THU-SPMI System For NIST 2018 Speaker Recognition Evaluation

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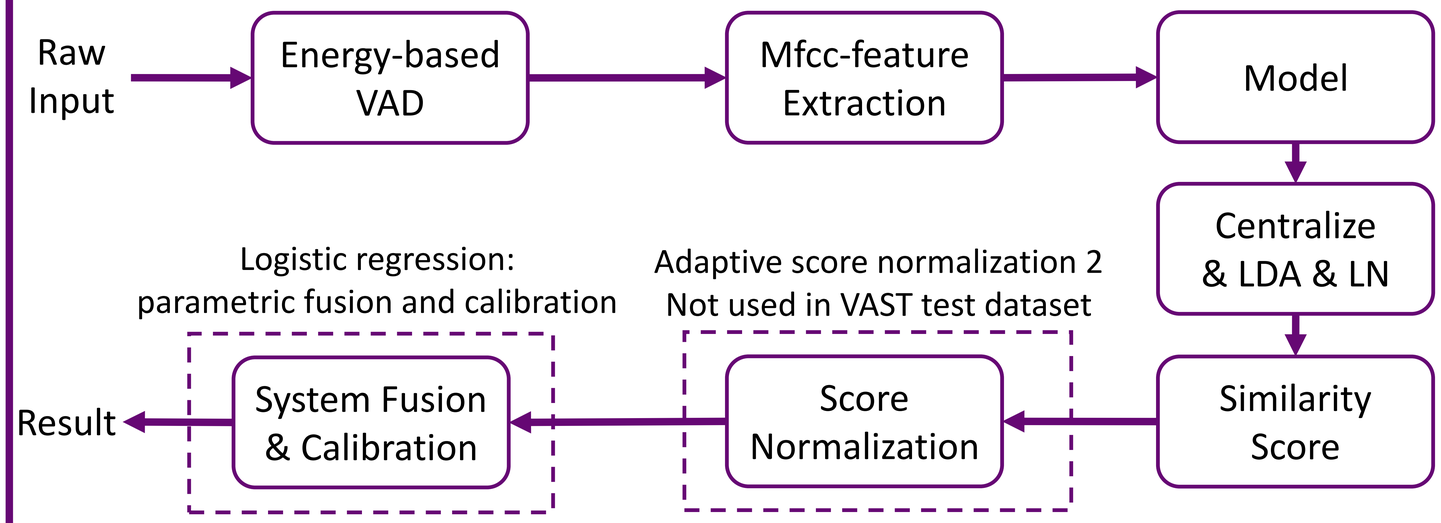
System Pipeline



Our Contributions

Similarity Score

- Joint Bayesian: $x_{ij} = \mu_i + \epsilon_{ij}$
- Kaldi PLDA: $\overline{x_i} = \mu_i + \overline{\epsilon_i}$

Model

- Model 1: GMM i-vector
- Model 2: DNN i-vector
- Model 3: Kaldi x-vector
- Model 4: Angular x-vector $L = \frac{1}{N}\sum_{n=1}^{N} -\log\left(\frac{e^{\|\mathbf{x}^{(n)}\|\varphi\left(\theta_{y_n}^{(n)}\right)}}{e^{\|\mathbf{x}^{(n)}\|\varphi\left(\theta_{y_n}^{(n)}\right)} + \sum_{j\neq y_n} e^{\|\mathbf{x}^{(n)}\|\cos\left(\theta_j^{(n)}\right)}}\right)$
- Model 5: Cosine x-vector $L = \frac{1}{N}\sum_{n=1}^{N} -\log\left(\frac{e^{s\left(cos\left(\theta_{y_n}^{(n)}\right)-m\right)}}{e^{s\left(cos\left(\theta_{y_n}^{(n)}\right)-m\right)} + \sum_{j\neq y_n} e^{s\left(\cos\left(\theta_j^{(n)}\right)\right)}}\right)$

* Red color indicates our contributions in SRE18. Model 4 and model 5 are implemented by Pytorch.

Min_C of CMN2 development data (after score norm)

	Model 1	Model 2	Model 3	Model 4	Model 5
Joint Bayesian	**0.665**	**0.645**	**0.478**	0.481	**0.480**
Kaldi PLDA	0.683	0.674	0.493	**0.470**	0.496

Result

Fused System

Set	Model	Similarity	condition	EER[%]	min_C	act_C
CMN2	1,2,3,4	Joint Bayesian	dev	7.01	0.401	0.411
			eval	7.02	0.441	0.443
VAST	1,2,3,5 (Whole) 3,5 (Seg)	Kaldi PLDA	dev	5.35	0.370	0.453
			eval	17.14	0.760	0.864

* Whole: use test utterance as a whole in scoring
* Seg: cut test utterance into 2s segments, score each segment, and then use the largest score as the final score

Single System

Set	Model	Similarity	condition	EER[%]	min_C	act_C
CMN2	3	Joint Bayesian	dev	7.57	0.478	0.489
			eval	7.87	0.494	0.496
VAST	2 (Whole)	Kaldi PLDA	dev	11.11	0.379	0.564
			eval	14.92	0.709	0.719

Reference

1. Wang, Yiyan, Haotian Xu, and Zhijian Ou. "Joint bayesian gaussian discriminant analysis for speaker verification." ICASSP, 2017.
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3. Wang, Hao, et al. "CosFace: Large margin cosine loss for deep face recognition." CVPR, 2018.
4. Matejka, Pavel, et al. "Analysis of score normalization in multilingual speaker recognition." Interspeech, 2017.