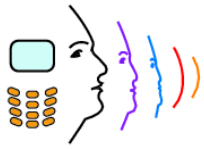

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Theme ICT-2007.1.4 [Secure, dependable and trusted Infrastructure]

WP 1: Management

Quarterly Report 2, 2009

Period: April-June 2009 **Submission date:** 02/07/2009
WP Manager: Sebastien Marcel **Revision:** 1

Author(s): S. Marcel (IDIAP), V. Devanthery (IDIAP)

Project funded by the European Commission in the 7th Framework Programme (2008-2010)		
Dissemination Level		
PU	Public	No
RE	Restricted to a group specified by the consortium (includes Commission Services)	Yes
CO	Confidential, only for members of the consortium (includes Commission Services)	No

Contents

1 Activities Overview of your WP

During this second reporting period, the MOBIO management team:

- was in charge of the Mobio Payment Process, period 1,
- wrote a questionnaire to gain some feedback from every MOBIO database participant to improve and simplify the recordings of the Phase II,
- worked on the Description of Work to reallocate the tasks initially foreseen to be performed by EyePmedia,
- prepared all official documents to integrate the new partner in the project,
- prepared the organization of the next plenary and review meeting in September.

2 Description of 3 month activity

- MOBIO Payment Process, period 1: After submitting the annual report at the beginning of February, we spent time on collecting different information requested by the European Commission regarding financial documents and other official files. Finally, the payment processing finished mi-June and we were able to pay our partners few days after that.

- Questionnaire to gain some feedback from every MOBIO database participant:

  At the beginning of the year there was feedback from various sites collecting the database that there may be too many questions to answer and that the time to complete one session may be too long.

  To make sure this was not a systematic issue we asked the MOBIO database participants to fill in a survey. This survey was also generated to discover if there were other issues and to obtain user feedback so that we could improve and simplify the recordings for Phase II of the database collection. The results from the survey were positive, however, they did highlight several issues which could be addressed for Phase II of the database collection such as including different questions to ask and possibly reducing the length of each recording session.

- Updating the Description of Work (DoW)

  After finding the new partner Visidon, we had to work on the DoW to integrate Visidon and to reallocate the tasks initially foreseen to be performed by EyePmedia.

  After September 2009, EyePmedia will stop carrying any more technical development but will still be involved in the project. Visidon is taking the responsibility of integration and demonstration activities left by EyePmedia.

  EyePmedia will complete their activities within the pre-financing budget allocated in 2008. The remaining budget will be allocated, in full, to the new partner: Visidon.

  About deliverables, EyePmedia will deliver D6.3 "System specification and prototype implementation with draft biometric modules: laptop simulation" at month 18 (in September 2009) while Visidon will take the responsibility of subsequent deliverables in this workpackage (WP6), more precisely:

  - D6.4 "System prototype with initial mobile integration" at M26
  - D6.5 "System prototype with server side integration" at M30
  - D6.6 "Final prototypes" at M34

- Preparation of all official documents to integrate the new partner in the project:

  To inform officially the European Commission about the inclusion of Visidon, we wrote a Request for Amendment with the information requested. We also worked on the MOBIO Consortium Agreement to updated it with the new beneficiary.

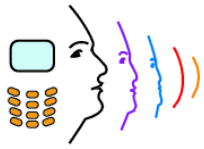
- Preparation of the organization of the next plenary and review meeting in September: the next MOBIO plenary and review meeting will be help at EyePmedia offices in Renens on September 15-17 2009.

3 Publications

not applicable.

4 Miscellaneous

none.



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Theme ICT-2007.1.4 [Secure, dependable and trusted Infrastructure]

WP 2: Use cases, Specifications and Databases
Quarterly Report 2, 2009

Period: April-June 2009 **Submission date:** 02/07/2009
WP Manager: Christopher Mc Cool **Revision:** 1

Author(s): C. McCool (IDIAP), S. Marcel (IDIAP)

Project funded by the European Commission in the 7th Framework Programme (2008-2010)		
Dissemination Level		
PU	Public	No
RE	Restricted to a group specified by the consortium (includes Commission Services)	Yes
CO	Confidential, only for members of the consortium (includes Commission Services)	No

Contents

1 Activities Overview of your WP

For the second quarter of 2009 the goals of this work package were to finialise Phase I of the data collection and to develop the collection protocol for Phase II of the data collection. Phase I of the data collection has been completed by every partner and intense discussion has led to the development of collection protocol for Phase II of the database.

2 Description of 3 month activity

There were two priorities for the second quarter of 2009. The first was to finalise the collection of Phase I of the MOBIO database and the second was to define the collection protocol for Phase II of the database.

Phase I of the database has been captured and is now ready for internal distribution. It represents 40% of the database collection and all of the partners, except for EPM and IdeArk, contributed to this work. During the second quarter of 2009 several problems were encountered with the acquisition device, particularly for the acquisition at the University of Manchester. Despite these difficulties the revised timeframe (from the first Quarterly Report of 2009) was met and consequently the delivery of Phase I of the database is on-time.

