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INTERACTIVE MULTIMODAL INFORMATION MANAGEMENT

IM2 Newsletter

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MLMI 05 Call for papers
Deadline : 13 May 2005

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Festival Science & Cité 2005
28 May 2005 in Martigny

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IM2 featured in a promotional video from Canton du Valais

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The 33rd issue of the IM2 Newsletter is online

Eight new IP Heads nominated

YOUNG SENIORS HAVE BEEN FAVORED TO ACT AS IP HEADS FOR THE SECOND PHASE OF IM2, 2006-2009

On March 4, 2005, 36 seniors researchers involved in IM2 met in Martigny to further define the content of the 8 individual projects (IP) planned for Phase 2 (2006-2009). In particular, the 8 new IP heads have been elected and the IP technical commitees have been defined. Fruitfull discussions about the vision and content of the IPs will also help prepare the proposal for Phase 2 due later this year.

The new IP Heads are

IP1	Database management and meeting analysis	Andrei Popescu-Belis, UniGE
IP2	Audio Processing	John Dines, IDIAP
IP3	Visual/Video Processing	Jean-Philippe Thiran, EPFL
IP4	Multimodal Processing and recognition	Samy Bengio, IDIAP
IP5	Multimodal context abstraction	Stéphane Marchand-Maillet, UniGE
IP6	Human-machine interaction	Pierre Wellner, IDIAP
IP7	Integration software and research demonstration	Mike Flynn, IDIAP
IP8	Brain machine interaction	José del R. Millán, IDIAP

Cover Story

Andrei Popescu-Belis

John Dines

Jean-Philippe Thiran

Samy Bengio

Stéphane Marchand-Maillet

Pierre Wellner

Mike Flynn

José del R. Millán

DIAP

FNS-NF
SCHWEIZERISCHER NATIONALFONDS
FONDS NATIONAL SUISSE
SWISS NATIONAL SCIENCE FOUNDATION

Neurology Department of Geneva University Hospital (HUG)

The Neurology Department of the Geneva University Hospital provides evaluation and services for patients with neurological conditions as well as the necessary infrastructure to carry out efficient multidisciplinary investigations. **Our department is represented in the IM2 NCCR project by Sara Gonzalez Andino (physicist), Rolando Grave de Peralta Menendez (mathematician) and Patrice Morier (engineer), members of the Electrical Neuroimaging Group (ENG)**. This group is involved in the developments of methods for the study of physiological signals (EEG, EKG, etc) and their application in clinics and basic research.

The ENG is particularly involved in the development of non invasive techniques for the estimation of the electrical activity inside the brain (e.g. ELECTRA LAURA or EPIFOCUS) and the assessment of advanced signal processing methods for the spatio-temporal analysis of the brain activity in patients and normal subjects. These methods find direct applications in different clinical scenarios as is the case for the presurgical evaluation of epileptic patients or in monitoring brain damage due to vascular accidents. Developed methods are also applied to the study of different sensory and cognitive process of the normal human brain.

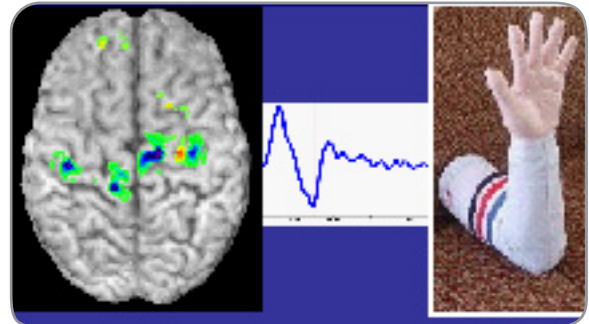### Electrical Neuroimaging Group (ENG) involvement in IM2

ENG participates at IM2 NCCR program through the Brain Machine Interface project (IM2.WP.BMI and IM2.MI) bringing their expertise in:

Numerical computation of realistic head models based on anatomical images of the head.
- Design and evaluation of noninvasive methods for the estimation of the generators of the electrical activity of the brain (EEG).
- Nonlinear (global or local) optimization algorithms.
- Brain Computational models

More specifically, this group proposed the construction of a Direct Brain Computer Interface based on the non invasive estimation of local field potentials as provided by ELECTRA. Diverse aspects of this idea are under evaluation in collaboration with different national (IDIAP, UNIGE) and international partners.

