

as i see it by Nelson Morgan, Director

Nationalism is an infantile disease, the measles of mankind   -- Albert Einstein

As we say on our home page, our twin goals are furthering computer science research through international collaboration, and furthering international collaboration through computer science research. In practice these aren't two separate goals, but just two ways of looking at our ongoing international research efforts. One of our closest collaborations in the past decade has been with our "sister" laboratory in Martigny, Switzerland, IDIAP, where I'm writing this column. This year IDIAP has moved; while still in Martigny, they have consolidated a staff that was spread across several buildings to a single new location. The new building is also connected to a hotel, which makes it pretty convenient for visitors (like me); and the view from my temporary office (and from other offices here) is quite spectacular – see the photo below.

IDIAP has many points in common with ICSI. It is associated with a major university (EPFL, the Ecole Polytechnique Federale de Lausanne), as ICSI is with UC Berkeley; it has staff and visitors from around the world, as does ICSI; its research strengths include work in speech processing, incorporating capabilities in machine learning, as for ICSI; and, like ICSI, it is part of strong multi-site collaborations (often leading them), both with US and European labs. Finally, for both labs, the funding primarily comes from competitive grants.

IDIAP grew from a very small start, and in large part its current structure and program is due to its dynamic Director. ICSI also grew over time, but has been rather stable in size for the last 5-6 years. I would claim a far smaller role in making ICSI what it is today, as I was blessed with a very strong group of senior researchers when I became Director, and was handed an Institute with a strong reputation by ICSI's initial Director, Jerry Feldman.

Our connection to IDIAP is primarily based on research collaborations. In some cases, IDIAP provides the primary sponsor connection, in some cases ICSI does, and in others we both work together with a 3rd site, such as Edinburgh University. In addition, though, IDIAP (and in particular Hervé Bourlard) acts as our partner in the Swiss visitor program, an activity that has been ongoing in one form or another for 19 years. Visitor programs provide what is more or less ICSI's "core" funding, and in many other ways form the life's blood of the Institute; the day-to-day character of ICSI is very strongly determined by the collection of visitors from around the world. While our primary (and formal) international visitor programs are with European countries (Germany, Switzerland, Spain, and Finland), we always have visitors from many other parts of the world.

It is clear to me that the future of ICSI is dependent on the continuation and expansion of these programs. I will be leaving Switzerland today, moving on to Germany, where our colleagues Wolfgang Wahlster (a Trustee on ICSI's Board) and Oliver Guenther (head of the German organization that handles our visitor program) are working to continue and extend that program. Later this year I will be traveling to Korea and Japan to discuss possible visiting scholar agreements. My associate Marcia Bush and I are currently exploring several other possible international programs. In each case, the initiation and sustaining of a visitor program requires the enthusiastic interest of parties in the collaborating country. I want to offer my thanks now for everyone who is working to create a better bond between researchers in different countries through these initiatives.

My travels to promote our international mission are often no fun, frankly – flying in and out of countries quickly, and trying to keep up with work at home so that I am not overwhelmed when I return. I have to say that this trip was an exception. Sitting here and typing while pausing to look out the office window, seeing the green hills of Switzerland, I don't feel that I require much sympathy (nor do I think I will get it ...)

To close on something completely different: in this issue of the Gazette, we are focusing on the FrameNet research team. They have been working at ICSI throughout my tenure as Director, and have clearly established themselves as the producers of one of the leading machine-readable linguistic resources. We thought it was time to bring our readership up to date on this effort.

news briefs

ICSI's SRINI NARAYANAN is the winner of a Google Research Award in 2007. The award will be used to develop the use of search and language technology for local language content and resources in rural populations in the developing world. Srini Narayanan leads the Artificial Intelligence group at ICSI and has an adjunct appointment as Associate Professor in the Cognitive Science program and at the Institute for Cognitive and Brain Sciences at the University of California, Berkeley.

Congratulations to MARTIN HILPERT and his wife Ning on the birth of their son, Hugo Oliver, on August 27th. Hugo was born one day after his sister Carla's second birthday.

ICSI is pleased to welcome two new members to the Board of Trustees, DR. DAVID TENNENHOUSE AND PROF. PRABHAKAR RAGHAVAN. Dr. Tennenhouse is a general partner at New Venture Partners, which specializes in corporate spin-outs. Formerly, he was CEO of A9, Amazon's search technology subsidiary, and prior to that was Director of Research for Intel. Prof. Raghavan is the head of Yahoo! Research, a consulting professor of Computer Science at Stanford University, and the Editor-in-Chief of the Journal of the ACM.

In response to a recent article posted on the popular tech site Slashdot claiming that some ISPs (Internet Service Providers) are increasing revenue by inserting ads into web pages viewed by their users, scientists at ICSI AND UNIVERSITY OF WASHINGTON created a Javascript program that checks whether this occurs. They found a few cases where this is true. The program can be accessed on the University of Washington web site http://vancouver.cs.washington.edu/.

