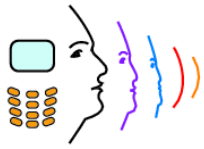

MOBIO

Mobile Biometry

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

WP 1: Management

Quarterly Report 1, 2010

Period: January - March 2010 **Submission date:** 02/04/2010
WP Manager: Sebastien Marcel **Revision:** 1

Author(s): 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 fourth reporting period, the MOBIO management team:

- consolidated the 2009 annual report (financial and scientific),
- updated the MOBIO website, mainly the pages Community of Interest, Demonstrations, Technology Transfer, ICPR 2010
- managed the organisation of the contest for the next International Conference on Pattern Recognition (ICPR)
- put in place a call for Use Case Scenarios 2010
- organised a plenary meeting.

2 Description of 3 month activity

- consolidated the 2009 annual report (financial and scientific): 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 like the partners signature on their Form C.

- updated the MOBIO website, mainly the pages Community of Interest, Demonstrations, Technology Transfer, ICPR 2010:

  Few companies joined the MOBIO Community of Interest at the beginning of 2010. They have been added on the MOBIO website and in the LinkedIn group.

  Following the recommandations of the reviewers about the Use Case Scenarios, we organised a call for Use Case Scenarios 2010 on the MOBIO website.

- organised a contest for the next International Conference on Pattern Recognition (ICPR):

  The MOBIO consortium is organising a contest for the next International Conference on Pattern Recognition (ICPR) to be held in 2010 at Istanbul on August 23. A webpage has been created for this event on the MOBIO website: http://www.mobioproject.org/icpr-2010

- organised a plenary meeting:

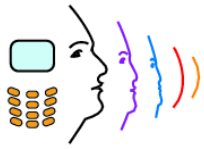
  - Martigny March 25-26, 2010: Technical Meeting

3 Publications

Not applicable

4 Miscellaneous

Not applicable



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

WP 2: Use cases, Specifications and Databases
Quarterly Report 1, 2010

Period: January - March 2010 **Submission date:** 02/04/2010
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 first quarter of 2010 the goals of this work package were to continue the collection of Phase II of the database and to continue defining protocols. Phasee II of the data collection is almost fully completed, there are currently minor delays (with one or two users) for several sites, however, as was highlighted previously the University of Manchester is much further behind the original schedule due but is on time with the updated schedule and will deliver all of its data before the end of April Initial protocols were defined and used to run the 2010 ICPR Face and Speaker Verification cometition.

2 Description of 3 month activity

There were two priorities for the first quarter of 2010. The first was to continue the collection of Phase II of the database and the second was to use and highlight any deficiencies with the initial protocol.

Phase II of the database is the final part of the database collection. So far the data collection has proceeded close to schedule and so almost all of the data has been collected, however, as was noted in previous quartlery reports there were setbacks at the University of Manchester and so a revised schedule was developed for Manchester for which they are on time (for the end of April 2010). After this data has been collated it will be checked again to ensure its integrity before being distributed.

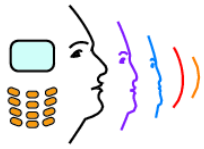
An initial protocol for PhaseI of the database was developed and used for the Face and Speaker Verification Competition which was held in conjunction with the 2010 International Conference of Pattern Recognition. The use of this protocl has highlighted its overall strength but also some of the deficiencies which will be addressed before distributing it further. The lessons learnt from developing this protocol will be applied to the protocols developed for use with both Phase I and Phase II of the MOBIO database.

3 Publications

None

4 Miscellaneous

None



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WP 3: Uni-Modal Segmentation and Authentication
Quarterly Report 1, 2010

Period: January - March 2010 **Submission date:** 02/04/2010
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

WP3 was concluded in M22; there has been no further activity in this WP.

2 Description of 3 month activity

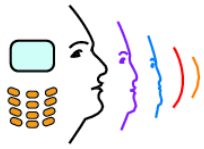
WP3 was concluded in M22; there has been no further activity in this WP.

3 Publications

None

4 Miscellaneous

None



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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 1, 2010

Period: January - March 2010 **Submission date:** 02/04/2010
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 baseline fusion (D4.1 and D4.2) and joint bimodal fusion via feature level fusion (D4.3 and D4.4) as well as working with UNIS on and adaptive systems (D4.5 – D4.8)
- **UAPV**: to deliver an adaptive speech system for D4.5 as well as D4.7.
- **UMAN**: to provide a support for facial annotation needed for the adaptive systems (D4.7 – D4.8)
- **BUT**: to provide phoneme conditioning for speaker verification system (with no obligation)
- **UOULU**: none

2 Description of Three-month activity

- **Advanced fusion system (D4.3)**:
  Status: Completed
  UNIS submitted a frame-score level based fusion technique combining both the face and speech modalities. IDIAP delivered a feature-level fusion technique combining approximately synchronized face and speech modalites. The report deliverable, D4.4, will be led by IDIAP, with UNIS' participation, the first draft of which is scheduled to be available on 17 May, 2010.