The fundamental reason for this proposal is that prospective application of direct (invasive) BCIs to humans is debatable due to the inherent medical risks and the degradation of the quality of the signal with time. On the other hand non invasive BCI basically rely on specific scalp EEG which is generated by the noisy spatiotemporal overlapping of activity arising from very diverse brain regions, i.e., a single scalp electrode picks up and mixes the temporal activity of myriads of neurons at very different brain areas. Consequently, temporal and spectral features, specific to different processes arising at different areas, are intermixed on the same recording. As an alternative we try to develop a direct noninvasive BCI system aimed to reproduce the excellent speed and prediction properties of the invasive systems while suppressing their risks. For doing that, we propose the non-invasive estimation of local field potentials in the whole human brain from the scalp measured EEG data. For this purpose we use recently developed

Local Field Potentials estimated by ELECTRA might be the

inverse solutions to the neuroelectromagtic inverse problem (LAURA and ELECTRA). Inverse solutions allow to de-convolve or un-mix the scalp signals attributing to each brain area it's own temporal activity. By targeting on the particular temporal/spectral features at specific brain areas we expect to select a low number of features that capture information related to the state of the individual in a way that is relatively invariant to time, avoiding long training periods and increasing the reliability and efficiency of the classifiers. In that way, a direct non invasive BCI system based on linear inverse solutions might combine the advantages of invasive and non invasive devices providing a safer and faster alternative to translate brain thoughts into actions.

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IM2 Newsletter

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Report and recommendations of the International Scientific and Industrial Advisory Board - IDIAP, Martigny, February 10-11, 2005

The (IM)2 International Scientific and Industrial Advisory Board (SIAB) met at IDIAP in Martigny on February 10-11 2005 for an evaluation of the first phase of the NCCR and to provide the management of (IM)2 with recommendations for the next phase.

The meeting started on Thursday morning with a general presentation by NCCR Director Prof. Hervé Bourlard who recalled the context of the NCCR and the major achievements over the first three years of activity. The positive feedback given by the Swiss National Science Foundation (SNSF) Review Panel following its site visit in November was also available to the Board members and discussed.

The afternoon of the first day was split in two parts. First each of the eight Individual Projects (IPs) leaders gave a brief overview of their activities, and then three talks covered some aspects in greater details, namely:

- Dr Daniel Gatica-Perez, IDIAP, *«Modeling Individual and Group Actions in Meetings with Layered HMMs»,*
- Prof. Jean-Philippe Thiran, EPFL, *«Behavioral model-based scene analysis»,*
- Dr Joé del R. Millán, IDIAP, *«Brain Interaction»*.

Friday morning, the meeting resumed with a presentation of the new IP structure forseen for the second phase, 2006-2009, as well as the procedure for the transition. General comments were exchanged between IP Heads and Board members, and are recalled in this report.

Overall, SIAB is pleased by the amount and quality of the work performed so far. Important progress is observed, following the recommendations formulated in the previous meeting. The consortium continues to be at the leading edge in the areas targeted by the project on multimodal interaction and multimedia information management and presentation. Some individual achievements were explicitly acknowledged.

Research quality and technology transfer

Basic research of high quality is documented by numerous publications on top level journals and in the proceedings of prestigious conferences. The reported activity appears and the phase II proposal shows a convergence on a few, well defined, application scenarios with results well in line with the state-of-the-art at an international level. Particular attention has been made on the development and evaluation of components and systems as well as on data collection in synergy with important institutions like NIST in the US. Some improvements to the evaluation process may consist in providing citation numbers and the number of joint papers with co-authors from different institutions.

