# D4.3 Advanced Fusion System:

Coordinated by UNIS/IDIAP

CVSSP

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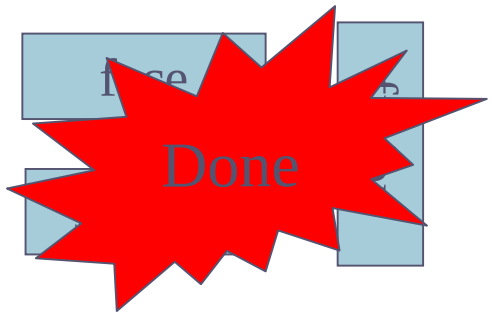
School of Electronics and Physical Sciences,
University of Surrey, U.K.

# Overview

Baseline non-adaptive fusion

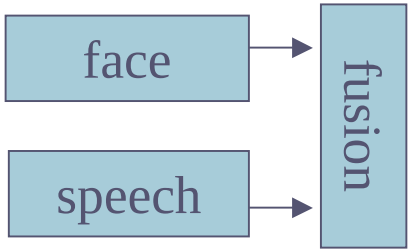
Baseline fusion




D4.1 (m15) & 4.2 (m16)

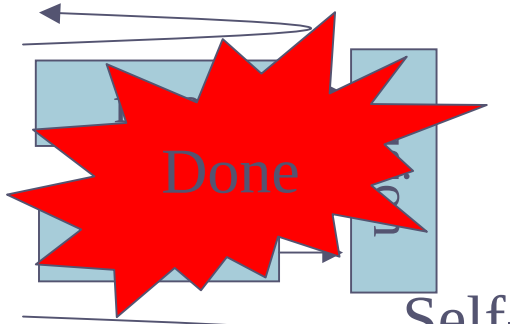
Advanced non-adaptive fusion

Advanced fusion




D4.3 (m24) & 4.4 (m30)

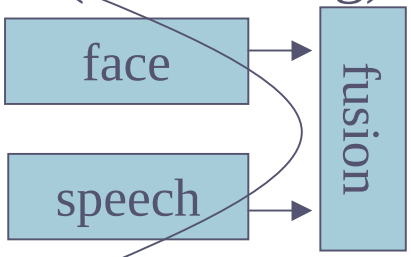
Baseline adaptive fusion




Self-train

D4.5 (m17) & 4.6 (m20)

Advanced adaptive fusion (co-training)