MICHAEL LUBY AND AMIN SHOKROLLAHI, both alumni of ICSI, were corecipients of this year's IEEE Eric E. Sumner Award. This award was given "for bridging mathematics, internet design, and mobile broadcasting as well as successful standardization". Luby founded Digital Fountain, Inc. which utilizes technology he helped develop while at ICSI. Shokrollahi was chief scientist for Digital Fountain before starting his current position at Ecole Polytechnique Fédérale de Lausanne (EPFL) in Switzerland.

PROFESSOR RICHARD KARP, head of the Algorithms Group, was selected by the Computing Research Association (CRA) to serve on its Council for the Computing Community Consortium. The Council will provide leadership to the CRA while it works with industry partners on determining the direction of future research projects.

Professor Rickard Karp

The University of Chicago presented SCOTT SHENKER, head of ICSI's Networking Group, with an honorary Doctorate of Science degree at its June 8th convocation ceremony. Shenker, an alum of the university, was one of five scholars to receive honorary degrees this year. He

was chosen for his "unprecedented record of fundamental contributions to the core architecture that underlies the Internet, a tool that is an engineering achievement of the first order, as well as a social revolution". The complete story is online at the University of Chicago Chronicle web site http://chronicle.uchicago.edu/070607/honorarydegrees.shtml.

VERN PAXSON of ICSI's Networking Group was featured in an article by Dennis Fisher on the Search Security website (http://searchsecurity.techtarget.com/), "Eyeing unnoticed security researchers", which profiles six security experts who are making significant contributions to the field. Paxson is described as the "baseball umpire" of Internet security, because "if things are running smoothly, you'll never even know he's there". Paxson's work to keep the Internet running smoothly, particularly with regard to early detection and prevention of worm outbreaks, is what puts him on this short list of security experts.

Wiley Press will publish a new edition of "Speech and Audio Signal Processing: Processing and Perception of Speech and Music", a textbook written by ICSI's NELSON MORGAN and MIT's BEN GOLD, with added material that will be written over the next year by ICSI alum DAN ELLIS (now at Columbia University).

Speech Communication awarded the 2007 best paper award to DILEK HAKKANI-TUR of ICSI's Speech Group, GOKHAN TUR of SRI, and ROBERT E. SCHAPIRE of Princeton for their paper "Combining Active and Semi-supervised Learning for Spoken Language Understanding". The paper was originally published in the February 2005 edition of Speech Communication.

featured research: framenet con't.

fully annotated. More than 825 semantic frames are represented and exemplified in over 140,000 sentences. The data is available through the FrameNet web site (http://framenet.icsi.berkeley.edu) and is already being used by researchers around the world, including NLP researchers at ICSI. Srini Narayanan, head of the AI Group, used FrameNet to aid in semantic information detection in the ongoing question-answering project known as AQUAINT, and a new effort by Adam Janin of the Speech Group and Michael Ellsworth of the AI Group will focus on paraphrasing, using FrameNet data to provide semantic information. Last year, Thomas Schmidt, then a visiting German postdoc, created a multi-lingual dictionary of soccer terms, called Kicktionary, using a FrameNet-style semantic analysis of each term. (See www.kicktionary.de for more information.)

> As FrameNet projects expand in Spanish, Japanese, German, and other lanuguages, FrameNet analysis can make increasing contributions to cross-linguistic AI and NLP research.

A significant improvement to FrameNet is the development of tools to automate much of the annotation process. This is essential to enable the widespread use of FrameNet data in NLP research, as it will allow NLP researchers to quickly annotate the text they are using in their project. FrameNet developers are working to create software that will annotate semantic frame information, as well as collaborating with scientists working on practical applications for FrameNet data.

One such collaboration is with researchers led by Nancy Ide at Vassar, who are working on development of a large corpus of American English called the American National Corpus. The corpus includes a wide variety of language use, both speech and text, covering everything from sermons to sitcoms. The FrameNet team is working on a FrameNet-style analysis of part of this corpus, to provide semantic information for use of the corpus in NLP research. Another collaboration is with a team led by Christiane Fellbaum at Princeton University. Fellbaum's team developed WordNet, an online dictionary which provides less detailed information than FrameNet but for many more words. The NSF-funded collaboration between FrameNet and WordNet will explore theoretical issues involved in aligning the two resources. Katrin Erk of the University of Texas at Austin,

who has collaborated with the ICSI FrameNet project in the past, is working on automatic annotation of German and English. Erk worked previously on the development of SALSA, a German project which annotated German newspaper articles using English frames, and more recently collaborated with Sebastian Pado to develop the Shalmaneser system, which analyzes text both syntactically and semantically. The system uses existing syntactic parsers for the syntactic analysis. Then, using FrameNet data for training, it performs Word Sense Disambiguation and Semantic Role Labeling. The system currently works for English and German. For English, it has been trained on the Framenet data. For German, it has been trained on the Frame-semantic annotation of the SALSA project.

Another NSF-funded effort is the rapid development of a frame semantic lexicon. This project aims to provide an improved interface for people working on defining semantic frames. This should speed up the labor involved in creating and annotating frames. In a similar vein, a collaboration with researchers at Lawrence Livermore Lab is working on increasing the speed of programs for automatic frame recognition, using inexpensive parallel processors which are commonly used for modern video gaming systems. This involves rewriting algorithms to run on parallel processors, but should improve the efficiency of automatic frame recognition software.