Of particular importance are the impact on education, also thanks to the exchange program with Berkeley and visits of students at MIT. Worth mentioning is also participation in activities with DARPA, NIST and NSF in the US.

A real integration of speech, vision and multimodal fusion is another interesting result of phase I and is well articulated with more focus in phase II. Test beds or driving applications are well identified in a vision to develop interaction technologies with specific results for a broad field of applications.

The issue of the focus of claims and patents was discussed. It was recommended that focus of patents should not be on meetings, but on technologies developed for the research on meetings. It is also recommended to continue performing market analysis and overview of IM2 technology. Some aspects of technology transfer were discussed and some questions were raised about the proportion of members that do technology transfer or if knowledge transfer is a barrier for technology transfer.

Retention and development of talents, advancement of women

IM2 in the past year has attempted to attract young women researchers through establishing and advertising new one-year fellowships at IDIAP for them. Unfortunately, suitable candidates have not yet emerged for these fellowships, but a start has been made. To encourage good applicants, the fellowships will be advertised more widely to women computer scientists and engineers. The senior researchers in the project are also encouraged to use their personal research networks to locate suitable women graduate students and postdocs. The SIAB committee also suggested that younger women might be encouraged to participate in shorter summer research projects, similar to those that have been successful at Bell Labs, IBM research, and Microsoft Research. Local female secondary school students could also be invited to visit labs participating in the project for special one-day programs designed to interest young women in careers in multimedia research.

For the Boards,
Prof. Renato De Mori,
University of Avignon, France

Members of the Scientific Advisory Board
Prof. Maurice Bellanger, C.N.A.M., France;
Prof. Edward Delp, Purdue University, USA; (excused)
Prof. Renato De Mori, University of Avignon, France;
Prof. Julia Hirschberg, Columbia University and AT&T Research, USA;
Prof. Thomas Huang, University of Illinois, USA;
Prof. Fred Jelinek, Johns Hopkins University, USA; (excused)
Prof. Josef Kittler, University of Surrey, UK;

Members of the Industrial Advisory Board
Dr Aldo Bussien, VP of Engineering, Logitech SA, CH; (excused)
Dr Jordan Cohen, CTO, VoiceSignal Technologies, Inc, USA;
Prof. Stephen Emmott, Microsoft Research, Cambridge, UK.
Dr Kari-Pekka Estola, Nokia Research Center, Finland; (excused)
Dr Tom Malzbender, HP Laboratories, Palo Alto, USA; (excused)
Dr Christophe Meier, Director, CCSO, CH; (excused)

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Upcoming Events

MLMI'05
11-13.7.05
CALL FOR PAPERS

2nd Joint Workshop on Multimodal Interaction and Related Machine Learning Algorithms MLMI'05
http://groups.inf.ed.ac.uk/mlmi05

11-13 July 2005,
Royal College of Physicians,
Edinburgh, UK

The second MLMI workshop is coming to Edinburgh, UK, 11-13 July, 2005 follows from the first successful MLMI'04 held in Martigny, Switzerland, June 2004 *(http://www.idiap.ch/events/workshop-mlmi04/)*.

The topics covered by the MLMI'05 workshop are the following:
- human-human communication modeling
- speech and visual processing
- multi-modal processing, fusion and fission
- multi-modal dialog modeling
- human-human interaction modeling
- multi-modal data structuring and presentation
- multimedia indexing and retrieval
- meeting structure analysis
- meeting summarizing
- multimodal meeting annotation
- machine learning applied to the above

The workshop will be sponsored by several european and national projects, including AMI, CHIL, HUMAINE, PASCAL, SIMILAR, IM2, etc. (more information on the sponsors available on the website).

