

# OLR19 System Description

Task1 & Task2

Samsung Research Institute China - Beijing

# Content

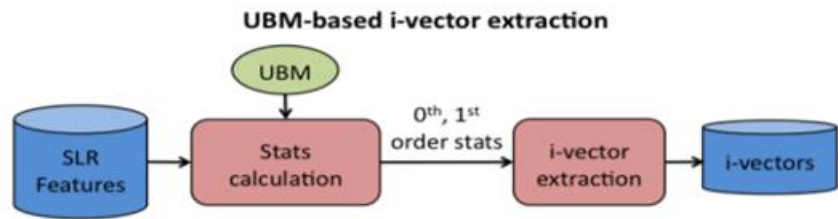
## ➤ Basic systems

- ① GMM-ivector
- ② DNN-ivector
- ③ phonotactic-pca-ivector
- ④ Phonotactic-xvector
- ⑤ BNF-xvector
- ⑥ x-vector
- ⑦ CCA transform for i-vector and x-vector

## ➤ Task1

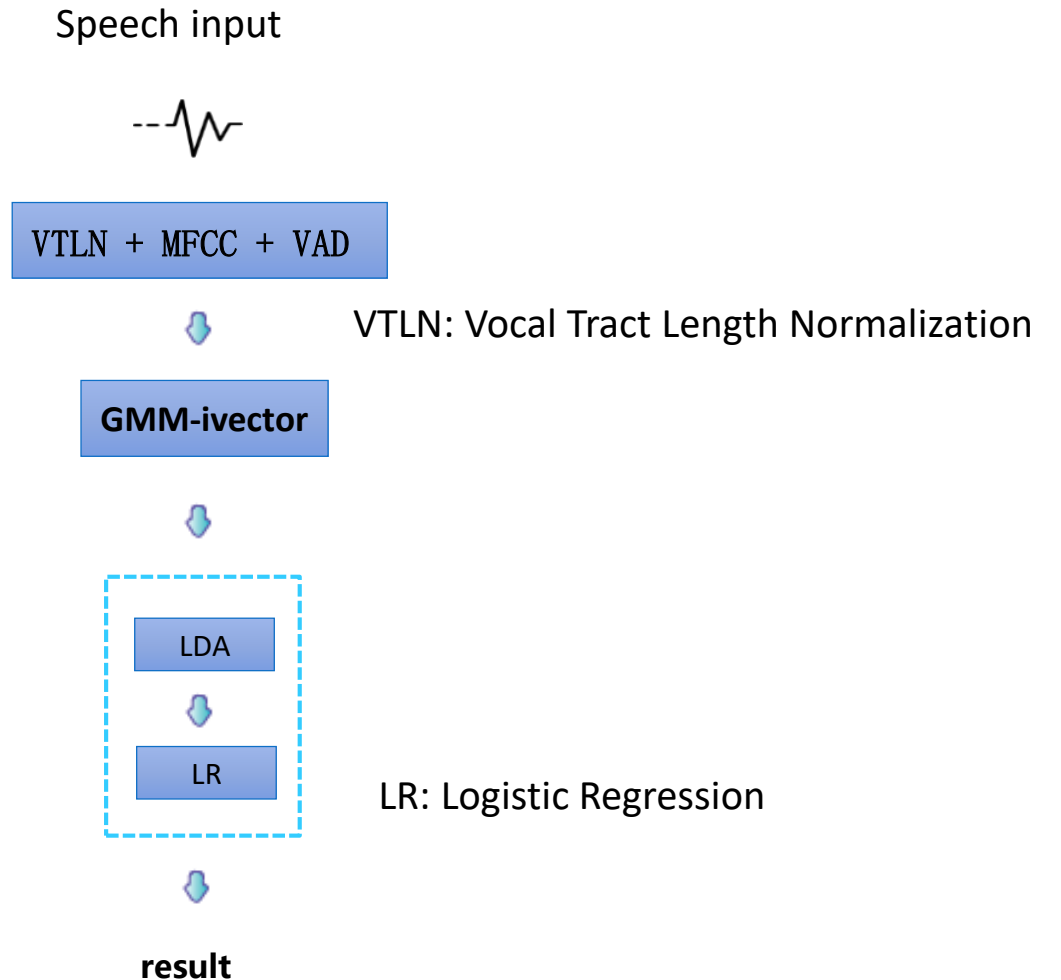
## ➤ Task2

# 1.1 GMM-ivector

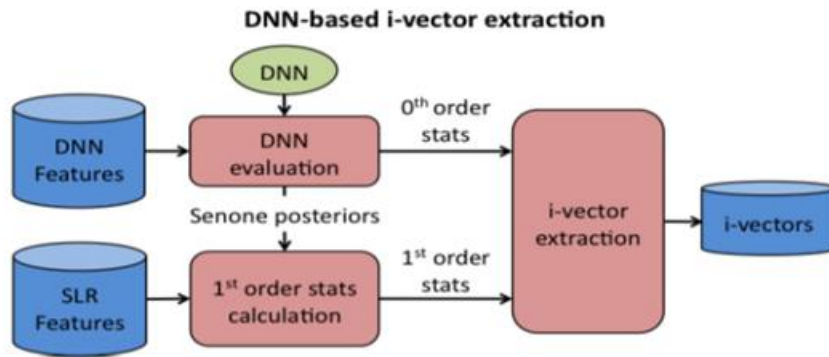


GMM-ivector system:

1. Extract MFCC features(with VTLN) and VAD
2. Train i-vector extraction(GMM)
3. Extract ivector
4. LDA transform
5. Logistic Regression scoring