- **Advanced adaptive system (D4.7)**:
  Status: Completed
  IDIAP delivered an *online* adaptive face system using multiple models. UNIS delivered several adaptive face and speech systems comprising of self-training (a system training itself), co-training (a system trained by fusion) and cross-training (a system trained by another system) systems. The report deliverable, D4.8, will be led by UNIS, with IDIAP's participation, the first draft of which is scheduled to be available on 17 May, 2010.

- **Addressing missing values in multimodal biometric systems** [4]:

  In multimodal biometric information fusion, it is common to encounter missing modalities in which matching (of a biometric reference/template with a query sample) cannot be performed. As a result, at the match score level, this implies that scores will be missing. We address the multimodal fusion problem involving missing modalities (scores) using support vector machines with the Neutral Point Substitution (NPS) method. The approach starts by processing each modality using a kernel. When a modality is missing, at the kernel level, the missing modality is substituted by one that is unbiased with regards to the classification, called a neutral point. Critically, unlike conventional missing-data substitution methods, explicit calculation of neutral points may be omitted by virtue of their implicit incorporation within the SVM training framework. Experiments based on the publicly available Biosecure DS2 multimodal (scores) data set shows that the SVM-NPS approach achieves very good generalization performance compared to the sum rule fusion.

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]
- Four challenges and research directions for multimodal adaptive biometric systems have been identified [5]. This paper won the Best Paper awards in the past Int'l Conference on Biometrics (ICB2009).

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)*, 2010. accepted for publication.

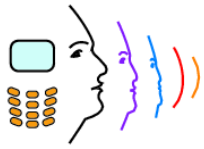
[3] N. Poh and J. Kittler. On Using Error Bounds to Optimize Cost-sensitive Multimodal Biometric Authentication. In *Proc. 19th Int'l Conf. Pattern Recognition (ICPR)*, pages 1–4, 2008.

[4] N. Poh, D. Windridge, V. Mottl, A. Tatarchuk, and A. Eliseyev. Addressing missing values in kernel-based multimodal biometric fusion using neutral point substitution. *IEEE Trans. on Information Forensics and Security*, 2010. accepted.

[5] 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 1, 2010

Period: January - March 2010 **Submission date:** 02/04/2010
WP Manager: J-F. Bonastre **Revision:** 1

Author(s): Christophe Lévy & Anthony Larcher (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 cellphone specifications or the amount of transferred data.

2 Description of 3 month activity

2.1 Overview

During this period, the following remaining task of the WP5 were completed.

- Face detection module, provided by the University of Oulu has been delivered. This module is described in part 2.2.
- The cpu time evaluation process was changed for face group: as describe in the previous quarterly report. Considering specificity of video processing (face detection/localization/verification), the time consumption evaluation was modified and integrated into the source code.
- Missing results on the english part of the BANCA database were updated during this period.
- Full-chain scalability was evaluated on the english part of the BANCA database.

2.2 Face detection : OULU part

University of Oulu developed a fixed-point Viola-Jones face detector. Moreover, scalability of several parameters of this face detector were evaluated:

Sliding window step size a window is analyzed each clock's tick and is then shifted of one window-size. Different shifts were studied in order to decrease the time consumption until less than 50% of computational time of the baseline system.

Window scaling step size the step size parameter is the window scaling between two successive scales. In this implementation, research is started at the largest possible scale. The window is then down-scaled successively until the selected minimum window size is achieved.

Image downscaling For the purposes of face verification in the MOBIO project, we are not interested in detecting the very small faces (less than about 60x60 pixels). For this reason, we can downscale the input image prior to performing face detection, resulting in smaller memory footprint and also shorter detection time, due to more efficient memory cache usage.

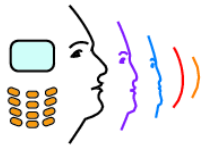
Stopping at largest face found the search can be stopped when the first cluster with sufficient number of overlapping detections is found. This is expected to make the search much faster for those frames where a large face can be found.

