Issue N° 35 / November 2005

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INTERACTIVE MULTIMODAL INFORMATION MANAGEMENT

IM2 Newsletter

www.im2.ch

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Cover Story

A major IM2 event: combined Summer Institute, Review Panel and Advisory Boards meeting

LAUSANNE, 14-17 NOVEMBER 2005, HOTEL ALPHA-PALMIERS

To conclude its fourth year of existence and the end of the first phase, the IM2 NCCR joins forces into a major combined event, bringing together not only all scientists active in IM2 as had been the case in the previous summer institutes in Martigny and Crans-Montana and the MLMI workshop, but also the SNSF appointed Review Panel and the Scientific and Industrial Advisory Boards.

The program of the week features oral and poster sessions for IM2 students to present their work, as well as a keynote from Prof. G. Rigoll, Institute for Human-Machine Communication Munich University of Technology, and Member of the IM2 Review Panel, and various committee meetings. The week will balance past activities, featured in the talks and posters, and the future of IM2 as the new research directions included in the eight new Integrated Projects will be presented by their respective leaders.

IM2 Summer Institute Overview of the program

Monday 14.11.05	Tuesday 15.11.05	Wednesday 16.11.05	Thursday 17.11.05
9:00-9:30 **Welcome to Summer Institute 2005**	8:30-12:30 **Workshop part I** Veenhuys David, «Marketing Yourself», A seminar about how to apply modern marketing to job hunting and career development in the research area.	9:30-12:30 **Workshop part II** Veenhuys David, «Marketing Yourself», A seminar about how to apply modern marketing to job hunting and career development in the research area.	9:30-12:00 **IM2 Phase II** Presentation of new IPs and management structure
9:30-12:30 **Talks** • Krzysztof Kryszczuk • Guillaume Lathoud • Serhiy Kosinov • Hamed Ketadbar • Anna Buttfield			12:00-12:30 **Closing of Summer Institute 2005**
12:30-13:30 Lunch	12:30-13:30 Lunch	12:30-13:30 Lunch	
13:30-14:30 **Invited Speaker** Gerhard Rigoll, «Multimodal Interaction in Smart Environments»	13:30-18:00 **Talks** • Dalila Mekhaldi • Dong Zhan • Tobias Kaufmann • Nicolas Moenne-Loccoz • Mark Barnard • Mael Guillemot • Siley Ba • Marita Ailomaa	13:30-14:00 **Invited Speaker** Irwin Sobel, «Coliseum Desktop Immersive Videoconferencing»	
14:30-15:30 Coffee Break		14:00-15:30 **Talks** • Florent Monay/ Pedro Quelas • Gianluca Monaci • Ardhendu Behera	
15:30-18:00 **Poster Session**		15:30-18h00 **Poster Session**	
19:00 Dinner	19:00 IM2 Gala Dinner	19:00 Dinner	

The full program is available from the IM2 Website

IM2 is the Swiss National Centre of Competence in Reseach (NCCR) on Interactive Multimodal Information Management, lead by the IDIAP Research Institute in Martigny, Switzerland. The National Centers of Competence in Research are managed by the Swiss National Science Fundation on behalf of the Federal Authorities.

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Short description of the eight new IPS

IM2.DMA - IM2.AP - IM2.VP - IM2.MPR

IM2.DMA Database Management and Meeting Analysis

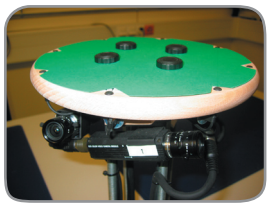
IP Head: Andrei Popescu-Belis (ISSCO/UniGe)
Partners: ISSCO/UniGE, IDIAP, DIVA/UniFR, ElAFr

The goal of IM2.DMA is to develop new techniques for managing multimodal data, which will facilitate its sharing among IM2 partners. Because data-driven methods lie at the heart of most of the IM2 IPs, a common data set and an extensible range of annotations are key to project integration. Therefore, IM2.DMA aims at developing hardware setups for data acquisition, storage and distribution, coupled with software solutions that will allow smooth and efficient access to the data and to its annotations. A flexible data model will be proposed to accomodate the exchange of various types of information, namely raw multimedia data, metadata about each recording, and time-dependent multimodal annotations.

