

**UNIVERSITY OF THE BASQUE
COUNTRY (GTTS@EHU)
SYSTEM FOR THE NIST 2019
SPEAKER RECOGNITION
EVALUATION**

Mikel Penagarikano, Amparo Varona, Luis J. Rodríguez-Fuentes, Germán Bordel

GTTS Group (<http://gtts.ehu.es>), Department of Electricity and Electronics

University of the Basque Country UPV/EHU, 48940, Leioa, Spain

e-mail: mikel.penagarikano@ehu.eus

Short description

- Task: CTS Challenge
- Datasets: SRE18 CTS dev&test (LDC2019E59)
- Features: BUT bottlenecks (BABEL) & MFCCs
- i-Vectors: 400 dim, 2048-mixture G1 diagonal UBM
- Classifier: PLDA
- Calibration: Supervised generative

Datasets

- SRE18 CTS development and test sets:
 - **Background:** sre2018_dev unlabeled
 - UBM & TV
 - **Development:** sre2018_dev enrollment & test
 - PLDA & calib
 - **Validation:** sre2018_eval enrollment & test
- The BABEL dataset was also used indirectly, since the BUT bottleneck extractor software was trained on it

System architecture

- **BN Feature extraction** {BUT bottleneck extractor}
 - BUT bottlenecks (80 dim) 17 languages from IARPA BABEL project, 3096 senones.
 - Voice activity: bottleneck extractor's internal energy based VAD.
- **MFCC Feature extraction** {Sidekit Toolkit}
 - 25 ms windows, 10 ms shift, pre-emphasis, 200-3800Hz freqs, 24 log filter bank and 20 cepstral coefficients plus energy.
 - Voice activity: energy based (30 dB)
- **i-Vector extraction** {Sidekit Toolkit}
 - UBM & TV were trained on the **Background** dataset
 - Gender independent 2048-mixture diagonal UBM.
 - TV matrix of rank 400 estimated with 10 iters of EM-MD.
- **PLDA Classifier** {Sidekit Toolkit}
 - Trained on the **Development** dataset
 - Dim: 100
 - 10 iterations of EM-MD
- **Calibration**
 - Trained on the **Development** dataset
 - Supervised generative

$$\left\{ \begin{array}{l} x(s) = a \cdot s + b \\ a = \frac{\mu_{tar} - \mu_{non}}{v}, \quad b = -a \frac{\mu_{tar} + \mu_{non}}{2} \\ v = \frac{\alpha}{N_{tar}} \sum_{i \in tar} (s_i - \mu_{tar})^2 + \frac{1 - \alpha}{N_{non}} \sum_{i \in non} (s_i - \mu_{non})^2 \end{array} \right.$$

Performance

Table 1. GTTS@EHU system performance, on the NIST SRE 2019 CTS Development & Progress sets.

Metric	Devel	Progress
minC	0.957	0.964
actC	0.981	0.990
EER[%]	27.03	27.11