In recent years, FrameNet projects in several other languages have begun. ICSI regularly hosts visiting scientists working to create FN databases in their native languages, which to date include Spanish, Japanese, and German.

Spanish FN – Carlos Subirats

Perenniel ICSI visitor Carlos Subirats is working with colleagues in Spain on the creation of a Spanish language FrameNet. Spanish FrameNet uses its own software to process a 370 million word Spanish corpus, and uses ICSI's FrameNet software to annotate the sentences extracted from the corpus, but due to language differences, some frames are different in Spanish compared with English. Subirats expects a

Spanish FrameNet release in February or March of 2008, which will include over 700 annotated lexical units (over 600 have already been annotated), and allows users to look at web reports of the data. Eventually all the data will be searchable online as well. Subirats is currently seeking new funding to replace a previous grant from Spain's Science and Technology department, and has two proposals currently in submission. An integral part of Subirats's work on Spanish FrameNet has resulted from collaborations with the English and Japanese FrameNet developers. Discussion of cross-linguistic frames as well as semantic differences between languages that affect the frames for each language have proved very useful. Some motion verbs, in particular, differ between English and Spanish, requiring some new frames in Spanish FrameNet.

There is also an interest in Brazil to start a Portuguese FrameNet, and Subirats has been invited to visit scientists in Brazil to discuss his work and advise them on how best to begin the Brazilian project.

JAPANESE FRAMENET – KYOKO OHARA AND HIROAKI SATO

Kyoko Ohara and Hiroaki Sato are frequent visitors to ICSI currently working on Japanese FrameNet through a grant for joint research between Japan and the U.S. Sato has been involved with FrameNet since 1999, when he spent his sabbatical year working on English FrameNet at ICSI. Since then, he has developed software tools that provide an easy way to search and view FrameNet data. He has adapted these tools for Spanish FrameNet and now Japanese FrameNet, allowing direct comparisons between pairs of languages. In addition, he is developing a tool that allows users to compare FrameNet data in different languages.

Japanese FrameNet is based closely on English FrameNet. The project started in 2002, but because there was no freely available corpus of Japanese text, the Japanese FrameNet team had to collect corpus data before beginning annotation work. Every attempt has been made to utilize the frames developed for English FrameNet, but typological differences between English and Japanese sometimes create a need for slightly modified frame definitions. Differences in the way verbs are expressed also complicate the use of English frames for Japanese text. A notable difference is the omission of verb arguments in Japanese, which is not common in English. Some verb constructions are different,

which can suggest a different frame in a Japanese translation of an English sentence, despite being semantically the same. An example is the sentence "He lay on the floor." In Japanese, the verb translates as fall + a resultative auxiliary, so the Japanese verb by itself suggests movement, while the English verb "lay" does not.

A new corpus, the Japanese National Corpus, is currently in development, and since Japanese FrameNet is in collaboration with the project, Ohara expects to begin using this corpus for Japanese FrameNet soon. She is hopeful that the cross-linguistic tools Sato is developing will be useful for Japanese speakers learning English, as it provides a means to compare the way an idea is expressed in the two languages.

GERMAN FRAMENET – HANS BOAS

Hans Boas, our featured alum for this issue, is working on a German FrameNet. Although the German FrameNet project began several years ago, it is still in its beginning stages. Boas hired three students to set up the infrastructure of German FrameNet, and is currently seeking funding to continue the project. Boas plans to use data from SALSA in building the German FrameNet database. Because of the same kinds of inherent linguistic differences that have caused the need for adapted frames in Spanish and Japanese, the SALSA data will need to be supplemented by human annotators who can fill in missing frame data, both for incomplete frames and those frames whose definitions might need to be changed to fit the German language.

While German FrameNet data is being compiled, related projects are underway focusing on the German language. Birte Loenneker-Rodman, a German postdoctoral researcher at ICSI, is working to incorporate FrameNet data in a bilingual dictionary of German and Slovenian. Her research ultimately will be used to create multi-lingual FrameNet databases. The Shalmaneser system for text analysis and the automatic annotation work on German mentioned previously are additional FrameNet resources for the German language.

Expanding FrameNet cross-linguistically has benefits for not only NLP, but also machine translation and second language learning. The ICSI FrameNet team is encouraged by the success of these foreign language efforts and hopes that FrameNet will eventually be expanded to cover all major languages.

featured alum: hans boas

Our featured alum is Hans Boas, Assistant Professor of Germanic Linguistics for the Germanic Studies Department at the University of Texas in Austin. Boas was a member of the AI group at ICSI working on FrameNet from January 1999 to August 2000. At the time, he was completing his dissertation for a linguistics PhD from UNC Chapel Hill, which he received in 2000. As a postdoctoral researcher, he continued his work on FrameNet, funded by the German Academic Exchange Service (DAAD), and later returned for a summer research visit in 2002. While at ICSI, Boas worked on the development of FrameNet. His role included defining frames and determining which words are in fact elements of each frame, as well as performing frame semantic annotation of texts.

He was hired by the University of Texas following his most recent stay at ICSI, and has been working to create a German language FrameNet there. He has obtained funding for three students to set up the infrastructure for German FrameNet, and he is seeking additional funding to continue the project.