Key Dates:
Submission deadline : 13 May 2005
Accept/reject decisions : 13 June 2005
Plenary workshop takes place : 11-12 July 2005
Specialist workshops take place : 13 July 2005

Guidelines for submissions:
The submitted papers should follow the Springer LNCS format and be 12 pages maximum per full paper. Extended abstracts of 2 pages maximum can also be submitted to be considered as posters. The best papers will then be published in an edited book, similar to MLMI'04, published as LNCS-3361: *http://www.springerlink.com/openurl.asp?genre=issue&issn=0302-9743&volume=3361&issue=preprint.*

IM2 Integration Week 2005

The IM2 PhD Integration Week will be organized again this year in Moudon on August 29-31. Interested students should contact their supervisor or Mrs Pellaud at *marie-jose.pellaud@epfl.ch* for more details.

Forum Engelberg *22-25.5.05*

On May 24, 2005, Prof. Hervé Bourlard, IM2 Director, will give an invited talk at the Forum Engelberg, During the Forum, Mr. Philippe Busquin, Member EC (1999-2004), Member of EU Parliament, will receive the Galileo Prize Award. More informations : *http://www.mhp.ch/fe.pdf*.

Partner News

Doctoral School EPFL

On March 1st, 2005, IDIAP has officially joined the EPFL doctoral school, in particular the I&C (Information and Communication) and the just submilted W&S (Waves and Signals) doctoral programms. This garantees a better integration for the 30-35 PhD student working at IDIAP. In parallel, 7 courses have been submitted to these doctoral programs and will be taught both in Lausanne and Martigny.

Science and Politics

IDIAP Deputy Directory Dr Jean-Albert Ferrez has been re-elected early March as a member of the Parliament of the Canton du Valais. He is now a member of the Commission of Education and in particular President of the Valais delegation to the Control Commission of the HES-SO and HES-S2.

Selected publications

A probabilistic Measure of Modality Reliability in Speaker Verification,
J. Richiardi, P. Prodanov, A. Drygajlo,
IEEE Int. Conf. Acoustics, Speech and Signal Processing (ICASSP 2005), Philadelphia, March 19-23, 2005, pp. 709-712, selected as finalist of the Student Paper Contest (10 best papers in Speech Processing)

EER of Fixed and Trainable Classifiers: A Theoretical Study with Application to Biometric Authentication Tasks,
N. Poh and S. Bengio,
in IDIAP Research Report 05-01, 2004, accepted for publication in Multiple Classifier Systems (MCS) 2005

Combining Color and Layout Features for the Identification of Low-resolution Documents
Ardhendu Behera, Denis Lalane, and Rolf Ingold,
International Journal of Signal Processing (IJSP), ISSN:1304-4478, Vol 2, No 1, pp. 7-14, 2005

Semi-supervised Adapted HMMs for Unusual Event Detection,
D. Zhang, D. Gatica-Perez, S. Bengio, and I. McCowan
in Proc.IEEE Int. Conf. on Computer Vision and Pattern Recognition (CVPR), San Diego, Jun. 2005, to appear

Interfaces Cerebrales. Mente y Cerebro,
J. del R. Millan
invited article, 2005

Tracking People in Meetings with Particles,
D. Gatica-Perez, J.-M. Odobez, S. Ba, K. Smith, and G. Lathoud,
in Proc. Int. Workshop on Image Analysis for Multimedia Interactive, Service (WIAMIS), invited paper, Montreux, Apr. 2005

Automatic Dialog Act Segmentation and Classification in Multiparty Meetings,
J. Ang, Y. Liu and E. Shriberg
IEEE International Conference on Acoustics, Speech, and Signal Processing, Philadelphia, PA, 2005

Phase Synchronization for the Recognition of Mental Tasks in a Brain-Computer Interface,
E. Gysels, P. Celka,
published in IEEE Transactions on Neural Systems and Rehabilitation Engineering, pp 406- 415, vol 12 n4, December 2004