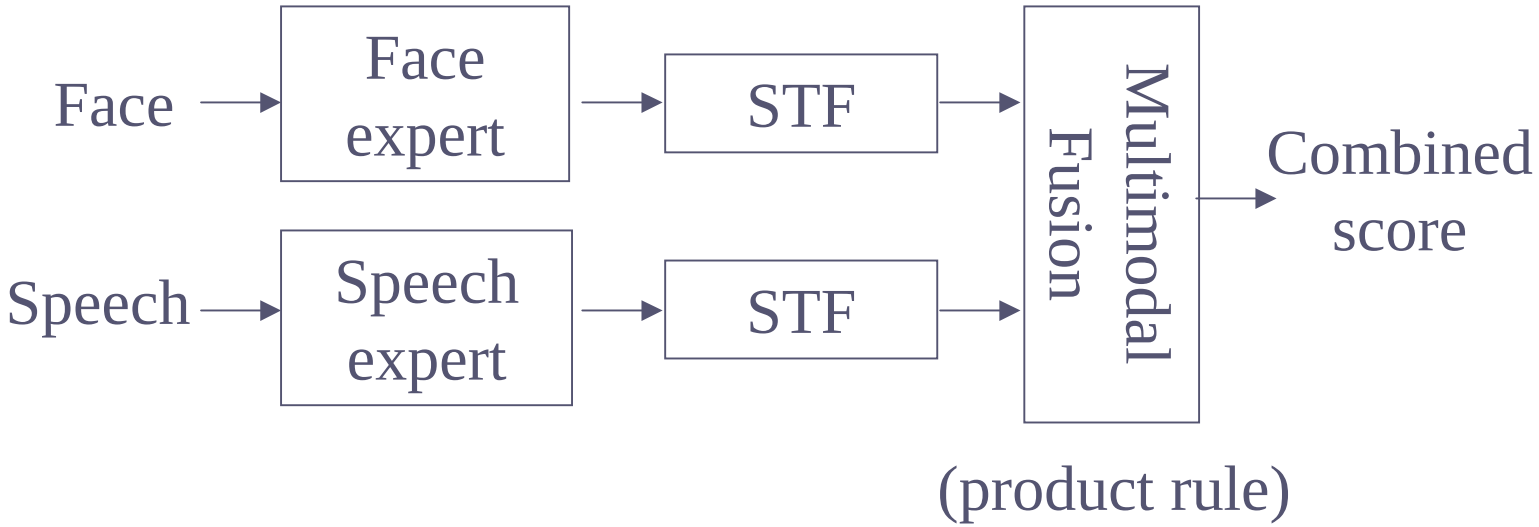

co-train

D4.7 (m26) & 4.8 (m30)

# D4.3 Advanced fusion system

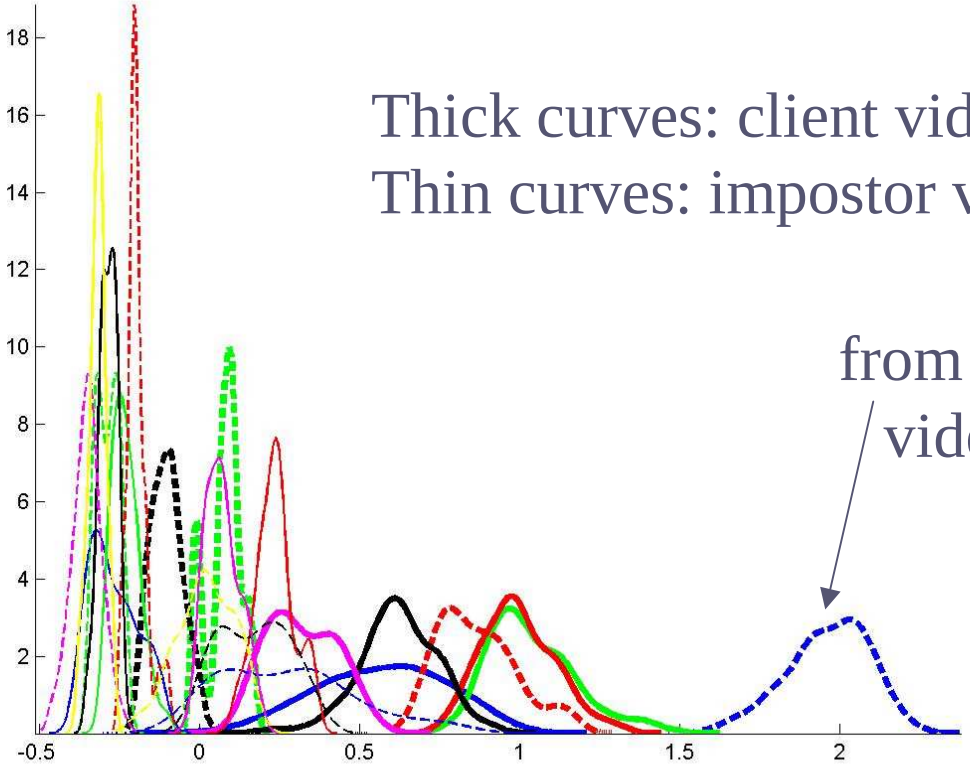
- UNIS: to investigate frame-level score-level fusion
- IDIAP: to investigage feature-level fusion
- Important dates
  - System deliverable D4.3 (m24)
  - Report deliverbale D4.4 (m30)

# Frame-leve score: Short-term Temporal Fusion (STF)




Note: No interaction between STF of different modalities (a possible future work)