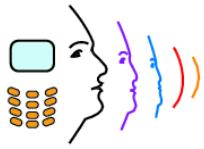
Phase II of the database is the final part of the database collection. In the second quarter of 2009 planning for the collection of Phase II of the database was conducted. Agreed upon was a timeline, by all of the partners, and a protocol for data collection. To ensure the timely capture of the data the protocol has been distributed to all sites so that collection can commence immediately.

3 Publications

none

4 Miscellaneous

none



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Theme ICT-2007.1.4 [Secure, dependable and trusted Infrastructure]

WP 3: Advanced Uni-Modal Face and Speaker Authentication

Quarterly Report 2, 2009

Period: April-June 2009 **Submission date:** 02/07/2009
WP Manager: T. Cootes **Revision:** 1

Author(s): Prof. T. Cootes (UMAN)

Project funded by the European Commission in the 7th Framework Programme (2008-2010)		
Dissemination Level		
PU	Public	No
RE	Restricted to a group specified by the consortium (includes Commission Services)	Yes
CO	Confidential, only for members of the consortium (includes Commission Services)	No

Contents

1 Activities Overview of your WP

The purpose of this work package is to develop state-of-the-art uni-modal face and speaker authentication approaches that are key components of the subsequent work package. The primary focus of work for this quarter of the year has been the development of advanced uni-modal face and speaker authentication systems. The role of each partner in the development of advanced models is summarized as below:

- **IDIAP**: Face detection and face authentication.
- **UMAN**: Facial feature localization.
- **UNIS**: Face authentication.
- **UOULU**: Face detection and face authentication.
- **UAPV**: Voice activity detection and speaker verification.
- **BUT**: Voice activity detection and speaker verification.

2 Description of 3 month activity

2.1 IDIAP

Idiap Research Institute undertook the development of advanced face localisation and face verification systems for WP3. For face localisation on a novel Haar-LBP feature was proposed for face detection. This novel feature called the Haar Local Binary Pattern (HLBP) feature can be used for fast and reliable face detection. Furthermore, methods for merging detections without the use of heuristics were investigated. For face verification two aspects were investigated. The first was the use of a Bayesian Network which incorporates not only gray-scale but also colour information, and the second was to extend the parts-pased approach to perform both a spatial- and frequency-based decomposition of the face.

- **Advanced Face Localisation**:
  For face localisation the HLBP features were developed to be robust to imaging conditions as well as being computationally inexpensive. This binary feature compares bin values of Local Binary Pattern histograms calculated over two adjacent image subregions. These subregions are similar to those in the Haar masks, hence the name of the feature. They capture the region-specific variations of local texture patterns and are boosted using AdaBoost in a framework similar to that proposed by Viola and Jones. Preliminary results obtained on several standard databases show that it compares well with other face detection systems, especially in adverse illumination conditions.

- **Advanced Face Authentication System**:
  For face authentication a particular emphasis has been placed on the parts-based approach because of its efficiency. This method has been extended to include not only a spatial decomposition but also a frequency decomposition. This frequency decomposition means that a classifier is derived for each frequency sub-image, which is later combined using the weighted sum rule. This parts-based sub-band approach has been tested on the BANCA database where it has been shown this it improves the performance of the system from an Average Half Total Error Rate of 24.38% to 15.17% when compared to a baseline parts-based approach on Protocol P.

  The upcoming deliverable, D3.3, will include the aforementioned face detection and face authentication systems. More precisely, there will be a novel software library which supports the HLBP detector as well as previous MCT detector and the face authentication system will be based on previous libraries and will consist only of the parts-based sub-band approach.

  The related publications containing the details of these proposed advanced systems can be found in [4, 5, 8, 9]

2.2 UMAN

- **A combined local/global model for facial feature localisation**:
  UMAN has been focussing on developing its advanced uni-modal face localisation system using combined local and global shape models. As a part of this work, we have described a method for modeling and locating facial features using a combination of global and local shape models. Facial features are represented as a set of patches together with a geometric model of their relative positions. The geometry is modeled with a global pose and linear shape model, together with a Markov Random Field (MRF) model of local displacements from the global model. Matching to a new image involves an alternating scheme in which an MRF inference technique selects the best candidates for each point, which are then used to update the parameters of the global pose and shape model. A cascade of increasingly complex models is used to achieve robust matching to new images. We explore the effect of model parameters on system performance and show that the proposed method achieves better accuracy than other widely used methods on standard datasets. The advanced model for face localisation as suggested above, has already been developed, tested and published [10]. The focus of our current work within this work package is exploring further possible extensions to the advanced system in order to improve its accuracy and efficiency. In order to achieve this, we are particularly interested in using specialized classification type feature detection methodologies and investigating other possible avenues of adaptive appearance modeling.