ICSI Alum Hans Boas

> "The German FrameNet at Austin, under the direction of Professor Hans Boas...is creating a detailed German FrameNet database that employs the Berkeley software and methodology and is based on a much larger corpus."

Boas is interested in topics related to FrameNet such as construction grammar and frame semantics, as well as computational lexicography, documentary linguistics, language contact and language variation, and language and politics.

His main research focus today is on the interface between syntax, semantics, pragmatics, and the structure of the lexicon. Using corpus-based methods, he compares English and German using the theoretical frameworks of Construction Grammar and Frame Semantics (topics he studied while working for ICSI's AI Group which continue to inform projects of ICSI's Neural Theory of Language group as well as the FrameNet project). He has recently been working on argument structure constructions in English and German, and is working on new ways to define verb classes using frame semantic principles.

Another of Boas's recent projects is the Texas German Dialect Project which he founded in 2001 to record, archive, and analyze the remnants of the Texas German dialect. He is currently investigating linguistic features of the dialect which have changed over the past sixty years and the reasons for these changes. Boas has been successful in obtaining funding for this research, including setting up an endowment to continue the research in the future. He has also completed a book manuscript based on this work, which is scheduled for publication by Duke University Press in 2008.

sally floyd wins
2007 sigcomm award

Sally Floyd of the Networking Group has been awarded the 2007 SIGCOMM Award. This award is widely recognized as the most prestigious award given to a scientist working in computer networking. (Another ICSI scientist, Scott Shenker, won this award in 2002.)

Floyd has been previously recognized as winner of the IEEE Internet Award as well as the Outstanding Alumna Award from UC Berkeley. The following is excerpted from a news email distributed by ACM:

The ACM Special Interest Group on Data Communications (ACM SIGCOMM) will present its highest honor to Dr. Sally Floyd for her far-reaching contributions to Internet architecture and her work in identifying practical ways to control and stabilize Internet congestion. Dr. Floyd, a research scientist at the International Computer Science Institute (ICSI) Center for Internet Research in Berkeley, CA, is a leading authority on the mechanisms that allow the resources of a network to be shared efficiently and effectively. She received the 2007 SIGCOMM Award at the SIGCOMM annual conference on August 28th, in Kyoto, Japan.

Dr. Floyd was instrumental in providing the Internet community with a solid foundation for network simulation by developing the ns simulator with Steve McCanne. Prior to ns, the evaluation of network designs was often primitive; today simulation is a widely used tool. In a hallmark of her rigor, Dr. Floyd clearly articulated the limitations of simulation in her paper entitled "Difficulties in Simulating the Internet" co-written with Vern Paxson. This research was awarded the IEEE Communication Society's William R. Bennett Prize Paper Award.

A renowned expert in Internet congestion control, Dr. Floyd proposed elegant and practical mechanisms to achieve congestion control. She has taken her ideas from theory to practice by long-standing involvement in the Internet Engineering Task Force (IETF), the international community of network designers, operators, vendors, and researchers concerned with the evolution and smooth operation of the Internet.

Dr. Floyd's most well-known contribution to congestion control is the design of Random Early Decision (RED), which founded the field of Active Queue Management (AQM), developed with Van Jacobson. RED, or some closely-related AQM variant, is implemented in almost all commercially available routers, the devices that determine the proper path for data to travel between different networks.

Dr. Floyd has combined the community spirit and dedication that was present in the early Internet with the intellectual rigor that characterizes today's research community. According to CiteSeer, the search engine and digital library for scientific and academic papers, she is the eighth most highly cited researcher in all of computer science. Yet she has also played a crucial role on the Internet Advisory Board and been instrumental in advancing congestion control standards.

news briefs continued

Congratulations to **MICHAEL LEVIT** of the Speech Group and his wife Mika. Their daughter Alyssa Aoki Levit was born on April 19th at 8:00 p.m.

The **ICSI SPEECH GROUP** has once again scored very well at the annual NIST evaluations in speech recognition and diarization. Building on last year's success, both ICSI's diarization team and the ICSI/SRI speech recognition team excelled in all categories entered in this year's evals.

Alyssa Levit

ICSI has announced **RELEASE 1.4 OF XORP**, the eXtensible Open Router Platform. It is available for download at www.xorp.org. Release 1.4 adds OSPFv3, the IPv6-compatible version of the Open Shortest Path First protocol, to the set of routing protocols that XORP supports.

Congratulations to **TOBIAS KIESLING**, a visiting postdoctoral researcher with the Networking Group, and his wife Manuela on the birth of their daughter Miriam on Tuesday, March 13th. Miriam weighed 3465 grams and was 52 cm long.

new books

christian müller

CHRISTIAN MÜLLER, a postdoctoral researcher from Germany working with the Speech Group, is the editor of two new books on speaker classification. The books are part of Springer's State-of-the-Art Survey and the Lecture Notes on Artificial Intelligence sub-series of Lecture Notes on Computer Science. In the first book, **SPEAKER CLASSIFICATION I: FUNDAMENTALS, FEATURES, AND METHODS,** Müller compiled a comprehensive collection of articles written by leaders in the field of speaker classification. Liz Shriberg of the Speech Group wrote a chapter in this volume titled "Higher Level Features in Speaker Recognition". The second book, **SPEAKER CLASSIFICATION II: SELECTED PROJECTS** is intended to be a companion to the first book, and contains numerous papers related to recent work done on speaker classification.

visiting scholars

Since its inception, ICSI has had a strong international program consisting primarily of ties with specific countries. Current formal agreements exist with Finland, Germany, Spain, and Switzerland.

