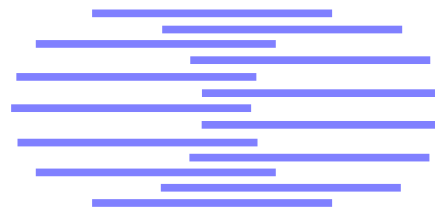


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EVALUATION PROTOCOL FOR THE XM2FDB DATABASE (LAUSANNE PROTOCOL)

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Abstract

This document describes a proposal for an evaluation protocol for the extended M2VTS database (XM2VTSDB) including the training of experts and supervisor.

1 XM2FDB Database

- No persons: 295
- No sessions: 4
- No shots per session: 2
- Shot content
 1. Clipperboard sequence, includes unique key to shot, colour chart and resolution checker
 2. Speaking sequence
 - a) 0 1 2 3 4 5 6 7 8 9
 - b) 5 0 6 9 2 8 1 3 7 4
 - c) "Joe took father's green shoe bench out"
 3. Clipperboard sequence, includes unique key to shot, colour chart and resolution checker.
 4. ROTATING HEAD SHOT Subject will be asked to rotate his/her head from center to left to right to center. Then to rotate his/her head up and then down then back to center. If the subject wears glasses they will then be asked to remove them for a few seconds.

2 Protocol Motivation and Description

Figure 1 shows the diagram of the protocol.

1. Two protocol configurations are defined:
 - Configuration I: **Expert results are due October 10. Fusion results are due October 30.** Assumption: Good Expert training using data from three different sessions. Inferior Fusion training using data from the same shots that were used for expert training.
 - Configuration II: **Expert results are due October 20. Fusion results are due October 30.** Assumption: Inferior Expert training using data from only 2 different shots. Good Fusion training using data from shots that were not used for expert training.
2. Each shot being used consists of the 2 audio digit sequences 2.a) and 2.b) and of one image. The 2 speaking sequences allow to perform both text dependent and text independent verification experiments using the same data.
3. The impostors in the evaluation set allow to train a supervisor with impostors that were never seen by the experts. This fact might be important for cases where experts were trained by methods which use data of all clients to build client models (e.g. based on Karhunen-Loeve expansion or linear discriminant analysis) and for which therefore subjects from the client set would not represent unknown subjects.
4. The evaluation set serves for the evaluation of experts, the determination of the verification threshold, and for the training of the supervisor.
5. The following number of subjects will be used:

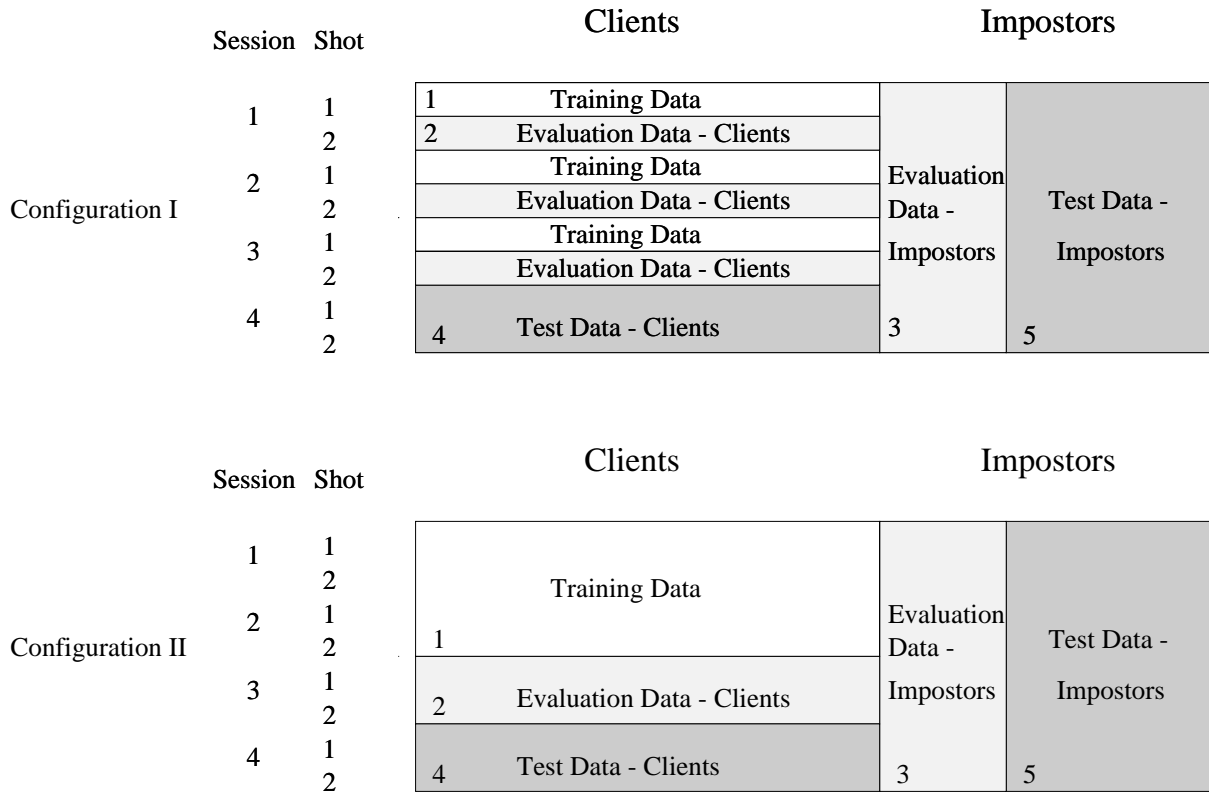


Figure 1: Diagramme showing the partitioning of the XM2FDB database according to the protocol Configuration I (top) and II (bottom).

- Clients: 200
- Impostors - Evaluation: 25
- Impostors - Test: 70

This leads to the following statistics (see also Figure 1 for the partitions):

- 1. client training examples: Conf. I: 3 per client, Conf. II: 4 per client
- 2. evaluation - clients: Conf. I - 600, Conf. II - 400
- 3. evaluation - impostors: 40'000 ($25 * 8 * 200$)
- 4. test client accesses: 400 ($200 * 2$)
- 5. test impostor accesses: 112'000 ($70 * 8 * 200$)

3 Protocol File Formats

The partners must provide their experimental results according to the following convention.

File name:

UV_WX_Y_Z_S

UV: Experiment ID

U: Protocol configuration {1, 2}

V: Shot rotation set {1}, may be extended with more rotations

WX: Expert/Fusion algorithm ID

W: Partner ID {IDIAP, UCL, etc.}

X: Partner's Algorithm No {1, 2, ...}

(Can be Expert or Fusion Algorithm, depending on Y)

Y: Set ID {E for Expert Evaluation, T for Expert Test, F for Fusion Test}

Z: Type of Access {C for client, I for impostor}

S: Client identity {e.g. 200} for both impostor and client accesses.
One file per client and access kind is stored to facilitate the calculation of statistics per client, client based fusion, etc.

Each file consists of one line per access (in ASCII) with three mandatory entries (L, M, N) and one optional entry (O), separated by 'white' characters (spaces, tabs), e.g.:

L M N O

L M N O

. . .

. . .

L M N O

with

L: Accessing person in the format ID_session_shot {e.g. 100_4_2}

M: Claimed person: ID {e.g. 100}

N: Score

- for expert evaluation and expert test set {0 - 1.0}, where 0.5 corresponds to the decision threshold that gives equal error rate

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    on the evaluation set, i.e. if score >= 0.5: accept, else: reject.
- for fusion test set {1 for accepted, 0 for rejected}

```

Example 1:

=====

```

File name: 11_IDIAP1_E_I_200 : Protocol conf. 1, rotation no 1,
IDIAP expert No 1, evaluation set, impostor scores, client 200

```

```

File name: 11_IDIAP1_E_I_200

```

```

File contents:

```

```

201_1_1 200 0.099

```

```

201_1_2 200 0.077

```

```

...

```

```

300_4_1 200 0.088

```

```

300_4_2 200 0.019

```

Example 2:

=====

```

File name 11_EPFL2_F_C_001 : Protocol configuration 1, rotation no 1,
EPFL Fusion No 2, fusion test, client 001

```