2.3 UNIS

- **User assistance in biometric trait acquisition**:
  Status: On-going (a three-year PhD program)
  UNIS investigated an audio-assisted interface for face video acquisition. The goal is to provide audio feedback to the user, especially for persons with visual impairment, to acquire good face images, i.e., as frontal as possible. Novel feedback mechanisms and acquisition procedures are currently being investigated. This work is a collaboration between UNIS CVSSP and the psychology department within UNIS.

  Initial experiments show that a simple protocol for registering the frontal face image of the user, especially with eyes closed (to simulate visual impairment), with audio feedback is more effective than without audio feedback.

  Currently, a real time appearance-based head pose estimator is being designed in order to provide feedback to the user with the goal of obtaining a perfect frontal face.

- **Advanced face authentication**:
  Status: Submitted for publication
  In video based face recognition, faces typically experience challenging illumination

conditions, blur, or localisation errors in several frames. To alleviate these challenges, quality measures can be used to remove the most severely degraded frames. Still, when the videos are taken in real life settings, degradations are likely to be present even in the highest quality frames, and robust recognition techniques are required. UNIS investigated a novel discriminative face representation based on the Linear Discriminant Analysis of (Multiscale) Local Phase Quantisation histogram (LPQ). This is a joint work with UOULU.

- **Mechanism to counter spoof attack**:
  Status: On-going
  UNIS is currently investigating a Bayesian framework to integrate a verification score and a measure of spoof attack in order to obtain an optimal decision. The Bayesian framework provides a principled means to gauge the relationship between these two seemingly unrelated pieces of information. An important advantage of this approach is that it eliminates the need to define two thresholds for each measurement manually. Instead, the system designer needs only to specify the prior knowledge (prior probability of spoof attacks) which is then updated using the likelihood of the observation. This is a joint work with Dr. Daigo Muramatsu, Waseda University, Tokyo, Japan.

- **Adaptive Client-Impostor Centric Score Normalization**:
  Status: Submitted for publication Cohort-based score normalization as examplified by the T-norm (for Test normalization) has been the state-of-the-art approach to account for the variability of signal quality in testing. On the other hand, user-specific score normalization such as the Z-norm and the F-norm, designed to handle variability in performance across different reference models, has also been shown to be very effective. Exploiting the strenghth of both approaches, UNIS investigated a novel score normalization called adaptive F-norm, which is client-impostor centric, i.e., utilizing both the genuine and impostor score information, as well as adaptive, i.e, adaptive to the test condition thanks to the use of a pool of cohort models. Experiments based on 12 fingerprints acquired using both the thermal and optical devices, for the BioSecure DS2 database, show that the proposed (Adaptive) F-norm is better or at least as good as the other alternatives, including those recently proposed in the literature.

2.4 UOULU

- **Advanced Face detection using local phase**:
  Face detection using local phase: In Q2, UOULU was working on a face detection using local phase, or more specifically, Local Phase Quantization (LPQ) labels. The developed system, based on cascade of Gentle AdaBoost classifiers using LPQ labels, will be a part of the advanced unimodal algorithms deliverable of the project. Advanced unimodal algorithms: In Q3 and Q4, UOULU will be working on testing

the advanced unimodal algorithms developed by the project partners and writing an evaluation report.

2.5 BUT

- BUT worked towards its advanced system. It is based on full JFA, that contains both speaker and channel factors. Systems based on the full JFA paradigm obtained the best results in NIST 2008 SRE evaluation, and were further refined at the 2008 JHU workshop in the work-group lead by BUT Speech@FITs director Dr. Lukas Burget.

- BUT has 3 papers on speaker recognition accepted to Interspeech 2009 to be held in Brighton, UK, in September 2009:

  1. Burgets paper [3] investigates JFA used for speaker recognition. First, we performed systematic comparison of full JFA with its simplified variants and confirmed superior performance of the full JFA with both eigenchannels and eigenvoices. We investigated into sensitivity of JFA on the number of eigenvoices both for the full one and simplified variants. We studied the importance of normalization and found that gender-dependent zt-norm was crucial. The results are reported on NIST 2006 and 2008 SRE evaluation data.
  2. Consolidated version of BUT system description for NIST 2008 SRE [2]. Two Joint Factor Analysis (JFA) GMM/UBM systems and one based on SVM-GMM are analyzed on NIST SRE 2006 and 2008 evaluation data. We concentrate on the influence of side information in the calibration.
  3. Brummers [1] and Kockmanns [6] papers deal with the topics of language and emotion recognition, but they build and investigate into similar principles that we use in speaker recognition, namely JFA and discriminative system optimization.