FROM FINLAND
Ari-Veikko Anttiroiko (Campus Affiliation)
Jyri Kivinen (Algorithms)
Teemu Koponen (Networking)
Janne Lindqvist (Networking)
Pekka Valkama (Campus Affiliation)
Antti Vehkaoja (Campus Affiliation)

FROM GERMANY
Gerald Friedland (Speech)
Martin Gairing (Algorithms)
Martin Hilpert (AI-FrameNet)
Tobias Kiesling (Networking)
Thomas Kleinbauer (AI-FrameNet)
Christian Kreibich (Networking)
Birte Lönneker-Rodman (AI-FrameNet)
Andreas Maletti (AI)
Christian Müller (Speech)

FROM SPAIN
Alberto Amengual (AI)
Santi Caballe (AI-FrameNet)
Alberto Suarez (Algorithms)
Carlos Subirats (AI-FrameNet)

FROM SWITZERLAND (IM2)
Sebastien Cuendet (Speech)
Neha Garg (Speech)
Adish Singla (Speech)
Kamand Kamangar (Speech)
Petr Motlicek (Speech)
José Millan (Speech)

FROM EUROPEAN UNION (AMIDA)
Joan Isaac Biel (Speech)
Marijn Huijbregts (Speech)
Jachym Kolar (Speech)
Beatriz Trueba (Speech)
Oriol Vinyals (Speech)

In addition, we often have visitors associated with specific research and projects.

NETWORKING
Ravi Dhillon
Leo Juan
Larry Kao
David Lan
Chih-Hung Lin
Po-Ching Lin
Li Tang
Shutang Yang

NETWORKING INTERNS
Steve Hanna
Matthias Vallentin

SPEECH
Michael Feld
Umit Guz
Oded Ghitza

FRAMENET
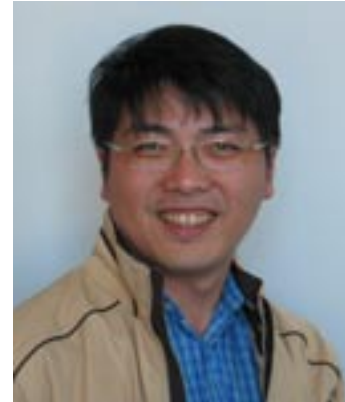Kyoko Ohara
Hiroaki Sato
Qibo Zhu

AI
Amjad Al-Haidari
Behrang Mohit

EXTREME ARCHITECTURE
Chris Batten
Ronny Krashinsky
Rose Liu
Heidi Pan

ALGORITHMS
Gad Kimmel
Javier Rosa
Sriram Sankararaman

Po-Ching Lin

Beatriz Trueba

Steve Hanna

publications listing

X. ANGUERA, T. SHINOZAKI, C. WOOTERS, AND J. HERNANDO. *Model Complexity Selection and Cross-validation EM Training for Robust Speaker Diarization.* Proceedings of ICASSP 2007, Honolulu, HI, April 2007.

X. ANGUERA, C. WOOTERS, AND J. HERNANDO. *Acoustic Beamforming for Speaker Diarization of Meetings.* IEEE Transactions on Audio, Speech and Language Processing, 2007.

X. ANGUERA, C. WOOTERS, J. PARDO, AND J. HERNANDO. *Automatic Weighting for the Combination of TDOA and Acoustic Features in Speaker Diarization for Meetings.* Proceedings of ICASSP 2007, Honolulu, HI, April 2007.

K. ARGYRAKI, P. MANIATIS, O. IRZAK, A. SUBRAMANIAN, AND S. SHENKER. *Loss and Delay Accountability for the Internet.* ICNP 2007.

B. BERGEN AND J. FELDMAN. *It's the Body, Stupid: Concept Learning According to Cognitive Science.* Book chapter in Elsevier Handbook of Embodied Cognitive Science, 2007.

M. CASADO, M. FREEDMAN, J. PETTIT, N. MCKEOWN, AND S. SHENKER. *Ethane: Taking Control of the Enterprise.* SIGCOMM 2007.

O. CETIN, A. KANTOR, S. KING, C. BARTELS, M. MAGIMAI-DOSS, J. FRANKEL, AND K. LIVESCU. *An Articulatory Feature-Based Tandem Approach and Factored Observation Modeling.* Proceedings of ICASSP 2007, Honolulu, HI, April 2007.

K. CHAUDHURI, E. HALPERIN, S. RAO, AND S. ZHOU. *A Rigorous Analysis of Population Stratification with Limited Data.* ACM-SIAM Symposium on Discrete Algorithms (SODA), 2007.

O. CHENG, J. DINES, AND M. MAGIMAI-DOSS. *A Generalized Dynamic Composition Algorithm of Weighted Finite State Transducers for Large Vocabulary Speech Recognition.* Proceedings of ICASSP 2007, Honolulu, HI, April 2007.