3 Publications

None

4 Miscellaneous

None



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

WP 6: Demonstration
Quarterly Report 1, 2010

Period: January - March 2010 **Submission date:** 02/04/2010
WP Manager: Markus Turtinen **Revision:** 1

Author(s): Dr Markus Turtinen (VISI)

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 first quarter of 2010 the goals of this work package were to complete the initial mobile integration of biometric modules. The framework developed by VISI was used to build compatible modules of face detection (IDIAP and UOULU), face verification (IDIAP) and speaker verification (BUT). These modules were integrated on Nokia N900 device.

2 Description of 3 month activity

The primary priority for the first quarter of 2010 was to develop the first version of mobile compatible biometry modules and make these work on the real hardware.

The earlier developed framework was used for the integration experiments. IDIAP, UOULU and BUT compiled their biometry modules for the Maemo environment and VISI integrated these on the N900 mobile device.

The experiments indicated the performance of the scalable biometry algorithms and the modern mobile devices. Although, the performance is not yet on the desktop level, it is fairly good for obtaining biometric decisions on the mobile. IDIAP and UOULU face detection algorithms were able to provide detecion results in 2-7 frames per second. IDIAP face verication also performed real-time on the N900. Speaker verification of BUT was also running well on the N900, but still some improvements with the silence / voice detection need to be done. For the face biometry, the initial experiments were performed without the face localization module.

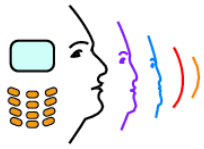
Initial mobile integration was successful. During the next period, furher development of mobile compatible algorihms is made. Also, face localization of UMAN is experimented on the mobile. Another goal is start server side integration work to make possible more realistic use-case implementations.

3 Publications

None

4 Miscellaneous

None



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WP 7: Dissemination and Exploitation

Quarterly Report 1, 2010

Period: January - March 2010 **Submission date:** 02/04/2010
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

During the 1st reporting period in 2010, WP7 dissemination activities concerned mainly scientific publications, dissemination to general public, evaluations, Web pages, Community of Interest (CoI), trade fairs and projects related to MOBIO.

An important activity in WP7 was the closure of MOBIO Face and Speaker Verification Evaluation for ICPR 2010.

2 Description of 3 month activity

2.1 MOBIO ICPR Evaluation

is the main MOBIO dissemination activity held in 2010. Three MOBIO sites: IDIAP, UOULU and BUT are jointly organizing **MOBIO Face and Speaker Verification Evaluation** for the next International Conference on Pattern Recognition (ICPR) to be held in 2010 at Istanbul on August 23.

Phase1 of MOBIO database was distributed to the participants, the sites were required to provide their results on a development set before receiving evaluation data. This contest focuses on evaluating the performance of uni-modal face and speaker verification techniques in the context of a mobile environment, thus offering challenging recording conditions (adverse illumination, noisy background).

The evaluation s now over and we consider it a success – it has attracted interest and active participation of 13 labs. A summary paper if being prepared for the International Conference on Pattern Recognition (ICPR).

See ICPR MOBIO competition web page[1] for details.

2.2 BUT

BUT, as the leader of WP7, was responsible for 2 deliverables in this reporting period:

- D7.4: Second report on dissemination activities
- updated version of D7.1: Planning of evaluation campaigns reflecting the changes requested by the EC and reviewers during the 1st project review.

Both documents were drafted, the partners were asked for comments in the standard way and they were delivered to the EC.

BUT is preparing for participation in 2010 NIST Speaker recognition evaluation[2] that is closely related to MOBIO. Note that the NIST 2010 SRE recognition workshop will take place at BUT from 24-25 June 2010.

BUT is hosting a PhD student - Ms. Doris Baum from NetMedia group Frauenhofer IAIS, Germany, to work on speaker recognition.

BUT is busy with preparing the summer series of events related to speaker recognition: NIST workshop, Odyssey 2010[3] and research workshop "BOSARIS 2010". A draft of article on "Hot speech summer" in Brno was submitted to IEEE Spoken Language Technology Committee (SLTC) newsletter.

[1] `http://www.mobioproject.org/icpr-2010`
[2] `http://www.itl.nist.gov/iad/mig//tests/sre/2010/`
[3] `http://speakerodyssey.com/`

2.3 IDIAP

MOBIO was presented by Dr Sebastien Marcel during a Forum The Ark dedicated to biometry. The Ark is the program of economical development through innovation of the Valais area. It acts on 3 levels:

- accelerator: bringing technologies faster towards the industry
- incubator: supporting start-ups in the early days
- innovation: bringing R&D in SMEs by bridging collaborations with research institutes

The forum was organized by IdeArk, one of the six technological sites of The Ark. Although the target audience is quite local, these forums aim at enlightening new areas or specific topics. The main message was that biometry is no longer a James Bond technology; it is present in everyday's life starting with the passport, maybe a physical access control, certainly with a logical access control.