- BUT participated in NIST 2009 language recognition evaluation (LRE). Although this topic is not covered by MOBIO, several of the investigated techniques are directly useable in speaker recognition:

  – we have used and confirmed excellent performance of JFA in language recognition.
  – advanced techniques of score fusion and calibration (cooperation with Niko Brummer from Agnitio). Investigations into duration-independent back-end are of great interest also for speaker verification.
  – Region-Dependent Linear Transforms (RDLT) for discriminative feature extraction.

2.6 UAPV

- **Advanced speaker verification**:
  The system presented by UAPV as the baseline system (deliverable D3.1) was a state-of-the-art system. The lastest technique of speaker recognition area was already included into the baseline system. For example, our baseline system includes sessions compensation using factor analysis approach [7]. This system was optimized for the NIST 08 evaluation. The world model and the eigenchannel matrix was estimated on NIST 04. With this baseline system, the Equal Error Rate (EER) was about 4.5%.

  For the advanced system, we decided to work on the eigenchannel matrix which seems not to be optimal regarding the differences of type of signal acquisition (microphone) and acoustic conditions (environment) between NIST and BANCA. We assumed that a new eigenchannel matrix, adapted to BANCA, could improve the performance of the system. To support this theory, we used the data from BANCA-G1 to train(adapt) a(the) new eigenchannel matrix before testing it on the BANCA-G2 subset.

  Vice-versa, we performed tests on BANCA-G1 using a trained(adapted) matrix with BANCA-G2. This matrix adaptation allows a relative reduction of the Equal Error Rate about 20%.

3 Publications

References

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[2] L. Burget, M. Fapso, V. Hubeika, O. Glembek, M. Karafiat, M. Kockmann, P. Matejka, P. Schwarz, and J. Cernocky. But system for nist 2008 speaker recognition evaluation. In *to appear in Proc. Interspeech 2009*, Brighton, UK, 2009.

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[4] G. Heusch and S. Marcel. Bayesian networks to combine intensity and color information in face recognition. In *IEEE IAPR International Conference on Biometrics (ICB)*, 2009.

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[6] M. Kockmann1, L. Burget, and J. Cernocky. Brno university of technology system for interspeech 2009 emotion challenge. In *to appear in Proc. Interspeech 2009*, Brighton, UK, 2009.

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[8] C. McCool and S. Marcel. Parts-based face verification using local frequency bands. In *IEEE IAPR International Conference on Biometrics (ICB)*, 2009.

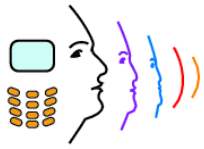
[9] A. Roy and S. Marcel. Haar local binary pattern feature for fast illumination invariant face detection. In *British Machine Vision Conference*, 2009.

[10] P. Tresadern, H. Bhaskar, S. Adhesina, C. Taylor, and T. Cootes. Combining local and global shape models for deformable object matching. In *British Machine Vision Conference*, 2009.

4 Miscellaneous

The remaining deliverables for this work package are as follows:

- **D3.3**: Advanced uni-modal systems (due June 2009)
- **D3.4**: Report on evaluation of advanced uni-modal systems (due October 2009)



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Theme ICT-2007.1.4 [Secure, dependable and trusted Infrastructure]

WP 4: Joint Bi-Modal Authentication and Model Adaptation

Quarterly Report 2, 2009

Period: April-June 2009 **Submission date:** 02/07/2009
WP Manager: N. Poh **Revision:** 1

Author(s): Dr N. Poh (UNIS)

Project funded by the European Commission in the 7th Framework Programme (2008-2010)		
Dissemination Level		
PU	Public	No
RE	Restricted to a group specified by the consortium (includes Commission Services)	Yes
CO	Confidential, only for members of the consortium (includes Commission Services)	No

Contents

1 Activities Overview of WP4

Biometric authentication using mobile devices is becoming a convenient and important means to secure access to remote services such as telebanking and electronic transactions. Such an application poses a very challenging pattern recognition problem: the training samples are often sparse and they cannot represent the biometrics of a person. The query features are easily affected by the acquisition environment, the user's accessories, occlusions and aging.

The objectives of this WP are to tackle the above problems in two fronts:

- **Joint bimodal authentication**: to develop a novel fusion mechanism to combine the face and speech biometrics
- **model adaptation**: to investigate model adaptation techniques, or semi-supervised learning, i.e., learning from the vast unlabeled query/test data

The roles of each partners are as follow:

- **UNIS**: to coordinate the activities in WP4 and to design mechanisms for adaptive face and speech systems as well as experiments for their evaluation
- **IDIAP**: to study joint bimodal fusion via feature level fusion (D4.3 and D4.4) as well as working with UNIS on baseline fusion and adaptive systems
- **UAPV**: to deliver an adaptive speech system
- **UMAN**: to provide a support for facial annotation needed for the adaptive as well as advanced face verification systems
- **BUT**: to provide phoneme conditioning for speaker verification system

2 Description of 3 month activity

- **Report on baseline fusion**:
  Status: Completed
  D4.2, which reports the score-level fusion results contributed both by UNIS and IDIAP, was delivered on time.