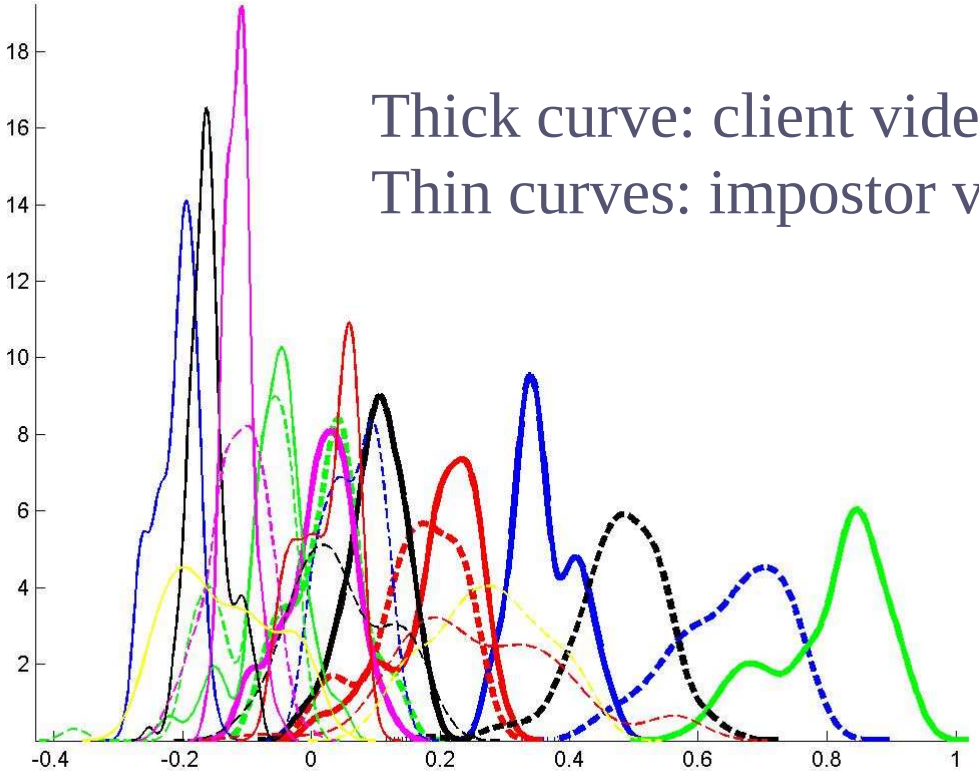
# Case Study: Client 1001




Thick curves: client video scores
Thin curves: impostor video scores

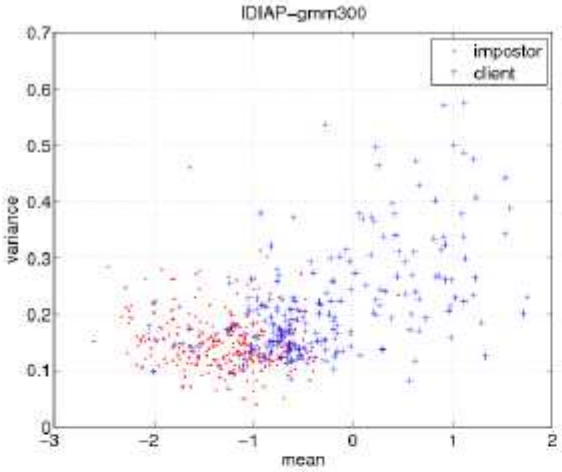
from one video

# Case Study: Client 1013

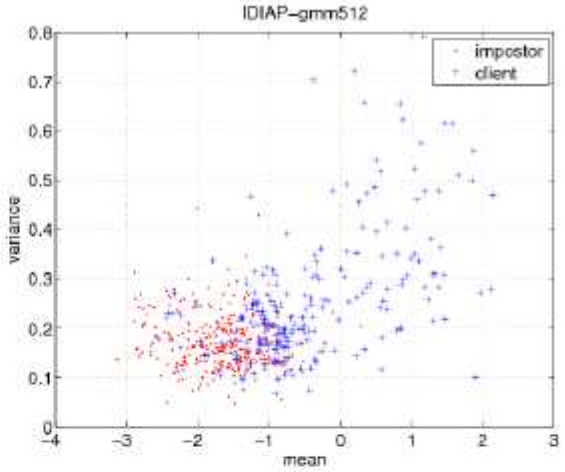



Thick curve: client video scores
Thin curves: impostor video scores

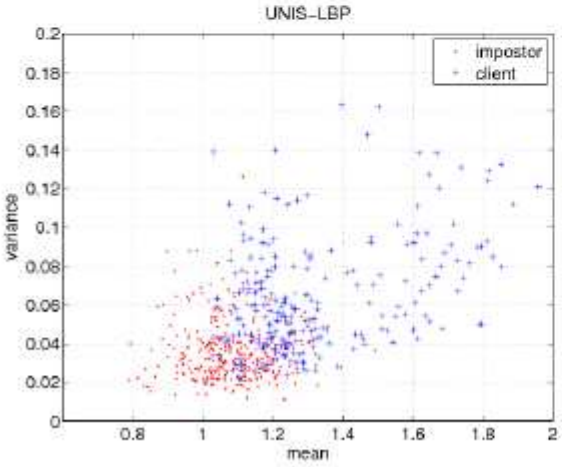
# Mean-std Scatter Plots



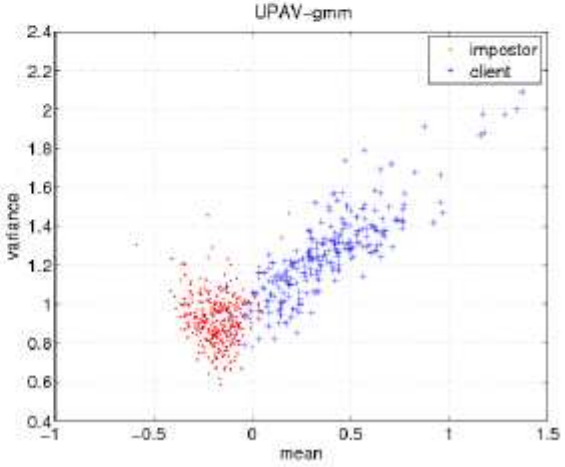

(a) GMM-based face expert (300)




(b) GMM-based face expert (512)