IM2.AP Audio Processing

IP Head: John Dines (IDIAP)
Partners: IDIAP, TIK/ETHZ, ICSI

The IM2 domain is characterised by audio signals captured by lapel and headset microphones, microphone arrays and binaural recordings, when it is frequently non-trivial to identify which speaker or speakers are speaking at a particular time. Automatic Speech Recognition (ASR) is difficult in the meeting environment: beyond the issues arising from far-field microphones and multiple sound sources, speech in meetings is conversational, characterised by phenomena such as disfluencies and incomplete utterances. There are additional challenges arising from a high proportion of accented speech from non-native speakers and a multilingual orientation. Finally, we are concerned with the automatic extraction of metadata, such as speaker identity and ``punctuation'' information.



The major objectives for Phase II of IM2.AP are summarised as follows:

- The continued advancement of fundamental techniques in audio processing and their application in applied ASR (especially meeting) environments
- Encouraging greater intra- and inter- disciplinary cooperation in making advancements to the state-of-the-art
- Investigation and rigourous `proof-of-concept' of new paradigms in audio processing, in particular, for speech recognition and speaker recognition tasks
- Evaluation on more realistic and complex tasks

IM2.VP Visual/Video Processing

IP Head: Jean-Philippe Thiran (ITS/EPFL)
Partners: ITS/EPFL, ASL/EPFL, IDIAP, FKI/UniBE, BIWI/ETHZ

An important element of multimodal multimedia information management systems is the development of unimodal primitives based on solid theoretical foundations and their correspondent integration into multimodal protocols. Our main focus in this framework corresponds to the analysis of visual information that includes digital and analog images, documents with different sort of semantic information and text. Specifically, the objectives of this IP is to develop cutting-edge algorithms for visual (images and videos) information processing, namely segmentation, feature extraction, representation, modelling and classification, with particular emphasis on face, gesture, people and handwriting image analysis, that are of central importance for IM2.

To achieve these objectives, we work in this IP will be divided in the following tasks:

- Image/object representation and modelling
- Face, gesture and people detection, recognition, tracking and analysis
- Handwriting recognition

IM2.MPR Multimodal Processing and Recognition

IP Head: Samy Bengio (IDIAP)
Partners: IDIAP, ITS/EPFL, LIAP/EPFL, CVML/UniGE

Given the proliferation of electronic recording devices (cameras, microphones, EEGs, etc) with ever cheaper, and ever increasing processing speed, storage, and bandwidth, together with the advances in automatically extracting and managing information recorded from these devices (such as speech recognition, face tracking, etc), it becomes more and more feasible to simultaneously capture the same sequence of events (such as during a meeting) with several devices, generating richer and more robust sets of feature-streams. Efficiently modeling such data coming from multiple channels, thus resulting in multiple observation streams, and using the underlying models in real applications, are the goals of IM2.MPR.

The main objectives of this IP are thus three-fold:

- investigate fundamental aspects of multi-channel/multi-stream processing
- continue more applied research on several tasks for multi-stream/multi-channel processing, including tracking, audio-visual speech recognition, person identification, segmentation, 3D scene reconstruction, and activity recognition
- identify possible additional modalities (such as infra-red, laser, and various other sensors)

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Short description of the eight new IPS

IM2.MCA - IM2.HMI - IM2.ISD - IM2.BMI

IM2.MCA Multimodal Content Abstraction

IP Head: Stephane Marchand-Maillet (CVML/UniGE)
Partners: CVML/UniGE, ISSCO/UniGE, IDIAP

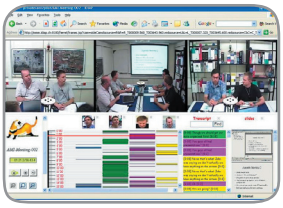
IM2.MCA addresses the issues of content-based indexing, retrieval, semantic analysis and mining of multimedia data based on multiple modalities. As such, it focuses on all activities related to content abstraction of mono- and multi-modal information, based on the annotation and features of all signal-based documents (i.e. documents representing raw signals.
Such multimedia documents include video, audio (inc. speech), images, slides, complex printed documents, handwritten notes as instances of containers of spatial, temporal and multimodal information.