- **Baseline adaptive systems**: UNIS provided a *supervised adaptation protocol* defined for the BANCA database. IDIAP and UAPV each delivered their respective face and speaker score files on the defined protocol as part of D4.5 deliverable.

- **A Bayesian framework for adaptive systems**:
  Status: On-going
  UNIS identified four major research issues related to implementing adaptive systems. The issues are: online model updatation, training and inference with several models, quality-based criteria to control the creation of a new model, and person-specific time-dependent performance evaluation. For each issue, a solution is also proposed [4]. IDIAP and UNIS will work together in this research direction.

3 Publications

Past contributions relevant to this work package include the following:

- Survey on the state-of-the-art biometric [1]
- Selecting a subset of biometrics system for fusion [3]
- Quality-based multimodal biometric fusion with cross-device matching [2]

References

[1] J. Kittler and N. Poh. Multibiometrics for identity authentication: Issues, benefits and challenges. In *IEEE Conference on Biometrics: Theory, Applications and Systems*, pages 1–6, Washington, D.C., 2009.

[2] N. Poh, T. Bourlai, and J. Kittler. Quality-based score normalisation with device qualitative information for multimodal biometric fusion. *IEEE Trans. on Systems, Man, and Cybernatics (part B)*, 2009. accepted for publication.

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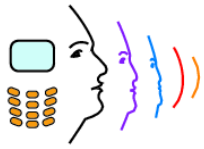
[4] N. Poh, R. Wong, J. Kittler, and F. Roli. Challenges and research directions for adaptive biometric recognition systems. In *LNCS 5558, Proc. of the 3rd Int'l Conf. on Biometrics*, pages 753–764, Sardinia, 2009.

4 Miscellaneous

None



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Theme ICT-2007.1.4 [Secure, dependable and trusted Infrastructure]

WP 5: Scalability

Quarterly Report 2, 2009

Period: April-June 2009 **Submission date:** 02/07/2009
WP Manager: J-F. Bonastre **Revision:** 1

Author(s): Prof. J-F. Bonastre (UAPV)

Project funded by the European Commission in the 7th Framework Programme (2008-2010)		
Dissemination Level		
PU	Public	No
RE	Restricted to a group specified by the consortium (includes Commission Services)	Yes
CO	Confidential, only for members of the consortium (includes Commission Services)	No

Contents

1 Activities Overview of your WP

The use of biometric authentication systems on mobile device requires high level of performance with limited resources. Limited processor performance, energy consumption and memory capacity are important examples of such limitations.
Development of biometric system scalability allows to deal with such constraints. The scalability study will investigate a number of important parameters taking into account the cell-phone specications or the amount of transferred data.

During this period, a preliminary work was performed in order to evaluate the constraints involved by the characteristics of mobile devices.

A phone meeting including EPM and LIA allowed to specify memory storage and computing power limitations.

Each partner involved in WP5 was asked to fix a list of possible scalable parameters.

2 Description of 3 month activity

Preparatory Meeting (2^{nd} February 2009)

LIA organised a phone meeting with EPM in order to collect information on cell phone capacity. The aim of this meeting was to specify cell-phone limitations and scalability demands.

Nowadays, top-of-the-range mobile phones include

- 500MHz processors (only 60% or 70 % available for processing);
- 64Mb of memory available (out of 128 or 256 Mb of memory), DRAM or PRAM.

The memory storage could be upgraded using memory cards. Considering to the long access time needed this extra storage capacity can only be used during initialisation.

Manchester Meeting (30^{th} March 2009))

LIA organised sub-group discussions during the Manchester meeting. Results of those discussions are summarised below.

Video group discussion

- 2 systems will be scaled for the Face Detection task:
  - **UOULU** → Viola and Jones Baseline system;
  - **IDIAP** → MCT Baseline system;
- UMAN baseline Face Localisation system will be scale;
- **UNIS** baseline Face Verification system will be scale and two sets of input will be studied
  - best face detector;
  - FL system.
- Face Detection and Face Verification will be evaluated on BANCA;
- Face Localisation will be evaluated on XM2VTS;
- The overall performance of the three systems in a chain is provided.

At the end of the Manchester meeting, the following task repartition was decided:

Face detection UOULU & IDIAP will study the influence of the following parameters:

- range of face sizes (the scales);
- limiting the scanning windows (the step sizes between windows);
- processing every N frames;
- Simpler model (if possible) : removing N cascades;
- Fixed point arithmetic;
- Reducing features when possible.

Face localization UMAN will study the influence of:

- reducing the number of points chosen for face modelling;
- the imprecision introduced for the eye centers;
- size of the template (the feature patch);
- radius of the search (if possible);
- number of iterations before stopping (to see if this can easily replace the normal method of convergence);
- model complexity: more and less dimensions/modes.

