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INTERACTIVE
MULTIMODAL
INFORMATION
MANAGEMENT

IM2 Newsletter

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Seminar of the third cycle CUSO (Conférence Universi-taire de Suisse Occidentale)

Information Retrieval: New Challenges, New Perspectives

March, Thursday 18th, 2010, Geneva (Battelle campus)

www.im2.ch

Cover Story

NCCR IM2 – Episode III
SNSF APPROVED THE IM2 PHASE III (2010-2013) LAST DECEMBER

Confirming the successful achievements of IM2 Phases I and II, and the very positive Phase 3 proposal (submitted in September 2009), the IM2 Community is proud to report that Division IV of the Swiss National Science Foundation has formally approved (in December 2009) the third and last phase of the IM2 National Centre of Competence in Research in "Interactive Multimodal Information Management (IM2)", officially starting the 1st of January 2010.

However, given some budgetary restriction, IM2 was forced to refocus its vision, reduce some of its activities, and emphasize others. More specifically, only one "Individual Project" (IP1) will focus on fundamental research related to multimodal processing and will also be driven by IP2, which will focus more on new applications and test the generalization properties of all the developments and conclusions achieved during the first 8 years of IM2. More specifically, IM2 has thus redesigned its structure along three main Individual Projects (IP):

IP1 - Integrated Multimodal Processing
• This project will focus on the IM2 core multimodal technologies (speech processing, visual processing, integration of modalities, coordination among modalities, further development and evaluation of meeting browsers) geared towards integration into end-to-end applications and consolidating all IM2 activities developed in Phase I and Phase II. Research focus in IP1 will also be driven by the findings and possible requirements arising from IP2.

IP2 - Human centered design and evaluation
• This project will target two new integrated applications which will be implemented in the context of the upcoming "EPFL Rolex Learning Center":
  ◦ AugmentedTeam, focusing on the enhancement of teamwork with unobtrusive devices.
  ◦ CBoard, focusing on the development and evaluation of a multimodal interactive communication board.

IP3 - Social signal processing
• This research area (partly pioneered by IM2) aims at analyzing and modeling non verbal communication and human behavior, using principled signal processing and machine learning techniques (as opposed to psycho-social science approaches, favored in the NCCR on "Affective Sciences", hence providing good opportunities of collaboration and complementarities).

In addition to the research goals described shortly above, IM2 has clear plans to create during its last phase, as well as beyond IM2, several types of incentives towards the retention of the network, collaboration between its affiliated members (with or without direct IM2 funding), and fostering the growth of the community.

This will be achieved through multiple actions spanning organization of summer institutes and international workshop series, wide distribution of corpora and software libraries, as well as the building of a lasting IM2 community, which will be referred to as "the Swiss Institute of Multimodal Information Management" (SIM2).

IDIAP RESEARCH INSTITUTE

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SCHWEIZERISCHER NATIONALFONDS
FONDO NAZIONALE SVIZZERO
SWISS NATIONAL SCIENCE FOUNDATION

NCCR IM2 – Episode III (continued)

Short glance over the IPs: partners & objectives

IP1: Integrated Multimodal Processing

IP Head: Prof. Aude Billard (EPFL)
Deputy IP Head: Dr. Stéphane Marchand-Maillet (UniGe)
Partners: Idiap, EPFL, UniFr, UniGe

IP1 has a research component (pursuing the most promising and/or fundamental research directions initiated in IM2-II), as well as a strong integration and evaluation component. Hence, besides further pursuing some of the most promising research direction in multimodal processing in the strict context of the IM2 vision, one of the objectives of IP1 will be to extend the applications of multimodal technologies, within the human meeting and conference framework, towards more integrated systems that work in real time, with human intervention only when required. Two of the recent prototypes developed in IM2, the Automatic Content Linking Device and the Mobile Meeting Assistant appear as particularly promising starting points for system integration in IM2 Phase III.