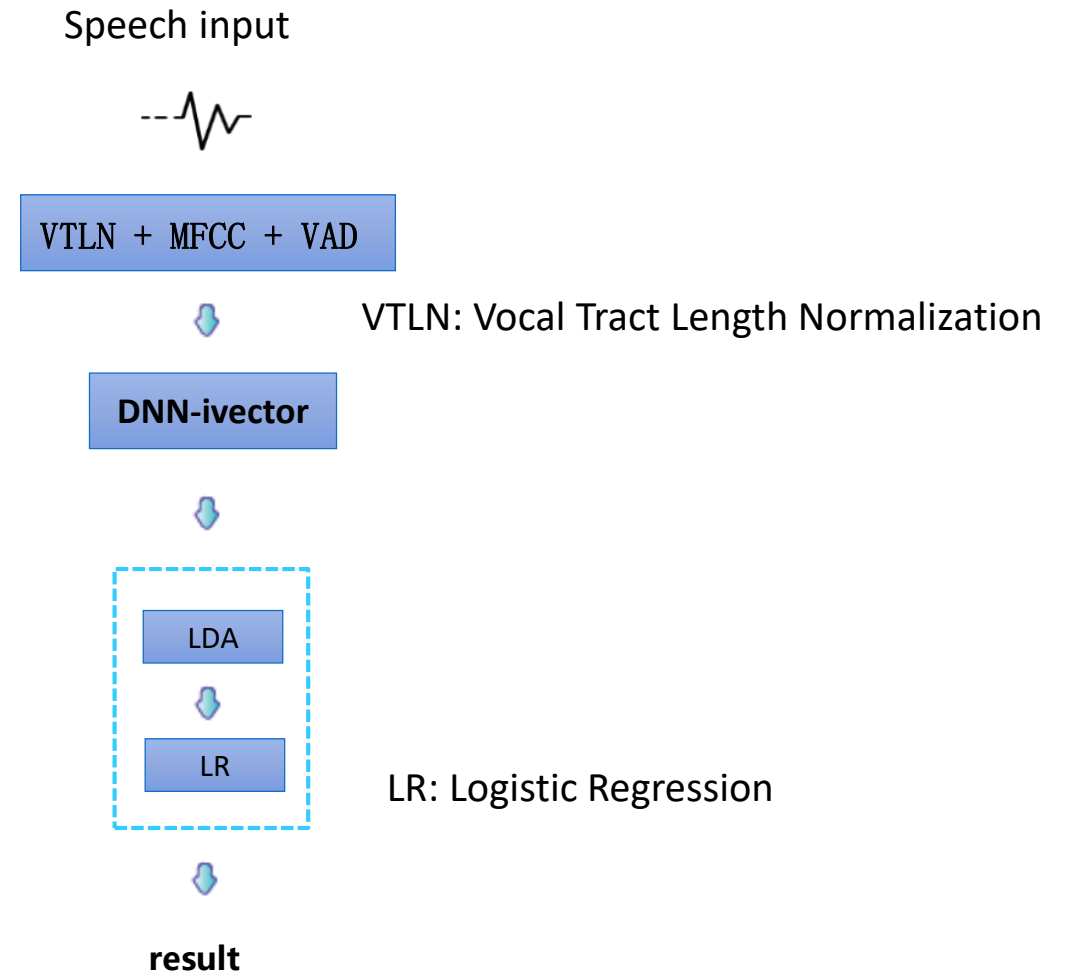


## 1.2 DNN-ivector



DNN-ivector system:

1. Extract MFCC features(with VTLN) and VAD
2. Train i-vector extraction(DNN)
3. Extract ivector
4. LDA transform
5. Logistic Regression scoring