(c) LBP-based face expert

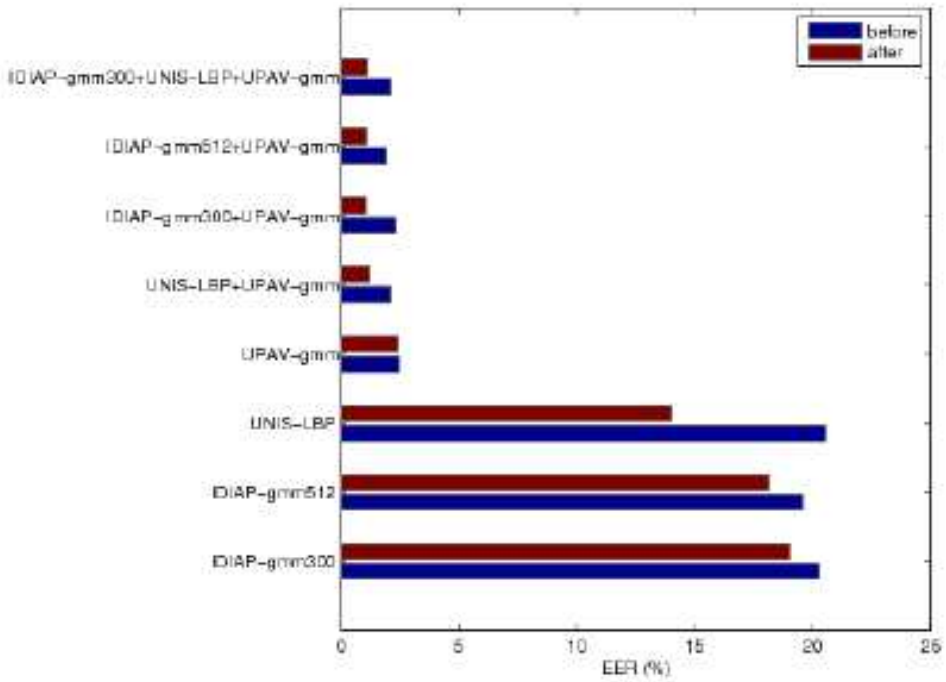



(d) GMM-based speech expert

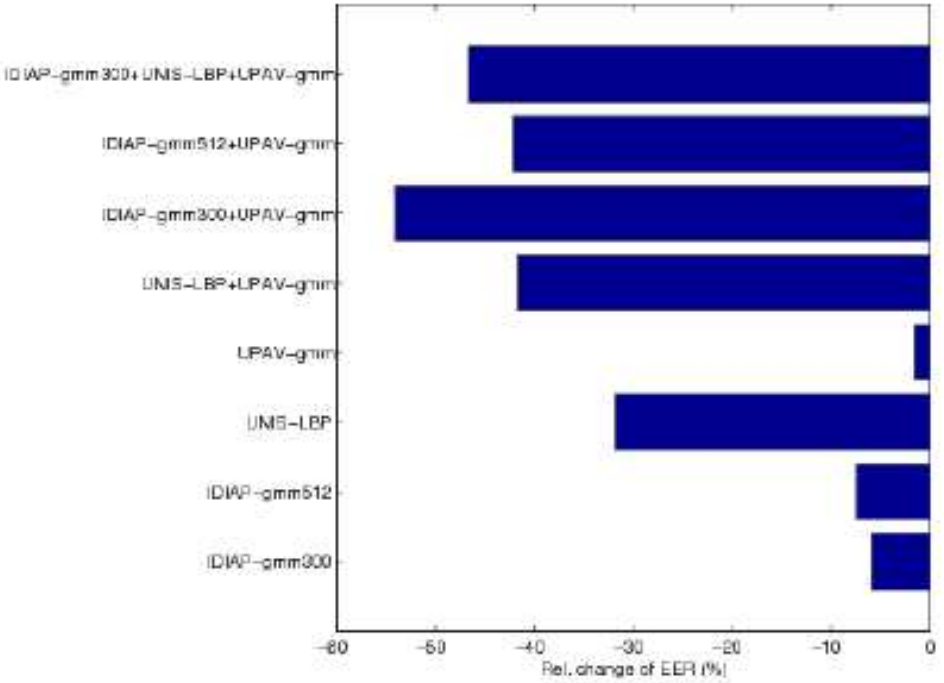
# Our Approach

- Based on the premise:
  - Client scores have higher variability than impostor scores
  - The characteristics of video-based score distributions contain some discriminative information
- Train a logistic regression with [mu, sigma, skew, Q1,Q2, Q3, min, max] as features