2002 - 2005
2006 - 2009
2010
2013

IP2: Human Centered Design and Evaluation

IP Head: Dr. Denis Lalanne (UniFr)
Deputy IP Head: Dr. Andrei Popescu-Belis (Idiap)
Partners: EPFL, UniFr, Idiap, UniFr

The goal of IP2 is to validate and generalize the technologies developed through research in the first two phases of IM2. The capacity to generalize these technologies will be demonstrated (1) through their application to new environments, other than smart meeting rooms, in combination with third-party technology, and (2) through their acceptance by various groups of users, which will be shown by formal studies of user requirements and user-oriented evaluation. The environments that are planned to be designed and implemented in IP2 will follow a novel approach which departs from the smart meeting rooms scenario. The new instrumented environments are intended to augment teamwork by using "lightweight" devices which will support team processes without being in the foreground, and without requiring from users a series of complex steps to initialize and run them. Neither participants, nor external operators will need to devote their attention to the tools, but instead will be helped to focus on their meeting purpose. Technology will thus be in the background, embedded into the physical environment of the rooms, that is, into furniture such as tables, lamps, or walls. The approach of IP2 believes that intelligence is distributed among meeting participants or individual users, and does not lie directly in the technology, which simply provides hints and scaffolds productive interactions. Therefore, IP2 has two related objectives:

1. Develop new, lightweight applications, making use of IM2 technologies, and mainly oriented towards teamwork support.
2. Develop and apply formal user-centric evaluation methods, targeting the evaluation of a selection of systems, both from phase 1 and 2 technology, and from the new applications.

IP3: Social Signal Processing

IP Head: Dr. Alessandro Vinciarelli (Idiap)
Deputy IP Head: Dr. Frederic Dufaux (EPFL, new)
Partners: Idiap, EPFL, ETHZ

The exploration of how we, as human beings react to the world and interact with it and each other remains one of the greatest scientific challenges. Perceiving, learning, and adapting to the world around us are commonly labeled as intelligent behaviour. But what does it mean being intelligent? Is IQ a good measure of human intelligence and the best predictor of somebody's success in life? There is now a growing research in cognitive sciences, which argues that our common view of intelligence is too narrow, ignoring a crucial range of abilities that matter immensely for how we do in life. This range of abilities is called social intelligence and includes the ability to express and recognise social signals like agreement, politeness, and empathy, coupled with the ability to manage them in order to get along well with others while winning their cooperation. The skills of social intelligence have been argued to be indispensable and perhaps the most important for success in life. Although each one of us understands the importance of social signals in everyday life situations, and in spite of recent advances in machine analysis and synthesis of relevant behavioural cues like gaze exchange, blinks, smiles, head nods, crossed arms, laughter, etc., the research efforts in machine analysis and synthesis of human social signals like attention, haughtiness, empathy, politeness, flirting, (dis)agreement, etc., are few, tentative, and fragmented.

The goal of this IP is to fill the above gap in meeting analysis by applying principles and approaches proposed in Social Signal Processing, the new domain aimed at understanding of social signals through automatic analysis of nonverbal communication.

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New IM2 Partner: an HCI lab from EPFL called CRAFT
SCHOOL OF COMPUTER AND COMMUNICATION SCIENCES OF EPFL

CRAFT is an HCI lab working on collaboration technologies, namely on computer-supported collaborative learning (CSCL). It belongs to the School of Computer and Communication Sciences of EPFL and counts about 20 members from learning sciences, cognitive psychology and computer science.

Two on-going research themes are related to IM2 activities.
To deepen the understanding of collaborative processes, we synchronized two eye trackers. Let us consider John and Sophie, who are working on line on the same document. Dual eye tracking tells us whether John is looking at the same object as Sophie and at the same time or not. Our experiments revealed that the distance between the gaze locations of John and Sophie is significantly higher in episodes of misunderstandings. In the same experiment, we found that team performance was significantly correlated with the gaze recurrence, i.e. the extent to which subjects look at the same thing at the same time.

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New IM2 Partner: an HCI lab from EPFL called CRAFT (continued)

Finally, we found a stable time lag between the time where the user looks at object X on his display and the time where he mentions X orally. While most studies in CSCL are based on human coding of verbal protocols, these results do not require any human coding. Hence, they converge with IM2 developments in social signal processing.