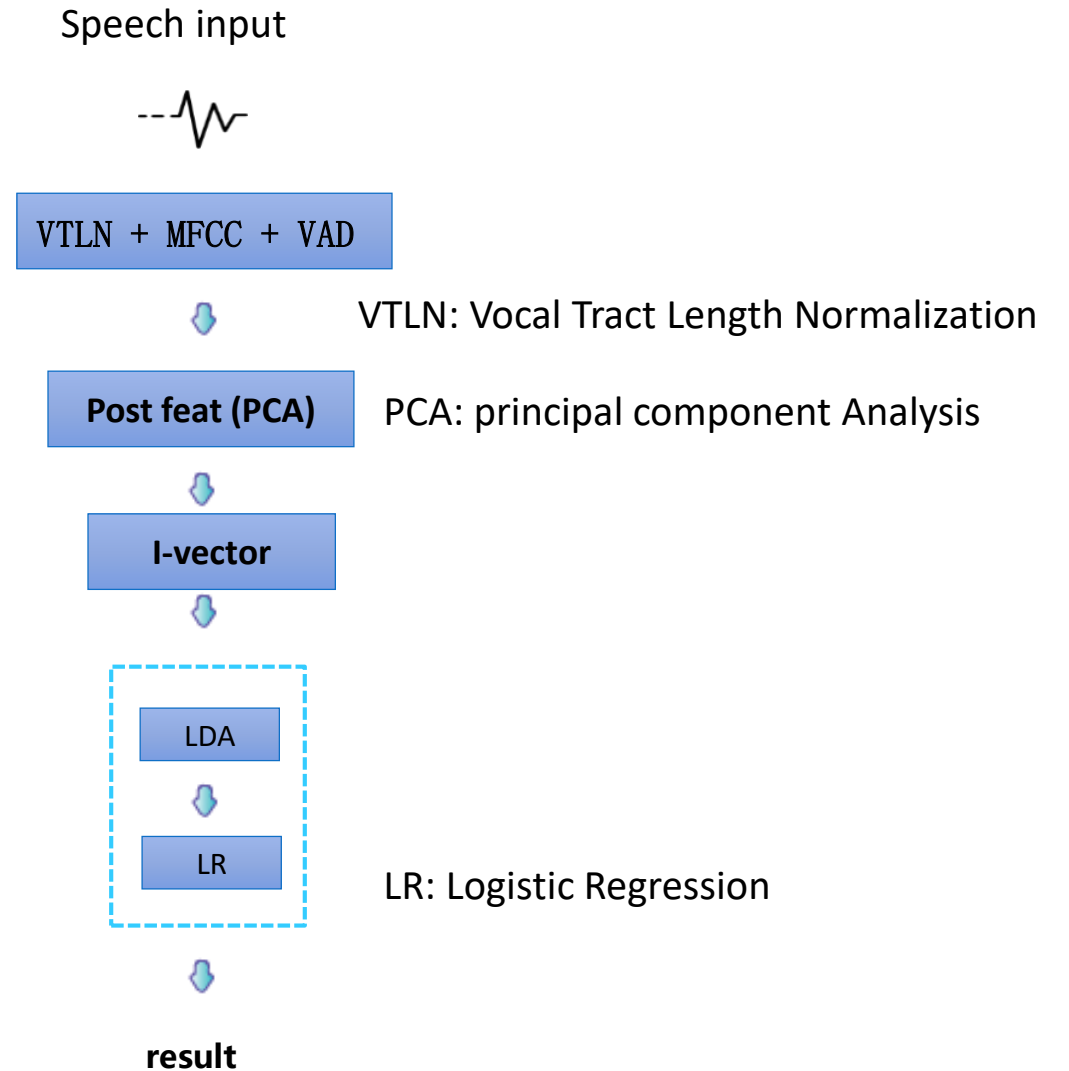


# 1.3 Phonotactic-PCA-ivector

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Phonotactic-PCA-ivector system:

1. Extract MFCC features(with VTLN) and VAD
2. Extract DNN posterior with PCA transform
3. Train i-vector extraction
4. Extract ivector
5. LDA transform
6. Logistic Regression scoring



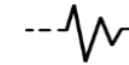
# 1.4 Phonotactic-xvector

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Phonotactic-Xvector:

1. Extract MFCC features and VAD
2. Extract DNN posterior(no pca)
3. Train x-vector extraction
4. Extract xvector
5. LDA transform
6. Logistic Regression scoring

Speech input



MFCC + VAD



Post feat



X-vector



LDA



LR



result

LR: Logistic Regression

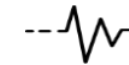
# 1.5 BNF-xvector

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BNF-Xvector:

1. Extract MFCC features and VAD
2. Extract BNF features
3. Train x-vector extraction
4. Extract xvector
5. LDA transform
6. Logistic Regression scoring

Speech input



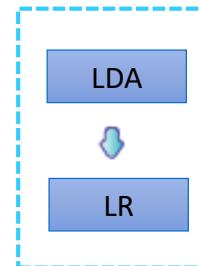
MFCC + VAD



BNF



X-vector



result

BNF: Bottleneck Features

LR: Logistic Regression

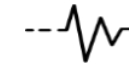
# 1.6 x-vector

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X-vector:

1. Extract MFCC features and VAD
2. Train x-vector extraction
3. Extract xvector
4. LDA transform
5. Logistic Regression scoring