```

File name: 11_EPFL2_F_C_001

```

```

File contents:

```

```

001_4_1 001 1

```

```

001_4_2 001 1

```

4 Performance Measures

The verification performance consists of two components: FA (false acceptance rate) and FR (false rejection rate) given by

$$FA = EI/I * 100\% \quad FR = EC/C * 100\% \quad (1)$$

where EI is the number of impostor acceptances, I the number of impostor trials, EC the number of client rejections, and C the number of client trials.

Although verification performance is often measured in EER (equal error rate), it does not correspond to a real word scenario, since the rejection/acceptance threshold that leads to an EER is found a posteriori using information about the real identities. In practical applications the threshold needs to be set a priori. It is therefore important to know how the FA/FR distribution for pre-set threshold on a given training set behaves on a new test set. This is particularly the case for applications where the FA or FR are constrained to lay within certain limits.

To simulate a real application, the threshold will be set on the EVALUATION DATA to obtain certain false acceptance (FAE) and false rejection (FRE) values. The same threshold will then be used on the test set. The test set will be evaluated for three different thresholds T .

$$\begin{aligned}
 T_{FAE=0} &= \operatorname{argmin}_T (FRE|FAE = 0) \\
 T_{FAE=FRE} &= (T|FAE = FRE) \\
 T_{FRE=0} &= \operatorname{argmin}_T (FAE|FRE = 0)
 \end{aligned} \quad (2)$$

This leads to a total of 6 scores:

$$\begin{array}{ll}
 FA_{FAE=0} & FR_{FAE=0} \\
 FA_{FAE=FRE} & FR_{FAE=FRE} \\
 FA_{FRE=0} & FR_{FRE=0}
 \end{array} \tag{3}$$

For each threshold T the Total Error Rate (TER) can be obtained as the sum of FA and FR:

$$\begin{array}{l}
 TER_{FAE=0} = FA_{FAE=0} + FR_{FAE=0} \\
 TER_{FAE=FRE} = FA_{FAE=FRE} + FR_{FAE=FRE} \\
 TER_{FRE=0} = FA_{FRE=0} + FR_{FRE=0}
 \end{array} \tag{4}$$

5 Subject IDs of the Training, Evaluation, and Test sets

Below are the randomised IDs for the three groups. These lists can also be found on the ftp site at Surrey.

Training

Set 1 - 200 Subjects

=====

003 Nasser Khalili
004 Robert Crida
005 Barbara Levenaise-Obadia
006 Lesley Crawford
009 Theodore Vlachos
012 John Illingworth
013 YongPing Li
016 Rupert Young
017 Graham Wilford
018 Sadegh Abbasi
019 Matthew Baker
020 Christine ManningPrior
021 Lyndon Hill
022 Andrew Stoddard
024 Daniel Davies
025 Sanjay Pandit
026 Leszek Cieplinski
027 Yusseri Yusoff
029 Holly Kelleher
030 Kieron Messer
032 Tony Sammut
033 Bob Gunn
034 Marion Harris
035 Patricia Yehia
036 Anita Poligadoo
037 Martin Adams
038 Tim Gilbert
040 Dave Fishlock
041 Helen Roberts
042 Charles Murray
045 Alan Way
047 ChangQing Zhu
049 Peter Hemment
050 Carol Werrett
051 Mike Shields
052 Lucy Riley
053 Martin Crowder
054 Andrew Salway
055 Jonathan Deane
056 Keith Sivyer
058 M Gurtler
060 G David
061 Keith Bateson
064 Maria Petrou

065 David Airey
066 Maria Tostevin
068 Costas Palmer
069 Gianne Derks
071 Anita Eves
072 Karen Rodham
073 Sylvia Tyler
074 David Lundyates
075 Rodney Bates
078 Stephen Todd
079 C Smith
080 Susan Nakiewjcz
082 John Holford
085 Jacky Tivers
089 Janet Moore
090 Liz Roberts
091 D Faux
092 Vanessa McClure
099 Claire Brown
101 Prair Banerjee
102 J Powell
103 Richard Hill
105 Jim Al-Khalili
108 Shuiyu Lu
110 Caroline Martin
112 Rebecca Hollands
113 Stephen Harris
115 Stepan Lucyszyn
116 Penny Roling
121 Richard Clarke
122 S Wesemeyer
123 James Darling
124 N Ranjbar
125 Valerie Gurney
126 Mike Blewett
129 Chas Skinner
132 Walter Gilboy
133 G Parlett
135 Sue Bargery
136 Muriel Mulvany
137 Marion Steed
138 M Grew
140 Cynthia Joel
141 David Hamill
145 M vonSchantz
146 Karen Dougherty