Face verification UNIS will study the influence of:

- reducing the number of dimensions for PCA+LDA;
- replacing PCA+LDA with feature selection;
- varying the number of features;
- replacing the chi-squared similarity measure with efficient (potentially fixed point measures) like the intersection algorithms.

Audio group discussion
BUT and LIA decided of a list of research topics assigned to each partner.

BUT has to:

- evaluate the influence of short term constraint on voice activity detection using ANN;
- study different possibilities on feature extraction process:
  - Limitation of size;
  - Frame Skiping.
- investigate into scalability of statistic computation and scoring. Several tracks could be considered:
  - scaling the model size;

  - using Gaussian selection for GMM evaluation;
  - sharing co-variance Matrix.

LIA has to:

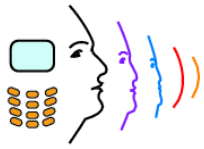
- evaluate the influence of short term constraint on voice activity detection using GMM-based approach;
- study the influence of size limitation on the feature extraction process;
- study different possibilities on feature extraction process:
  - Limitation of size;
  - Frame Skiping.
- investigate into scalability of statistic computation and scoring. Several tracks could be considered:
  - scaling the model size;
  - using Gaussian selection for GMM evaluation;
  - tree structuring of the acoustic space.

3 Publications

none

4 Miscellaneous

none



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Theme ICT-2007.1.4 [Secure, dependable and trusted Infrastructure]

WP 6: Demonstration
Quarterly Report 2, 2009

Period: April-June 2009 **Submission date:** 02/07/2009
WP Manager: Jerome Dilay **Revision:** 1

Author(s): Jerome Dilay (EPM)

Project funded by the European Commission in the 7th Framework Programme (2008-2010)		
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Contents

1 Activities Overview of your WP

During the second year of MOBIO, WP6 will implement the first prototype of a biometry-enabled telecommunication multimedia system that integrates the technology and algorithms developed during the project. During the first 12 months, a draft API specification has been made available for integration of biometric modules into the selected eyeP Media softphone application. Q1 of 2009 has been dedicated to the first steps towards the implementation of D6.3: System specification (stage 3) and prototype implementation with draft biometric modules; user device simulated using a laptop, which is due at M18.

The preparatory work done in this quarter has been basically performed by eyeP Media. EPM media stack has been chosen as the base software tool where MOBIO technology will be integrated for the first demonstrator, and the stack will be further used as the core of the EPM softphone application, desktop release. In spite of the announcement of eyeP Media to withdraw from MOBIO after deliver of D6.3, it has been recognized an interest in pursuing this integration for two main reasons: 1) the EPM media stack architecture constitutes a typical example of this kind of tools, and then adaptation to other stacks for the mobile phase should not constitute a ma jor update in libraries interface; 2) some baseline systems in MOBIO are not yet adapted to real-time requirements in terms of algorithms execution, and then this first work of integration will in any case constitute a fundamental step towards a real-time oriented application.

2 Description of 3 month activity

The main task during Q2 has been to start validating the integration of the different modules with the eyeP Media stack. The first step has been to support the team with integration of their own functionalities into the stack, while working on the test plateform, a Microsft Visual Studio project.

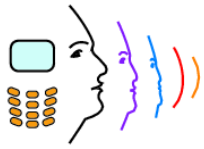
Then, around the end of the quarter, eyeP Media started receiving from the different teams the modules to be tested. The first module tested has been the Face Detection which has been integrated and tested successfully: no major issues encountered. The second module tested before the end of the quarter was Face Localisation which revealed requiring most of the computing power of the computer. This appears to be an issue if the target is to get a real-time application. There are different solution to this problem, which will have to be confirmed during the 3rd quarter.

3 Publications

None.

4 Miscellaneous

None.



MOBIO

Mobile Biometry

http://www.mobioproject.org/

Funded under the 7th FP (Seventh Framework Programme)
Theme ICT-2007.1.4 [Secure, dependable and trusted Infrastructure]

WP 7: Dissemination and Exploitation

Quarterly Report 2, 2009

Period: April-June 2009 **Submission date:** 02/07/2009
WP Manager: H. Cernocky **Revision:** 1

Author(s): Dr H. Cernocky (BUT)

Project funded by the European Commission in the 7th Framework Programme (2008-2010)		
Dissemination Level		
PU	Public	No
RE	Restricted to a group specified by the consortium (includes Commission Services)	Yes
CO	Confidential, only for members of the consortium (includes Commission Services)	No

Contents

1 Activities Overview of your WP

WP7 dissemination activities concerned mainly scientific publications, dissemination to general public, evaluations, Web pages, Community of Interest (CoI) with related MOBIO newsletter, and participation in trade fairs and projects related to MOBIO.