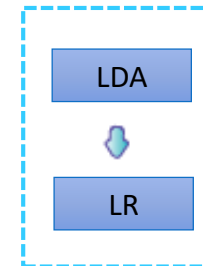
Speech input



Fbank + VAD



X-vector



LDA



LR



result

LR: Logistic Regression



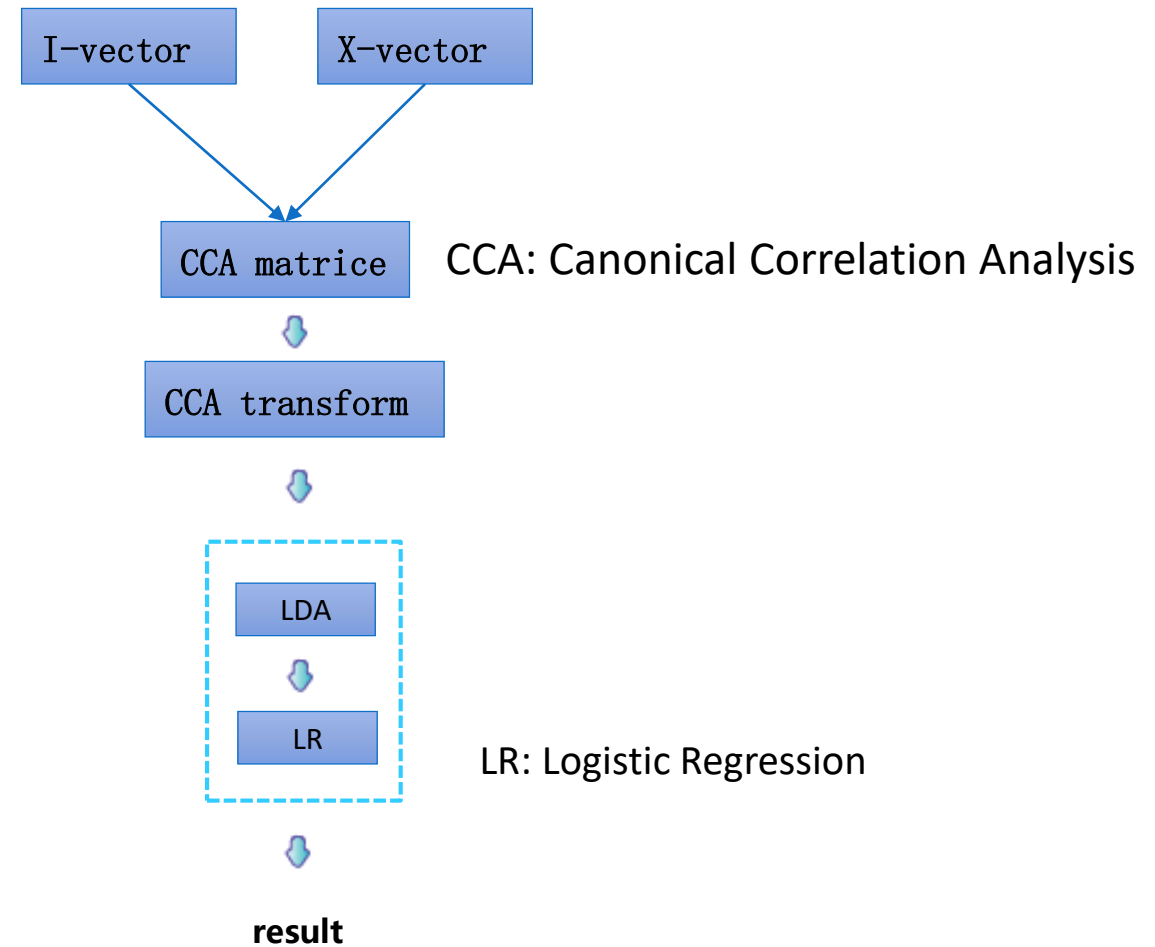
# 1.7 CCA transform for i-vector and x-vector

CCA: Canonical Correlation Analysis

$$\begin{aligned} &\text{maximize: } \text{tr}(A_1' \Sigma_{12} A_2) \\ &\text{subject to: } A_1' \Sigma_{11} A_1 = A_2' \Sigma_{22} A_2 = I. \\ &\hat{\Sigma}_{11} = \frac{1}{m-1} \bar{H}_1 \bar{H}_1' + r_1 I, \end{aligned}$$

CCA system:

1. Prepare i-vector and x-vector features
2. Train CCA matrice
3. CCA transform for i-vector(x-vector)
4. LDA transform
5. Logistic Regression scoring



## 2. Task1

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Our submit result of task1, fusion with following systems

1. GMM-ivector
2. DNN-ivector
3. phonotactic-pca-ivector
4. Phonotactic-xvector
5. BNF-xvector
6. x-vector
7. CCA transform for i-vector and x-vector

## 3. Task2

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Our submit result of task2, fusion with following systems

1. phonotactic-pca-ivector
2. x-vector
3. CCA transform for i-vector and x-vector

Thanks