Our second theme of research is the design of interactive artefacts that support face-to-face collaborative work. The pictures illustrate three artefacts. (1) Reflect is an interactive table that displays how much each participant has been speaking in order to support team self-regulation. Experiment revealed that it actually helps teams to self-regulate but does not force them to do so. The newest version detects the level of aggressivity of participants in order to help them to stay within the «zone of optimal conflict»: some level of disagreement is good for learning, but it should not become too much. (2) Tinker is an interactive lamp that recognizes objects on the table by using fiducial markers. The apprentices in logistics move these tangibles on the table in order to layout a warehouse. The lamp projects on the objects additional information such as a simulation of forklifts movements and indicators of the warehouse performance. The simulation parameters are tuned by placing tokens on simple paper sheers. The use of simple paper as interactive objects offers many advantages that we are currently exploring. (3) Lantern is a simple tool designed to help teaching assistants to optimize their
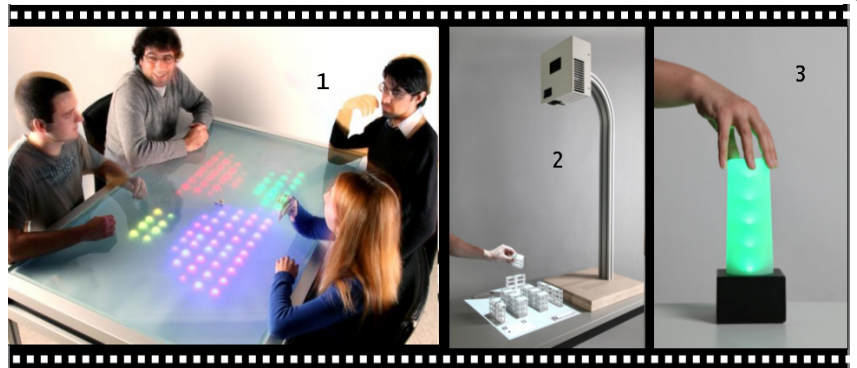
work during recitations. It displays on which exercise a team is working, for how long, whether it asked for help and for how long. Through experiments, we proved that it increased the students «while-waiting-productivity» from 60% to 95%.

Every artefact we develop is tested through both lab experiments as well as less formal experiments in the real context of use: schools, learning centers, …. The design of these artefacts is based on the same philosophy that we like to call «modest computing»: these devices are not smart; they do not predict what the users wants; they simply show things that were not visible before; they use a low resolution ; they are in the background i.e. do not constitute an obstacle to face-to-face interactions.

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New IM2 Partner: Cognitive Ergonomics Group from UNIFR
A DYNAMIC GROUP OF 5 MEMBERS FROM THE UNIVERSITY OF FRIBOURG

The Cognitive Ergonomics Group has been formed at the University of Fribourg about five years ago. It currently comprises five team members (see photo).

The main research activities of the Cognitive Ergonomics Group are concerned with (i) the design of complex and highly automated work environments and (ii) the design of interactive consumer products. In the first research field, we have examined various ways of reducing operator stress and maintaining human performance (e.g., through

automation, training, work team design) in complex work environments such as spaceflight, ship navigation and process control. In the second research field, we have investigated means of increasing the effectiveness of usability tests and of designing more environmentally-friendly consumer products. These research activities are currently supported by two research grants obtained from the Swiss National Science Foundation: (i) Adaptive automation and operator state in complex work environments and (ii) The utility of usability tests: An examination of their reliability and validity. The Cognitive Ergonomics Group is also involved in teaching at Bachelor and Master-level in German and English
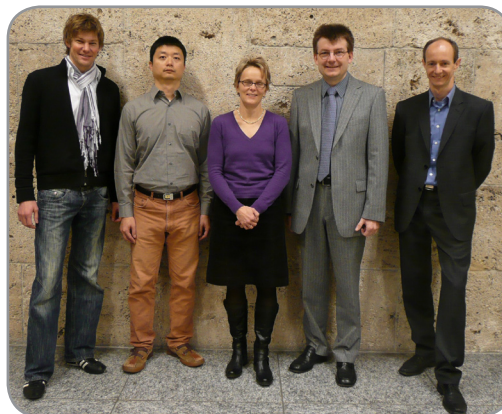
language at the Department of Psychology of University of Fribourg. Classes offered in the M.Sc. in Work Psychology and Cognitive Ergonomics include human factors, training, work design, shift work, and usability testing.

The planned research activities within IM2 are concerned with the evaluation of the key multi-modal IM2 technologies (e.g., interactive message board). A series of evaluation studies will be carried out to address the following main research questions: (a) How can different cognitive task activities be supported by the interactive message board? (b) How can cooperative work of different user groups be best supported by the interactive message board? (c) What are the effects of within-team distribution of tasks and access to displays and controls on the quality of teamwork? For the evaluation of the interactive message board, a range of parameters is collected: user performance, user satisfaction, team climate, self-rated user performance, perceived usability, information sampling behaviour, system control behaviour, psychophysiological data, and emotional response. This allows for a very comprehensive evaluation of the multiple effects of using the interactive message board and other applications.

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News

An IM2 Partner received the Innovation Prize 2009

The Computer Vision Lab at ETHZ

At the end of last year, the Computer Vision Lab at ETHZ has been awarded the Innovation Prize 2009 by ITG (Information Technology Society, Electrosuisse). The award was given for the lab's work on the robust tracking of multiple people in crowded scenes, with a single camera. It has been carried out by Michael Breitenstein, Esther Koller-Meier, Bastian Leibe, Fabian Reichlin, and Luc Van Gool. The judges praised the originality of the approach as well as its practical potential. The latter was demonstrated in the example videos, which covered a wide range of applications. These range from traffic safety, over surveillance, to sports analysis.