2 Description of 3 month activity

2.1 IdeArk

2.1.1 ACTIBIO workshop and Infosecurity Europe 2009

Stephane Rey of IdeArk and Sbastien Marcel of IDIAP attended on April 28-29 a workshop of another FP7 project (ACTIBIO) which took place at the Infosecurity Europe 2009 exhibition. The invitation from ACTIBIO (a member of the MOBIO Community of Interest) was aligned with the collaborative mood of European project. Sbastien Marcel got the opportunity to present the MOBIO project in details, and to discuss and collect useful feedback.

The visit of Infosecurity Europe 2009 gave some good insights of the future trends in the security domain, even if the exhibitors were more in a unidirectional selling mode of communication. Potential members of the CoI were approached and follow-up calls are planned for the summer.

2.1.2 Community of Interest

The CoI is continuing to grow with the addition of 2 new members (Think Trust and Koaba). Some more leads need to be re-activated and persuaded to step into the Community.

2.2 IDIAP

2.2.1 6^{th} Summer School on Biometrics, June 2009

Chris McCool and Sebastien Marcel had the opportunity to attend the sixth Biometrics Summer School. This summer school was held between June 9th and June 13th. It provided a broad overview of Biometrics from multiple biometrics through to the specifics of Iris, Fingerprint, Speaker and Face recognition.

It provided with the unique opportunity to talk with people such as Arun Ross, Fabio Roli, Alessandro Verri, Julian Fierrez, Massimo Tistarelli, Mark Nixon, John Mason and Jonathon Phillips. Chris had a long discussion with Jonathon Phillips regarding the NIST evaluations (mainly for face recognition) and the manner in which they define the protocols for these evaluations.

Every presenter provided an interesting presentation. For Chris the presentation that stood out were by Alice O'Toole who examined and presented the results on how well humans perform face recognition. The presentation by Fabio Roli on multiple classifier fusion was also interesting. Overall it was an unique opportunity to meet and discuss with well know researchers in the field.

2.2.2 International Conference on Biometrics (ICB) 2009

Guillaume Heusch, Chris Mc Cool and Sebastien Marcel attended the IAPR/IEEE International Conference on Biometrics (ICB) from June 2nd to June 5th . This conference was jointly organized by the International Association of Pattern Recognition (IAPR) and the IEEE Biometrics Council. It took place in Alghero, Italy.

The conference was single track, and we thus had the occasion to attend all the interesting presentations. In addition, a poster session and a demo session were organized each afternoon. Oral presentations were grouped by topics: biometric technologies (face, voice, fingerprint, palm-print and gait), but there were also presentations on fusion and competitions.

The conference brought together many experts from the diverse field of biometrics and had three invited speakers: Heinrich H. Bulthoff, Sadaoki Furui and Jean-Christophe Fondeur. The presentation by Heinrich H. Bulthoff on "What Can Machine Vision Learn from Human Perception?" was very interesting as it gave an insight into the depth of research that is possible in a large research institute such as the Max Planck Institute. While the presentation by Sadaoki Furui provided a very nice overview of how Speaker Recognition has developed over the last 40 years. The keynote given by Jean-Christophe Fondeur, the R&T Director from Sagem Security, was reviewing the challenges to be faced for biometrics to be deployed on real-world applications (mainly airports and borders). In particular, he pointed out that research should focus on three main aspects: speed (i.e. being able to authenticate people as quick as possible to achieve an acceptable throughput), scalability (airports are dealing with thousands of people everyday) and privacy. He also presented some of the work done at Sagem, with a focus on hardware, like a palm-print verification machine when you only have to swipe your hand, or an automatic portal allowing identity verification.

Chris presented his work on "Parts-Based Face Verification Using Local Frequency Bands", and Guillaume had a poster to present during the last afternoon. His work seemed to have been well-received: several people asked questions, on the particular topic of course, but also on the more general framework of Bayesian Networks. It was also an opportunity for him to present his PhD work in a broader way to some of the Professors who were attending the conference.

Concerning the work presented during this conference, the majority was dedicated to face recognition (both 2d and 3d) followed by speech and fingerprint. Other presentations were on the many biometric competitions. Some of these competitions include: face recognition using video, fingerprint and on-line signature verification and the Multiple Biometric Grand Challenge (MBGC).

Interesting presentations (for us) include:

- "Pixelwise Local Binary Pattern Models of Faces Using Kernel Density Estimation" from Timo Ahonen and Matti Pietikainen,
- "Challenges and Research Directions for Adaptive Biometric Recognition Systems" from Norman Poh and al.,

- "Manifold learning for Gender Classification from Face Sequences" from Abdenour Hadid and Matti Pietikainen,

and also more particularly:

- "Minimising Speaker Verification Utterance Length through Confidence Based Early Verification Decisions" from R. Vogt and S. Sridharan.

  The general outline of this paper is to estimate (on a short length of speech) the confidence of the score for the speaker. This means that rather than waiting for a fixed-length of speech to obtain a decision the process can stop when the system is confident that the acceptance score/threshold has been reached. This is done by estimating confidence intervals on the expected log-likelihood ratio.