148 Sandy Oxley
150 Charlotte Freeman
152 Carol Higgins
154 Irene Bradley
159 Mike Harper
163 Andrew Barnes

164 Nicola Harfield
165 S Stymne
166 D Stevenson
167 Linda Jones
168 Sompong Liangrocapart
169 Alan DuVergier
173 Naren Narenthiran
178 Frode Pedersen
179 John Cooksley
180 Ron Knott
181 Vicki Simpson
182 Daniel Lau
183 Linda Allen
188 Kate Jones
191 Mick Frank
193 Derek Sibley
196 Ewen Ferguson
197 Lesley Tutty
198 Jennifer Nordon
206 A Medlen
207 Sheila Smith
208 Margaret Cann
209 Tony Chamberlain
210 Vincent Marks
211 Paul Hayden
213 Theresa Amor
216 R Biddulph
218 Maria Campbell
219 Liz Griffiths
221 Jake McClaren
222 Kathryn Getliffe
224 Sophia Preston
227 Claire Robertson
228 Gillian Peterson
229 Veronica Asenek
231 Simon Latham
232 Dave Wonacott
233 Mark Oliver
235 Dominique McEwan
236 Derek Saunders
237 Andy Davey
240 ChongPeng Yeo
243 John Parsons
244 Faith Butt
246 M Baker
248 G. Sfikas
249 Ted Chilton
253 Katie Begg
255 Amanda Lillie
258 Jay Ginn
259 Philip Whitney
261 Jan NelsonCole

264 J Baker
266 Alan Woodcock
267 Duncan White
269 James Bell
270 Julie Gilbert
274 Peter Kench
275 Farzin Mokhtarian
278 Emerson Lopes
279 Heather Stych
281 Josephine DixonHardy
282 Neil James
285 Steve Procter
287 Barry Kingshot
288 Iain Rowsell
289 Karen Young
290 Joan Pulman
292 Barbara Rowland
293 Christine Cheepen
295 Peter Curnock
305 Shirley Heenan
310 David Jesson
312 Bernard Weiss
316 Sally Kirsan
319 Rebecca Greening
320 Tara Williams
321 Emma Treeby
322 Sybil Jubb
324 Terry Farmelo
325 Rachel Norman
328 Anne Tilling
329 Samantha Legge
330 Mary Dickinson
332 Maggie Grigg
333 Kathy Middleton
334 Charlie Cook
336 Tessa Shorey
337 Ole Starr
338 Jane Turner
339 Isabelle West
340 Pauline Colcutt
342 Josef Kittler
357 Maria Faraklioti
358 Jennifer Leahy
359 Eithne Buchanon-Barrow
360 Barry Cooper
362 Robert Finnis
364 Andy Webb
365 Paul Duree
366 Phil McLauclan
369 Sonsoles Pinar
370 Paul Counsell
371 Kevin Dodd

Evaluation - Impostors

Set 2 - 25 Subjects

=====

000 Charles Galambos
002 Ambalavanathan Saminathan
007 Bill Christmas
046 Alan Kimber
057 Dave Ryder
062 David Hawes
083 Averil Heaton
093 J Kakad
104 Patsy Betts
120 Mike Hampton
143 Physics Keddie
157 Fred Veale
158 Barbara Luff
177 Helen Light
187 Dan Erichsen
189 I Catterick
203 Josh OrdHume
212 Bob Doran
215 Shirley Hankers
242 C Macleod
276 Tony Beckton
284 Helen Vart
301 Margaret Williamson
314 Peter Brooks
331 Runli Guo

Test - Impostors

Set 3 - 70 Subjects

=====

001 Kenneth Jonnson
008 Andrew Griffin
010 Tim Brookes
011 Adrian Hilton
023 Medha Pandit
028 Ratna Rambaruth
031 Simon Hart
039 James Downes
043 Terry Hinton
044 Pat Norman
048 Chris Jeynes
059 Joan Farnham
067 Colin Hales
070 David Dickinson
081 Carol Wright

086 Richard Reffell
087 Margaret Millington
088 Rick Woods
095 Susanna Hourani
096 Glenda Davies
098 Gaye Mortali
107 Jan Fogg
109 Josie Gregory
111 Julian Roundhill
114 Martin Sweeting
119 Rhoda Omabegho
127 T Davies
128 Dave Pender
130 Rosemary Mumford
131 Michael Pilling
134 Sandra Walker
142 Tony Watson
147 M.J. Whiting
149 Lesley Noble
153 Max Thomas
155 Jean Alcott
160 Penny Briggs
161 Haidon Liang
170 Gwen Potter
171 Michael Kelly
172 Kumu Gordon
174 Alan Cheasley
175 Marcelo Schoenherr
176 David Davy
185 GuanYow Chen
190 Brian Barnard
199 Martyn Sandford
200 Terry Windeatt
201 D Stubbs
202 Alex Crispin
225 Jane Cohen
226 S.A. New
234 Annette Rocks
241 V Bennett
250 I Burton
263 Sara Cooper
271 Dawn Chescoe
272 Alison Sawyer
280 Margaret Pennells
283 G Parker
286 Maria Athanassiadou
300 Supalak Akkarangoon
313 Vesna Milanovic
315 Tricia Parker
317 Catherine Ashbee
318 Annette Strauss
323 Liz Shotter

335 Gladys Kleeman
341 George Matas
367 Tan YongSeng