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Two IM2 start-up winners of Red Herring 100 Global

The 100 most promising Global Tech-companies

The IM2 Community can be very proud to see that their 2 start-ups, KeyLemon and kooaba, are a part of the 100 most promising Global Tech-companies.

Red Herring's Global 100 has become a mark of distinction for identifying promising new companies and entrepreneurs. Red Herring editors were among the first to recognize that companies such as Google, Yahoo, Skype, Netscape, Salesforce.com, YouTube, and eBay would change the way we live and work.

"Choosing the best out of the previous three years was by no means a small feat," said Alex Vieux, publisher and CEO of Red Herring. "After rigorous contemplation and discussion, we narrowed down our list from 1,200 potential companies to 200 finalists. Trying to get it down to 100 companies was a task upon itself. The top 100 companies who were chosen should be extremely proud, the competition was difficult."

For the past three years, the award has been given to the top 100 global technology companies based upon both quantitative and qualitative criteria, such as financial performance, technology innovation, management quality, strategy, market size, investor record and customer acquisition.

This assessment of potential is complemented by a review of the track record and standing of startups relative to their sector peers, allowing Red Herring to see past the "buzz" and make the list an invaluable instrument of discovery and advocacy for the greatest business opportunities from around the world.

The winners of Red Herring 100 Global:
http://www.redherring.com/Home/26281

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An IM2 partner as an Associate Editor

IEEE Signal Processing Magazine

Alessandro Vinciarelli (Head of the «Social Signal Processing» IP) has been appointed Associate Editor of the IEEE Signal Processing Magazine for the Social Sciences Column.

The mission of Alessandro is to identify emergent research trends at the border between human and computing sciences and to ensure that they obtain sufficient visibility through the publication of high quality papers on the SPM. The attention of the IEEE for these new areas of research confirms that IM2, by including Social Signal Processing as one of its main research themes, promises to remain on the cutting edge for the next four years as well. On the other hand, the work carried out by IM2 on the analysis of interactions in meetings has contributed substantially to the diffusion of interest for social phenomena and human sciences in the computing community.

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An IM2 Partner invited as a speaker to the Seminar of the third cycle CUSO

March 18th 2010, Geneva (Battelle campus)

Stephane Marchand-Maillet is one of the speakers for the seminar "Information Retrieval: New Challenges, New Perspectives".

This seminar will open new perspectives in IR and IR-related research. We will focus on a better understanding of the user and their information needs and context as well as the use of new UI to search for pertinent information. With the Web, the subjective nature of the information plays an important role and detecting the subjective opinions about products, persons, and organizations is another challenging task. Finally the Web is not written in a single language (English) and does not use a single media (text) to deliver the information. Thus both cross-lingual and multimedia IR will be discussed in this seminar.

Registration is free but mandatory.
More information at : *http://members.unine. ch/jacques.savoy/Events/IR2010.html*

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Selected publications

A Comprehensive Database and Subjective Evaluation Methodology for Quality of Experience in Stereoscopic Video
L. Goldmann, F. De Simone and T. Ebrahimi
Proceedings of IS&T/SPIE Electronic Imaging, vol. 7526, San Jose, Jan. 17-21, 2010.

Predicting remote versus collocated group interactions using nonverbal cues
D. Sanchez-Cortes, D. Jayagopi, and Daniel Gatica-Perez
In Proc. ICMI-MLMI Workshop on Multimodal Sensor-Based Systems and Mobile Phones for Social Computing, Cambridge, USA, Nov. 2009.

Fusion Engines for Multimodal Interfaces: a Survey.
D.Lalanne, L.Nigay, P.Palanque, P.Robinson, J.Vanderdonckt, J-F.Ladry
In Proc. of International Conference on Multimodal Interfaces and Workshop on Machine Learning for Multi-modal Interaction (ICMI-MLMI 2009), Cambridge (MA) (USA), November 02 - 06 2009 , pp. 153-160.

Benchmarking Fusion Engines of Multimodal Interactive Systems.
B. Dumas, R. Ingold, D. Lalanne
In Proc. of International Conference on Multimodal Interfaces and Workshop on Machine Learning for Multimodal Interaction (ICMI-MLMI 2009), Cambridge (MA) (USA), November 02 - 06 2009 , pp. 169-176.