The main objectives of the IP are:
- to enrich multimedia documents, such as dialogue recordings and associated static documents, with cross-modal metadata, either via fully automatic recognizers or via computer-aided manual methods;
- to extract and mine information from the above documents and associated metadata;
- to define and implement multimodal indexing and retrieval approaches for the above information content;
- to define and implement strategies for managing the above information content at the collection level.

IM2.HMI Human-Machine Interaction

IP Head: Pierre Wellner (IDIAP)
Partners: IDIAP, ISSCO/UniGE, LIA/EPFL, DIVA/UniFR

Imagine that you missed a two-hour meeting with your colleagues, but that this meeting was recorded. You want to know what you missed, but you do not want to replay the entire meeting. Instead, you want to find quickly just the parts that most interest you. While other IPs in IM2 develop analysis and recognition technologies to address this need, the primary objective of IM2.HMI is to build on these other technologies to develop interactive browsing systems.
The objectives of IM2.HMI fall into three broad categories:
- Design novel interactive meeting browsers.
- Develop working prototypes, suitable for human testing.
- Evaluate the usability of these interactive prototypes with human subjects.



IM2.ISD Integrated Software and research Demonstrators

IP Head: Mike Flynn (IDIAP)
Partners: IDIAP, ITS/EPFL, LIA/EPFL, CVML/UniGE, BIWI/ETHZ

The goals of IM2.ISD include to:
- Develop research demonstrators for the most important results of the project;
- Encourage coordination between partners on these developments;
- Attract attention from industry and the general public.

In order to accomplish these goals efficiently, and to produce the most effective demonstrators, it will be necessary to look for common software tools and methods. Ideally, the demonstrators should illustrate the collaboration between IM2 partners. Therefore, a further aim of IM2.ISD will be to:
- Encourage adoption common software tools and techniques, enabling integration of the diverse technologies of the IM2 project into cohesive demonstrators.

This proposal therefore concerns three related types of activity:
- The construction of a Demonstration Framework, suitable for exhibiting many IM2 technologies.
- Individual Demonstrations, concentrating on one specific technology.
- Integration of the individual demonstrators into an Integrated Demonstration Browser, where feasible.

IM2.BMI Brain Machine Interfaces

IM2.BMI: IP Head: José del R. Millán (IDIAP)
Partners: IDIAP, FBML/UniGE, ASL/EPFL

The idea of controlling machines not by manual control, but by mere «thinking» (i.e., the brain activity of human subjects) has fascinated humankind since ever, and researchers working at the crossroads of computer science, neurosciences, and biomedical engineering have started to develop the first prototypes of brain-machine interfaces (BMI) over the last decade or so. Thus, researchers have been able to train monkeys, who had implanted tens of microelectrodes in their brain, to control a robot arm. Human subjects, on their side, have shown the possibility to drive a mobile robot between rooms in a house model using non-invasive EEG recordings .

Although these promising first results are attracting significant attention from an increasing number of research laboratories around the world, most of the issues being explored are related to «augmented communication» where fast decision-making is not critical as it is the case for real-time control of robotics devices and neuroprosthesis. The latter kind of applications is the most challenging for BMI and it is the goal of this IP. In particular, we will explore mental teleoperation of a mobile robot based on non-invasive brain activity related to motor tasks (i.e., subjects imagine natural movements of their body that are translated into similar actions of the robot) and multiple modalities of feedback (visual, auditory, haptic and vestibular).

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Upcoming Events

IM2 2005 Summer Institute

Nov. 14-17, see front page for details and program.

Partner News

New professorships

Important nominations for senior scientists involved in IM2

The academic anchoring of IDIAP has recently been strenghtened by the nomination of Dr José del R. Millán and Dr Hynek Hermansky as External Adjunct Professors.

Aude Billard, named associated professor at the EPFL

Last September, Mrs Aude Billard has been named associate professor in algorithmics and adaptative systems. Her Laboratory is active in the development of adaptive control systems to enable flexible human-robot interactions. She was formerly assistant professor (FNS Prof.) for 3 years.

Awards

Prof. Pascal Frossard receives the «2005 IBM Faculty Award».

Prof. Pascal Frossard leads the Signal Processing Laboratory (LTS4) and has received the IBM Award which is attributed to high level scientists for their research. This Award includes a grant for priority research following the IBM strategy.