B.-G. CHUN, P. MANIATIS, S. SHENKER, AND J. KUBIATOWICZ. *Attested Append-Only Memory: Making Adversaries Stick to their Word.* SOSP 2007.

S. CUENDET, D. HAKKANI-TÜR AND E. SHRIBERG. *Automatic Labeling Inconsistencies Detection And Correction For Sentence Unit Segmentation In Conversational Speech.* Proceedings of MLMI 2007, Brno, Czech Republic, June 2007.

S. CUENDET, D. HAKKANI-TÜR, E. SHRIBERG, J. FUNG, AND B. FAVRE. *Cross-Genre Feature Comparisons for Spoken Sentence Segmentation.* International Conference on Semantic Computing (ICSC), Irvine, CA, USA, September 2007.

S. CUENDET, E. SHRIBERG, B. FAVRE, J. FUNG, AND D. HAKKANI-TÜR. *An Analysis of Sentence Segmentation Features for Broadcast News, Broadcast Conversations, and Meetings.* SIGIR Workshop on Searching Conversational Spontaneous Speech, Amsterdam, Netherlands, 2007.

C.T. EE, V. RAMACHANDRAN, B.-G. CHUN, K. LAKSHMINARAYANAN, AND S. SHENKER. *Resolving Inter-Domain Policy Disputes.* SIGCOMM 2007, 2007.

F. ENOS, E. SHRIBERG, M. GRACIARENA, J. HIRSCHBERG, AND A. STOLCKE. *Detecting Deception Using Critical Segments.* Interspeech 2007, Antwerp, August 2007.

A. FARIA. *An Investigation of Tandem MLP Features for ASR.* ICSI Technical Report TR-07-003, Berkeley, CA, July 2007.

M. FELDMAN, J. CHUANG, I. STOICA, AND S. SHENKER. *Hidden-Action in Network Routing.* IEEE Journal on Selected Areas in Communications, Vol. 25, No. 6, 2007.

L. FERRER, E. SHRIBERG, S. KAJAREKAR, AND K. SONMEZ. *Parameterization of Prosodic Feature Distributions for SVM Modeling in Speaker Recognition.* Proceedings of ICASSP 2007, Honolulu, HI, April 2007.

L. FERRER, K. SONMEZ, AND E. SHRIBERG. *A Smoothing Kernel for Spatially Related Features and Its Application to Speaker Verification.* Interspeech 2007, Antwerp, August 2007.

S. FLOYD AND E. KOHLER. *RFC 4828: TCP Friendly Rate Control (TFRC): the Small-Packet (SP) Variant.* RFC 4828, Experimental, April 2007.

S. FLOYD AND M. ALLMAN. *RFC 5033: Specifying New Congestion Control Algorithms.* Request for Comments 5033, Best Current Practice 133. August 2007.

R. FONSECA, G. PORTER, R.H. KATZ, S. SHENKER, AND I. STOICA. *X-Trace: A Pervasive Network Tracing Framework.* Proceedings of NDSI 2007, 2007.

G. FRIEDLAND. *Multimedia Data Formats and Semantic Computing: A Practical Example and its Implications for the Future.* IEEE International Conference on Semantic Computing, Irvine, CA, September 2007.

G. FRIEDLAND. *The Digital Hand, Vol 2 - How Computers Changed the Work of the American Financial, Telecommunications, Media, and Entertainment Industries (book review).* IEEE Annals of the History of Computing, IEEE Computer Society, California, 2007.

G. FRIEDLAND. *Computers and Commerce: A Study of Technology and Management at Eckert-Mauchly Computer Company, Engineering Research Associates, and Remington Rand, 1946-1957 (book review).* IEEE Annals of the History of Computing, IEEE Computer Society, California, June 2007.

G. FRIEDLAND, K. JANTZ, T. LENZ, F. WIESEL, AND R. ROJAS. *Object Cut and Paste in Images and Videos.* International Journal of Semantic Computing, World Scientific, USA, 2007.

G. FRIEDLAND, W. HUERST, AND L. KNIPPING. *Educational Multimedia Systems: The Past, the Present, and a Glimpse into the Future.* Proceedings of the ACM Workshop on Educational Multimedia and Multimedia Education at ACM Multimedia 2007, Augsburg, Germany, 2007.

J. FUNG, D. HAKKANI-TÜR, M. MAGIMAI-DOSS, E. SHRIBERG, S. CUENDET, AND N. MIRGHAFORI. *Prosodic Features and Feature Selection for Multi-Lingual Sentence Segmentation.* Interspeech 2007, Antwerp, August 2007.

M. GRACIARENA, S. KAJAREKAR, A. STOLCKE, AND E. SHRIBERG. *Noise Robust Speaker Identification for Spontaneous Arabic Speech.* Proceedings of ICASSP 2007, Honolulu, HI, April 2007.

H. GURKAN, U. GUZ, AND B.S. YARMAN. *EEG Signal Compression Based on Classified Signature and Envelope Vector Sets.* Proceedings of ECCTD'07 European Conference on Circuit Theory and Design, Seville, SPAIN, August 2007.