So, speakers at this event ranged from local authorities presenting the new biometric passport, to new biometric solutions:

- biometry.com showing various products using multimodal biometric means
- Sensometrix speeding up the 1:N authentication in vein architecture of the hand

2.4 UNIS

Dr. Norman Poh visited the computer vision lab of Prof. Massimo Tistarelli in January 2010 for two weeks.

Dr. N Poh gave the following presentations

- "Research Trends in Biometric Person Recognition: A Personal Perspective", at U. of Basel on 23 March, 2010
- "Biometric Decision Landscape in the Presence of Spoof Attacks", at ParisTech on 22 March, 2010
- "Data Quality Dependent Decision Making in Pattern Classification", at EPFL on 24 March, 2010

Dr. Chan Chi Ho visited Prof. Matti Pietikinen in UOULU in November 2009.

2.5 IdeArk

IdeArk was active mainly in the Dissemination to the industry.

2.5.1 Professional events

IdeArk was present at the following events:

- **GSMA Mobile World Congress:** The annual gathering of everybody who has anything to do in connection with mobile phones took place in Barcelona on March 15-18, 2010. Too big to really offer good meeting opportunities for small actors, MWC innovated by offering through the Europe-Enterprise-Network a tool for speed dating (for business). More than 1000 profiles were entered in the database, which then allowed easy searching and meeting querying. The meetings turned out to be really focused and fruitful. IdeArk gathered 7 serious leads for not only participating in the CoI, but strongly interested in developing a use case for MOBIO.

- **CEBIT** The German Messe has lost its splendor since 2 years. Maybe people are turning towards more focused events. Nevertheless some good contacts were made although not as promising as the ones from Barcelona.

2.5.2 Community of Interest (CoI)

The CoI has now grown up to 22 members which could be split in 3 categories: speech or face technology users, mobile application players and research people. The Call for use case disclosed mid-March will certainly contribute to enlarge the CoI.

2.5.3 MOBIO LinkedIn group

Principal mean of communication with the Community and other interested individuals. Discussion topics and news are posted regularly on this new platform.

2.5.4 Call for Use Case

In 2008, MOBIO identified already a set of use case scenarios in the activities such as secured banking transactions, M-payment, kindergarten services or trusted peer-to-peer video chat. 2 years later, MOBIO would like to consider new use case scenarios. To achieve that goal, MOBIO is calling for a partnership and for use cases directly from companies and vendors in mobile identity management services or infrastructures.

MOBIO will choose the most promising use case scenario(s) and will implement demonstration prototype(s) on the Nokia N900 with no cost for the selected partners. Prototype(s) will be presented at the upcoming Biometrics 2010 Exhibition and Conference, in London on October 19-21 2010, where all the partners that sent their use cases will be duly acknowledged and the selected partners will be invited.

To summarize:

1. Companies can provide their use case scenarios

2. MOBIO will develop demonstration prototypes

3. Use case scenarios and prototypes will to be presented at Biometrics 2010

Dates:

- March 15, 2010: Template document for use cases available
- May 3, 2010: Deadline for use case submission
- May 31, 2010: Use case scenarios selection
- Summer 2010: Prototype preview
- Oct 19-21, 2010: Use case and prototype presentation at Biometrics2010[4]

2.5.5 Biometrics2010 – October 19-21

The London event is the No.1 choice for our CoI workshop. MOBIO has been promised to organize some talks during the conference and a booth will display the demonstrators related to the project.

2.5.6 Divers

MOBIO was selected for a Bachelor work of a student in management from the HESSO-Valais (Switzerland). Goals will be to analyze the market, determine the opportunities and a possible positioning, and evaluate the strengths and weaknesses of the MOBIO solution. Three movies to tease on a possible use case of MOBIO have been defined and were shot in March 2010. They are meant to be self-explanatory and innovative so that a buzz could be created. Availability is targeted for mid-April.

[4] `http://www.mobioproject.org/technology-transfer`

3 Publications

Several papers were proposed to conferences and journals. According to the consortium agreement, the abstracts were sent to the MOBIO mailing list.

4 Miscellaneous

N/A.