University of Balamand
NIST 2006 Speaker Verification Evaluation Systems Description

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Outline

- Novel Approach
- Parameterization
- Silence Removal
- Training and Adaptation
- Testing
- Gaussian Selection Technique
- Results
- Conclusions and Further Work

Novel Approach

- Three systems are presented:
  - Primary system:
    - 512 Gaussian Models
    - **NOVELTY:** Gaussian Selection techniques in testing phase
  - Two other systems:
    - 512 and 1024 Gaussian Models respectively
    - Classical Viterbi Decoding in testing phase

Parameterization

- Same parameterization for all systems.
- Conducted using SPro v.4.0
  - 16 LFCC + Δ
  - Band Limiting: 300 – 3400 Hz
  - Window length: 20 ms
  - Shift: 10 ms
  - Energy
  - CMS

Silence Removal

- World Model Data:
  - Bi-Gaussian modeling of energy
- Training and Testing Data:
  - Use of automatic transcriptions provided by NIST
- CMS conducted again on cepstral coefficients
- Energy removed
- Removal procedure applied in all systems

Training and Adaptation

- Conducted using Becars v.1.1.9
  - 512 classical GMM models.
  - 1024 classical GMM models.
- Amount of data:
  - Approx. 70 hours of data taken from NIST2001/2004/2005 data for separate female/male world models for all systems.
- MAP Adaptation

Testing

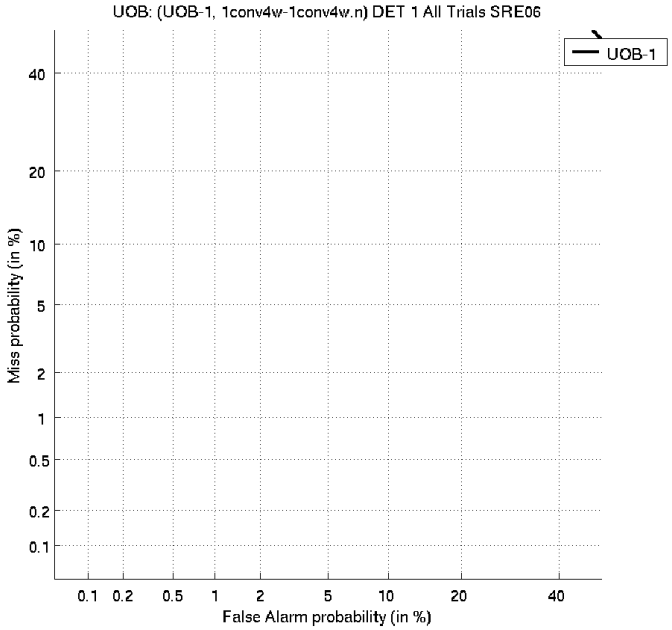
- Z-Norm using NIST-05 impostor lists used for all systems
- Primary system makes use of tree-based gaussian selection technique
- Secondary and Tertiary systems use classical Viterbi decoding

Gaussian Selection Technique

- Initialization:
  - Tree structure with clusters of Gaussian models
  - Root cluster for several Gaussian models
- Computation:
  - For each new frame, only root clusters with highest likelihood are chosen.
  - Only gaussian models under this root are taken into consideration when computing score.

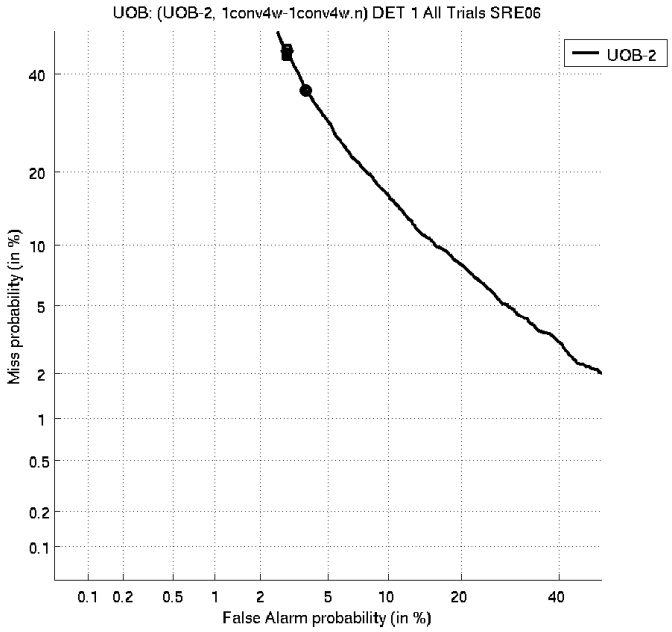
Results

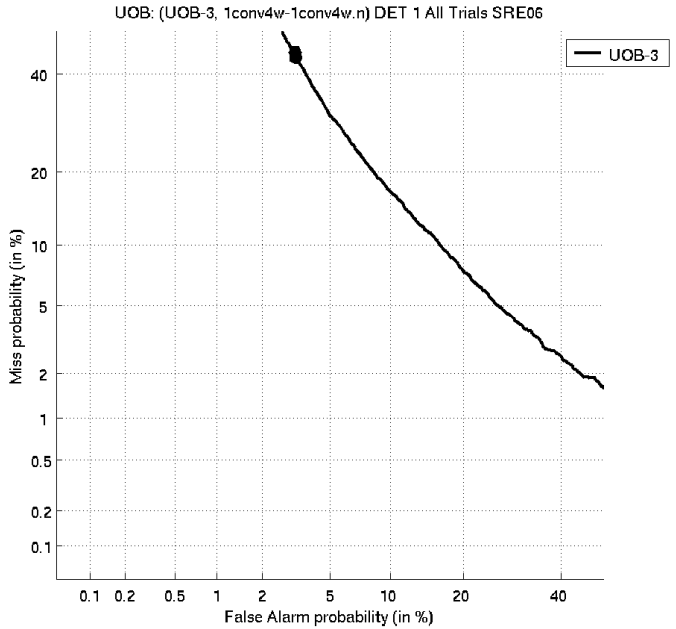
- Primary System:
  - NIST DET curve v.3 for primary system was not available, image below includes slight error. Overall performance was approximately 10% EER



Results

- Secondary Systems:





Conclusions and Further Work

- Systems still require a lot of work and UOB aims to implement online supervised adaptation in parallel in its future systems.
- Other additions include:
  - MLLR Adaptation
  - Different data tested for the creation of world models