U. GUZ, S. CUENDET, D. HAKKANI-TÜR, AND G. TÜR. *Co-training Using Prosodic and Lexical Information for Sentence Segmentation.* Interspeech 2007, August 2007.

U. GUZ, H. GURKAN, AND B.S. YARMAN. *A New Algorithm for High Speed Speech and Audio Coding.* Proceedings of ECCTD'07 European Conference on Circuit Theory and Design, Seville, August 2007.

D. HAKKANI-TÜR AND G. TÜR. *Statistical Sentence Extraction for Information Distillation.* Proceedings of ICASSP 2007, Honolulu, HI, April 2007.

D. HAKKANI-TÜR, G. TÜR, AND M. LEVIT. *Exploiting Information Extraction Annotations for Document Retrieval in Distillation Tasks.* Interspeech 2007, August 2007.

S. HEO, R. KRASHINSKY, AND K. ASANOVIC. *Activity-Sensitive Flip-Flop and Latch Selection for Reduced Energy.* IEEE Transactions on VLSI Systems, 15(9), September 2007.

M. HUIJBREGTS AND C. WOOTERS. *The Blame Game: Performance Analysis of Speaker Diarization System Components.* Interspeech 2007, Antwerp, August 2007.

M. HUIJBREGTS, C. WOOTERS, AND R. ORDELMAN. *Filtering the Unknown: Speech Activity Detection in Heterogeneous Video Collections.* Interspeech 2007, Antwerp, August 2007.

H. Hung, D. Jayagopi, C. Yeo, G. Friedland, S. Ba, J-M. Odobez, K. Ramchandran, N. Mirghafori, and D. Gatica-Perez. Using Audio and Video Features to Classify the Most Dominant Person in Meetings. Proceedings of ACM Multimedia 2007, Augsburg, Germany, September 2007.

K. Jantz, G. Friedland, L. Knipping, and R. Rojas. A Low-Cost Mobile Pointing and Drawing Device. Proceedings of the ACM Workshop on Educational Multimedia and Multimedia Education at ACM Multimedia 2007, Augsburg, Germany, 2007.

X. Jiang, J. Taneja, J. Ortiz, A. Tavakoli, P. Dutta, J. Jeong, D. Culler, P. Levis, and S. Shenker. An Architecture for Energy Management in Wireless Sensor Networks. WWSNA 2007.

M. Knox and N. Mirghafori. Automatic Laughter Detection Using Neural Networks. Interspeech 2007, August 2007.

J. Kolar, Y. Liu, and E. Shriberg. Speaker Adaptation of Language Models for Automatic Dialog Act Segmentation of Meetings. Interspeech 2007, Antwerp, August 2007.

T. Koponen, M. Chawla, B.-G. Chun, A. Ermolinskiy, K.H. Kim, S. Shenker, and I. Stoica. A Data-Oriented (and Beyond) Network Architecture. SIGCOMM 2007, 2007.

K. Lakshminarayanan, M. Caesar, M. Rangan, T. Anderson, S. Shenker, and I. Stoica. Achieving Convergence-Free Routing using Failure-Carrying Packets. SIGCOMM 2007.

H. Lei and N. Mirghafori. Word-Conditioned HMM Supervectors for Speaker Recognition. Interspeech 2007, Antwerp, August 2007.

H. Lei and N. Mirghafori. Word-conditioned Phone N-grams for Speaker Recognition. Proceedings of ICASSP 2007, Honolulu, HI, April 2007.

Y. Liu and E. Shriberg. Comparing Evaluation Metrics for Sentence Boundary Detection. Proceedings of ICASSP 2007, Honolulu, HI, April 2007.

K. Livescu, A. Bezman, N. Borges, L. Yung, O. Cetin, J. Frankel, S. King, M. Magimai-Doss, X. Chi, and L. Lavoie. Manual Transcription of Conversational Speech at the Articulatory Feature Level. Proceedings of ICASSP 2007, Honolulu, HI, April 2007.

K. Livescu, O. Cetin, M. Hasegawa-Johnson, S. King, C. Bartels, N. Borges, A. Kantor, P. Lal, L. Yung, A. Bezman, S. Dawson-Haggerty, B. Woods, J. Frankel, M. Magimai-Doss, and K. Saenko. Articulatory Feature-Based Methods for Acoustic and Audio-Visual Speech Recognition: Summary from the 2006 Jhu Summer Workshop. Proceedings of ICASSP 2007, Honolulu, HI, April 2007.

M. Levit, E. Boschee, and M. Freedman. Selecting On-topic Sentences from Natural Language Corpora. Proceedings of Interspeech 2007.

M. Levit and D. Roy. Interpretation of Spatial Language in a Map Navigation Task. IEEE Transactions on Systems, Man, and Cybernetics, Part B, 37(3), pp. 667-669, June 2007.

M. Magimai-Doss, D. Hakkani-Tür, O. Cetin, E. Shriberg, J. Fung, and N. Mirghafori. Entropy Based Classifier Combination for Sentence Segmentation. Proceedings of ICASSP 2007, Honolulu, HI, April 2007.

E. Matusov, D. Hillard, M. Magimai-Doss, D. Hakkani-Tür, M. Ostendorf, and H. Ney. Improving Speech Translation with Automatic Boundary Prediction. Interspeech 2007, Antwerp, August 2007.