Since 2003, Pascal Frossard is assistant professeur (FNS Prof.). His team is composed of 7 scientists dealing with multimedia communications, information theory, non-linear representations for visual information, rich media streaming, error control algorithms and multimedia content distribution. He is co-author of 60 publications and co-inventor on 7 patents.

Gianluca Monaci receives the ICIP'05 Best Student Paper Award

Gianluca Monaci, IM2 PhD student under the supervision of Prof. P. Vandergheynst at EPFL, won the IBM best paper award at the IEEE International Conference on Image Processing (ICIP), Genoa, Italy, in September 2005, for his work on the analysis ofmultimodal signals by redundant dictionaries».
Analysis of multimodal signals using redundant representations
http://lts1pc19.epfl.ch/repository/Monaci2005_1245.pdf

Indo Swiss Joint Research Programme

A joint Initiative of the Swiss and Indian governments

The Indo Swiss Joint Research Programme fosters innovative research projects between Indian and Swiss scientists in frontier areas of Life Sciences and Information Technology.

The Indian and the Swiss governments have established the ISJRP in 2004 to stimulate and further develop their scientific and technological cooperation. The programme is jointly implemented by the Indian Department of Science & Technology (DST) and the École Polytechnique Fédérale de Lausanne (EPFL) on behalf of the Swiss State Secretariat for Education and Research (SER). Funding is split between the DST and the Swiss National Science Foundation (SNSF).

ISJRP aims at

- funding new, innovative research projects on a competitive basis with at least one partner from India and one partner from Switzerland.
- promoting the exchange of knowledge and skills between India and Switzerland.
- creating the necessary structures required to train young Swiss scientists in India and vice versa.
- fostering long-term contacts between leading institutes in India and Switzerland.

Out of 12 projects selected for 2006-7 (9 in IT), 3 involve IM2 partners :

- Kernel Methods for Speech and Video Sequence Analysis, S. Bengio, IDIAP, Martigny; C. Bhattacharya, IISc Bangalore.
- Keyword Spotting in Continous Speech, H. Hermansky, IDIAP; Y. Yegnanarayana, IIT Madras.
- Plenoptic Function Rendering, Coding and Video-Streaming, P. Frossard, EPFL; U.B.Desai, IIT Bombay.

Selected Publications

A Probabilistic Measure of Modality Reliability in Speaker Verification
J. Richiardi, P. Prodanov and A. Drygajlo
IEEE Int. Conf. Acoustics, Speech and Signal Processing (ICASSP 2005), Philadelphia, March 19-23, 2005, pp. 709-712, winner of the Student Paper Contest

Error Handling In Multiple Classifier Biometric Systems Using Reliability Measures
K. Kryszczuk, J. Richiardi, P. Prodanov, A. Drygajlo
13th European Signal Processing Conference (EUSIPCO 2005), Antalya, Turkey, September 4-8, 2005, pp. 426-435, finalist of the Student Paper Contest

Interactive Partial Matching of Video Sequences in Large Collections
N. Moënne-Loccoz, E. Bruno and S. Marchand-Maillet
IEEE International Conference on Image Processing, Genova, Italy, 11-14 September 2005

Application of Information Retrieval Technologies to Presentation Slides
A. Vinciarelli and J.-M. Odobez
IEEE Transactions on Multimedia, 2005

Noisy Text Categorization
A. Vinciarelli
IEEE Transactions on Pattern Analysis and Machine Intelligence, 2005

Stochastic optimisation for high-dimensional tracking in dense range maps
M. Bray, E. Koller-Meier, P. Mueller, N. Schraudolph, and L. Van Gool
IEE Proc. on Vision, Image & Signal Processing, Vol. 152, No. 4, pp. 501-512, August 2005

The Multi-Channel Wall Street Journal Audio Visual Corpus (MC-WSJ-AV): Specification and Initial Experiments
M. Lincoln, I. Mccowan, J. Vepa, and H. Krishna Maganti, ,
IEEE Automatic Speech Recognition and Understanding (ASRU) Workshop, Cancun, Mexico, Nov, 2005

Sector-Based Detection for Hands-Free Speech Enhancement in Cars
G. Lathoud, J. Bourgeois and J. Freudenberger
EURASIP journal on Applied Signal Processing, special issue on Advances in Multichannel Processing, 2006.

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