# Mobio Deliverables D3.3 & D3.4

MOBIO Plenary meeting

Renens, 15.9.2009

# D3.3: Advanced unimodal algorithms

Status 15.9.2009: Algorithms have been submitted to the SVN repository by all the partners

- IDIAP: Face detection and face verification (C++ source)
- UMAN: Face point localization (Linux executable)
- UNIS: Face verification (Linux executable)
- UOULU: Face detection (Linux executable)
- LIA: Speech verification (Linux executable)
- BUT: Speech verification (Matlab)

# Presentation of algorithms

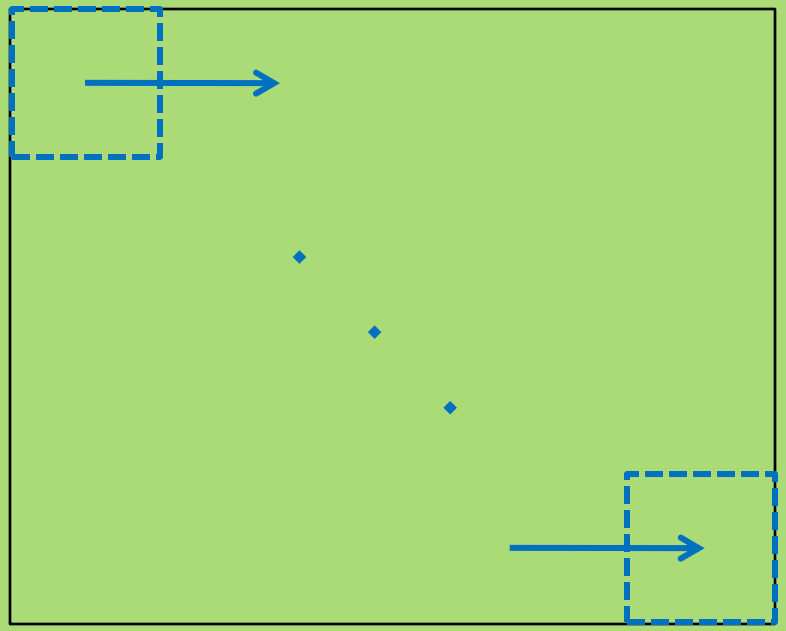
1. UOULU
2. IDIAP
3. UMAN
4. UNIS
5. LIA
6. BUT

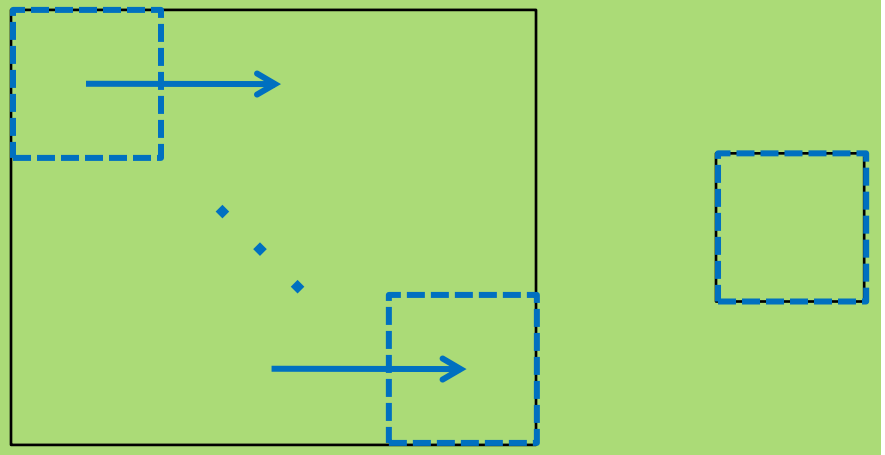
# UOULU Advanced Face Detector

Key properties:

- Sliding window + classifier approach
- Boosting based cascade classifier (GentleBoost)
- Local Phase Quantization labels as features

## 1. Search over location and scale





## 2. At each sliding window location, classify face vs. non-face


## 3. Post-processing

**Sliding window + classifier approach**

Boosting based cascade classifier (GentleBoost)

Local Phase Quantization labels as features

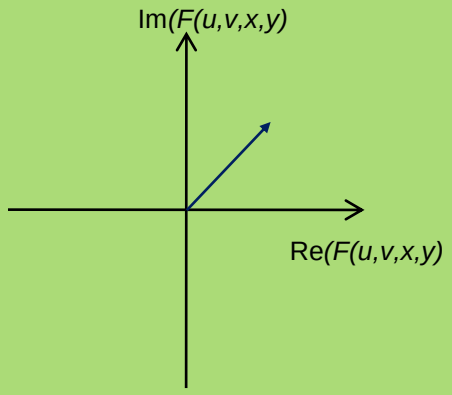
At each image pixel (x,y):