- and "Multi-Region Probabilistic Histograms for Robust and Scalable Identity Inference" from C. Sanderson and B. Lovell.

  Conrad presented a system to perform efficient face verification. He uses as a basis the GMM Parts-Based technique, however, he uses this to get an initial background model which is then considered to be a dictionary of words (face-parts essentially); the mean of each component of the UBM GMM is considered to be a visual (face) word. The dictionary is then used to develop a model for each user. In the end rather than developing a GMM for each user a histogram can be derived and used to score each client quickly and efficiently.

2.2.3 Talk on MOBIO at Infosecurity Europe 2009

Sebastien Marcel was invited to give a presentation on MOBIO at the 1st ACTIBIO Workshop held during INFOSECURITY in London on April 28 2009.

2.3 UNIS

2.3.1 Multimodal Biometric Grand Challenge (MBGC)

As part of benchmarking effort, UNIS participated in MBGC[1] organized by the National Institute of Standards and Technology (NIST). UNIS took place in the last meeting on 5 Dec 2008. This program will continue through Spring 2010. This is a joint work of with the University of Cambridge.

2.3.2 Organization of ICB2009 face verification competition

UNIS coordinated and completed the first known effort in assessing *video-to-video* face matching under unconstrained environment (with mobile devices). The result of the competition was presented in the Intl. Conf. on Biometrics 2009 held in Sardinia, Italy. Six academic institutes have participated, including IDIAP [**?**]. Currently, a journal article is being written.

[1] `http://face.nist.gov/mbgc`

2.3.3 6th Summer School on Biometrics and ICB2009

- N. Poh gave a lecture[2] on "Embedding Quality Measurements in Multiple Classifier Fusion" in the 6th Summer School on Biometrics, June 2009.
- UNIS paper entitled "Challenges and Research Directions for Adaptive Biometric Recognition Systems", written in the context of MOBIO, addressing the issue of multimodal adaptive fusion (WP4) , won the Best Paper Awards in ICB2009.

2.4 BUT

- BUT has 4 papers accepted to Interspeech 2009, 2 on speaker verification [**?**, **?**] and 2 on closely related domains – language [**?**] and emotion [**?**] recognition.
- BUT continues its participation in research-projects strongly related to MOBIO speaker recognition technologies, namely "Security-Oriented Research in Information Technology"[3] sponsored by Czech Ministry of Education under No. MSM0021630528, and "Overcoming the language barrier complicating investigation into financing terrorism and serious financial crimes" sponsored by Czech Ministry of Interior under No. VD20072010B16.
- BUT prepares for the organization of **Odyssey 2010: The Speaker and Language Recognition Workshop** it will host in June/July 2010. Odyssey2010 is an ISCA Tutorial and Research Workshop held in cooperation with the ISCA Speaker and Language Characterization SIG. The need for fast, efficient, accurate, and robust means of recognizing people and languages is of growing importance for commercial, forensic, and government applications. The aim of this workshop is to continue to foster interactions among researchers in speaker and language recognition as the successor of previous successful events held in Martigny (1994), Avignon (1998), Crete (2001), Toledo (2004), San Juan (2006) and Stellenbosch (2008). The initial Call for Papers was distributed at ICASSP 2009 in Taipei and is available on Odyssey's web page[4].
- BUT's PI Honza Cernocky was present at the ISS World Europe conference[5] on lawful interception and intelligence analysis. Topics covered by MOBIO were discussed with several potential industrial partners.
- BUT submitted a system and is present at the workshop of NIST 2009 Language recognition evaluation[6]. The submitted system shares several features with BUT's development in speaker verification, especially concerning the JFA.

[2] The slides are available for download from `http://personal.ee.surrey.ac.uk/Personal/Norman.Poh/data/2009-06-01_norman_biomeric_summer_sch_2009_v2.pdf`

[3] `http://www.fit.vutbr.cz/research/vzamer/np`

[4] `http://www.speakerodyssey.com/`

[5] `http://www.issworldtraining.com/ISS_EUROPE/`

[6] `http://www.itl.nist.gov/iad/mig//tests/lre/2009/`

- BUT researchers Lukas Burget and Petr Schwarz are present at the Johns Hopkins 2009 workshop. The group "Low Development Cost, High Quality Speech Recognition for New Languages and Domains"[7] will investigate UBM-JFA approaches to acoustic modeling, that are tightly linked to MOBIO work in speaker verification.

3 UMAN

UMAN submitted its advanced face localization module as a draft paper [**?**] to the British Machine Vision Conference to be held at the University College in London. This paper has been accepted for publication at the conference and will be presented as a poster at the Conference to be held in mid September.

[7] `http://www.clsp.jhu.edu/workshops/ws09/groups/ldchqsrnld/`

4 Publications

5 Miscellaneous

N/A.