P. Motlicek, V. Ullal, and H. Hermansky. Wide-Band Perceptual Audio Coding Based on Frequency-Domain Linear Prediction. Proceedings of ICASSP 2007, Honolulu, HI, April 2007.

C. Müller and F. Burkhardt. Combining Short-term Cepstral and Long-term Pitch Features for Automatic Recognition of Speaker Age. Interspeech 2007, Antwerp, August 2007.

J. M. Pardo, X. Anguera, and C. Wooters. Speaker Diarization For Multiple-Distant-Microphone Meetings Using Several Sources of Information. IEEE Transactions on Computers, 2007.

U. Pawar, J. Pal, R. Gupta, and K. Toyama. Multiple Mice for Retention Tasks in Disadvantaged Schools. ACM Conference on Human Factors in Computing Systems (CHI '07), San Jose, California, May 2007.

A. Reining and B. Lönneker-Rodman. Corpus-driven Metaphor Harvesting. Proceedings of the Workshop on Computational Approaches to Figurative Language, Rochester, New York, April 2007.

P. Sarolahti, M. Allman, and S. Floyd. Determining an Appropriate Sending Rate Over an Underutilized Network Path. Computer Networks Special Issue on Protocols for Fast, Long-Distance Networks, 51(7), May 2007.

J. Scheffczyk , C.F. Baker, and S. Narayanan. Reasoning with FrameNet and Ontologies. In Ontologies and the Lexicon, Chu-Ren Huang, Nicoletta Calzolari, Aldo Gangemi, Alessandro Lenci, Alessandro Oltramari, and Laurent Prevot, eds., Cambridge University Press, 2007.

L. Shastri. SHRUTI: A Neurally Motivated Architecture for Rapid, Scalable Inference. "Perspectives of Neural-Symbolic Integration Studies in Computational Intelligence," B. Hammer and P. Hitzler (Eds.), Springer, 2007.

E. Shriberg. Higher Level Features in Speaker Recognition. In C. Müller (Ed.) Speaker Classification I. Volume 4343 of Lecture Notes in Computer Science / Artificial Intelligence. Springer: Heidelberg / Berlin / New York, 2007.

E. Shriberg and L. Ferrer. A Text-Constrained Prosodic System for Speaker Verification. Interspeech 2007, Antwerp, August 2007.

S. Sridhar, S. Rao, and E. Halperin. An Efficient and Accurate Graph-based Approach to Detect Population Substructure. Proceedings of RECOMB, 2007.

A. Stolcke, X. Anguera, K. Boakye, O. Cetin, A. Janin, M. Magimai-Doss, C. Wooters, and J. Zheng. The SRI-ICSI Spring 2007 Meeting and Lecture Recognition System. Lecture Notes in Computer Science, 2007.

A. Stolcke, S. Kajarekar, L. Ferrer, and E. Shriberg. Speaker Recognition with Session Variability Normalization Based on MLLR Adaptation Transforms. IEEE Transactions on Audio, Speech, and Language Processing. Special Issue on Speaker and Language Recognition, 2007.

L. Stoll, J. Frankel, and N. Mirghafori. Speaker Recognition Via Nonlinear Discriminant Features. Proceedings of NOLISP, Paris, France, May 2007.

A. Tavakoli, D. Chu, J. Hellerstein, P. Levis, and S. Shenker. A Declarative Sensornet Architecture. WWSNA 2007.

A. Tavakoli, P. Dutta, J. Jeong, S. Kim, J. Ortiz, P. Levis, and S. Shenker. A Modular Sensornet Architecture: Past, Present, and Future Directions. WWSNA 2007.

G. Tür, E. Shriberg, A. Stolcke, and S. Kajarekar. Duration and Pronunciation Conditioned Lexical Modeling for Speaker Verification. Interspeech 2007, Antwerp, August 2007.

O. Vinyals, G. Friedland, and N. Mirghafori. Revisiting a Basic Function on Current CPUs: A Fast Logarithm Implementation with Adjustable Accuracy. ICSI Technical Report TR-07-002, June 2007.

J. Wawrzynek, D. Patterson, M. Oskin, S.-L. Lu, C. Kozyrakis, J.C. Hoe, D. Chiou, and K. Asanovic. RAMP: Research Accelerator for Multiple Processors. IEEE Micro 27(2), April 2007.

C. Wooters and M. Huijbregts. The ICSI RT07s Speaker Diarization System. Lecture Notes in Computer Science, 2007.

N. Zaitlen, H.M. Kang, E. Eskin, and E. Halperin. Leveraging the HapMap Correlation Structure in Association Studies. The American Jounal of Human Genetics, 80:683-691, 2007.

J. Zheng, O. Cetin, M.-Y. Huang, X. Lei, A. Stolcke, and N. Morgan. Combining Discriminative Feature, Transform, and Model Training for Large Vocabulary Speech Recognition. Proceedings of ICASSP 2007, Honolulu, HI, April 2007.

J. Zheng and A. Stolcke. fMPE-MAP: Improved Discriminative Adaptation for Modeling New Domains. Interspeech 2007, Antwerp, August 2007.

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