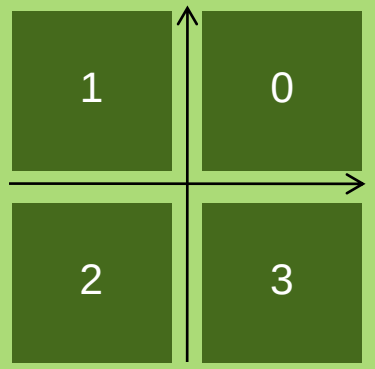
1. Compute short-Term Fourier Transform (STFT) coefficients

$$F(u,v,x,y) = \sum_{s=-R}^{R} \sum_{t=-R}^{R} I(x-s, y-t) e^{-j2\pi(us+vt)}$$

at 4 frequencies (u,v)={($\alpha$,0); (0,$\alpha$); ($\alpha$,$\alpha$); ($\alpha$,-$\alpha$)}

2. For each 4 complex coefficients, observe only the phase and quantize it into 4 levels (2 bits):

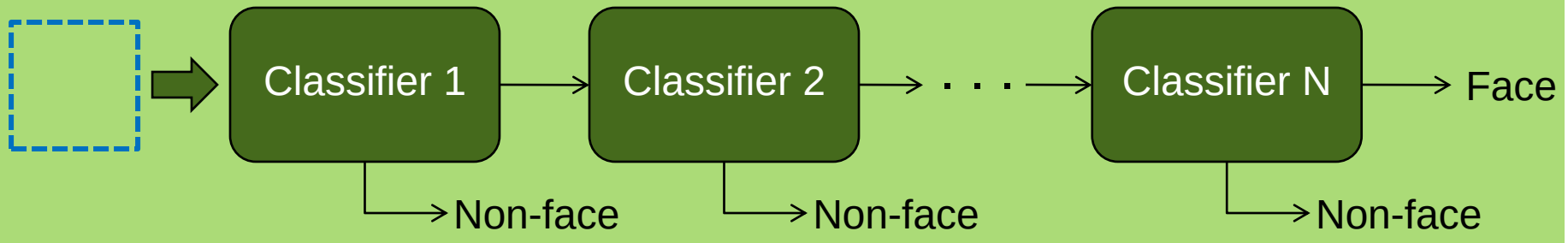



3. Combine the quantized phases of 4 STFT coefficients →2*4 bits = 256 different LPQ labels

Sliding window + classifier approach
Boosting based cascade classifier (GentleBoost)
**Local Phase Quantization labels as features**

**Cascade of classifiers:**




**Cascade step (Classifier *n*):**

Weak classifier *m*: $f_m(w_{LPQ}) : w_{LPQ}(x_m, y_m, R_m) \rightarrow R$

Strong classifier: $\text{sign}\left( \sum_m f_m(w_{LPQ}) - t \right)$

Sliding window + classifier approach

**Boosting based cascade classifier (GentleBoost)**

Local Phase Quantization labels as features

# Presentation of algorithms

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# D3.4 Report on advanced algorithms

Planned outline and responsibilities:

1. Introduction (UOULU)
2. Face Detection
   - 2.1 Related work (UOULU / IDIAP)
   - 2.2 Advanced systems (UOULU / IDIAP)
   - 2.3 Evaluation (UOULU / IDIAP)
   - 2.4 Results (UOULU / IDIAP)

Question: The sections marked in blue have significant overlap with D3.2. How shall we deal with these?

# D3.4 Report on advanced algorithms

Outline continued:

3. Face Point Localisation
   - 3.1 Related work (UMAN)
   - 3.2 Advanced systems (UMAN)
   - 3.3 Evaluation (UOULU / UMAN)
   - 3.4 Results (UOULU / UMAN)
4. Face Verification
   - 4.1 Related work (IDIAP / UNIS, done)
   - 4.2 Advanced systems (IDIAP / UNIS, partly done)
   - 4.3 Evaluation (IDIAP / UNIS, done(?))
   - 4.4 Results (IDIAP / UNIS, done(?))

# D3.4 Report on advanced algorithms

Outline continued:

5. Speech Verification
   - 3.1 Related work (BUT / LIA)
   - 3.2 Advanced systems (BUT / LIA)
   - 3.3 Evaluation (UOULU / BUT / LIA)
   - 3.4 Results (UOULU / BUT / LIA)
6. Summary / UOULU

# D3.4 Proposed schedule

- Text for sections X.1, X.2, X ∈ {2,3,4,5}
  **7.9.** → **28.9**. (ALL partners contribute)
- Experiments done
  **2.10.** (ALL partners contribute)
- Draft of complete report ready
  **9.10.** (ALL partners contribute to X.3, X.4)
- Deadline for sending comments on the draft
  **16.10.**
- Final version of the report ready
  **23.10.**