# Performance Improvement

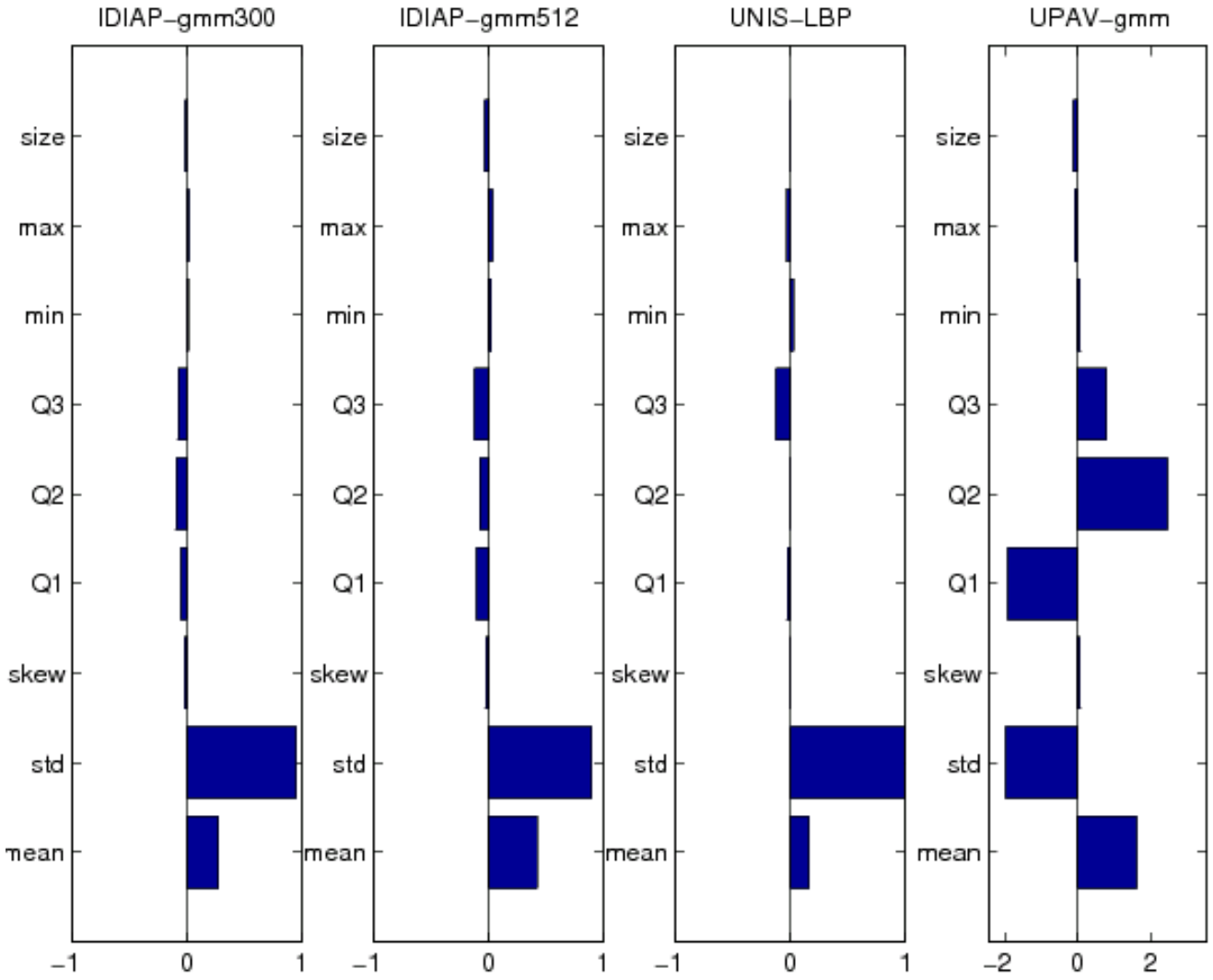



(a) EER

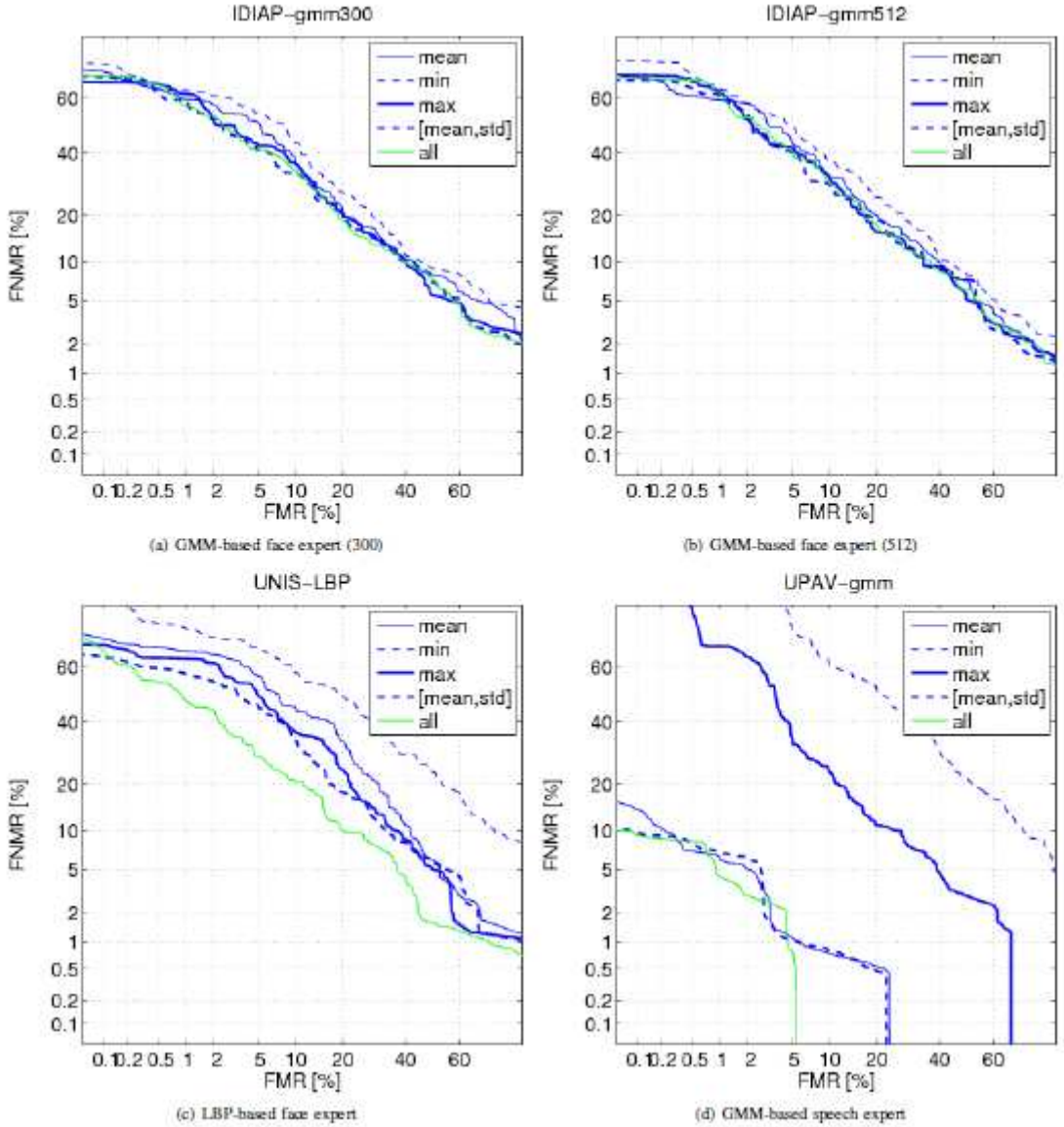



(b) Relative change of EER

# Logistic regression weights



# DET curves before/after SFT



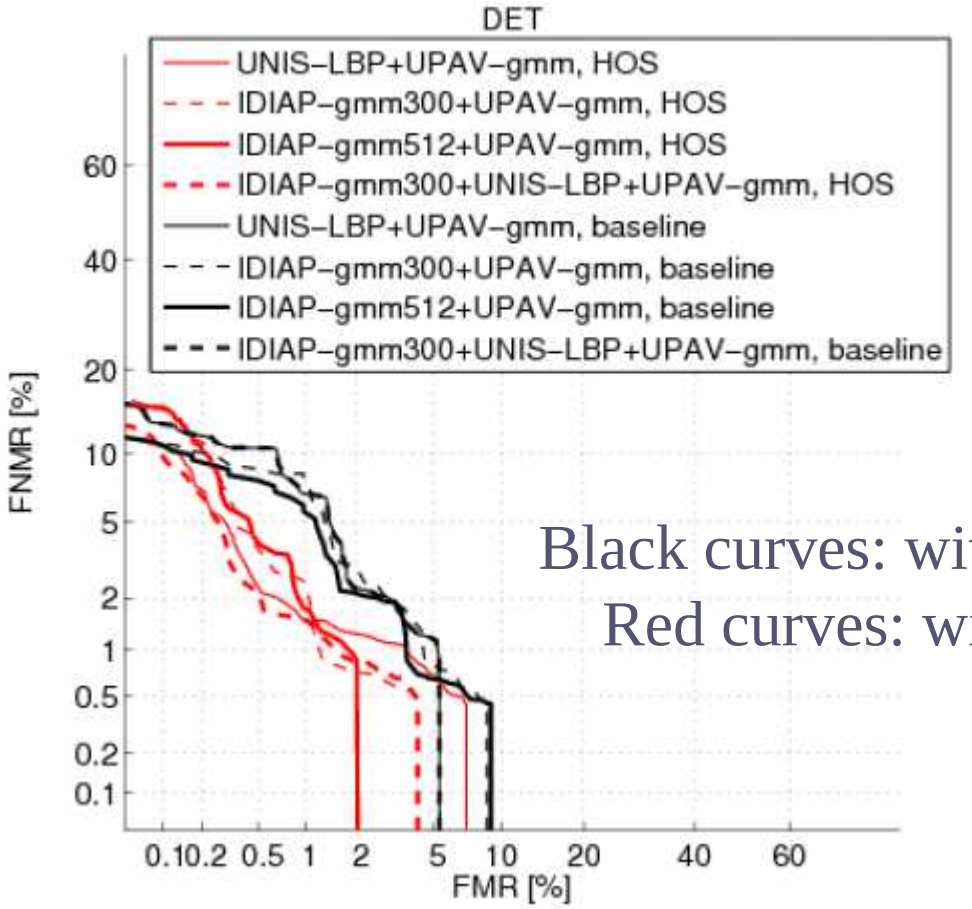

(a) GMM-based face expert (300)

(b) GMM-based face expert (512)

(c) LBP-based face expert

(d) GMM-based speech expert

# DET curves for fusion with/with out SFT




Black curves: without SFT
Red curves: with SFT

# Conclusions

- STF improves the individual expert performance
  - The UNIS face-based LBP expert benefits the most from the STF
  - GMM-based experts benefit only marginally
- In fusion, the relative improvement is still remarkable
- Why larger client variance?
  - Requires a deeper investigation – we only have conjecture at this moment – need an experimental simulation