8. Speaker Recognition

See also:

Robust Text-Independent Speaker Identification
Using Gaussian Mixture Speaker Models

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The Tasks

Speaker verification: is this Mary?

Speaker identification: who is speaking?
Issues

- Text dependent vs. text independent
- Amount of training data?
- Mismatch
  - Channel, noise
  - Cold, mood!
Speaker Verification

- Feature Extraction (MFCC)
  - feature vectors $\bar{x}_1...\bar{x}_N$
- Classification
  \[ \frac{P(\bar{x}_1...\bar{x}_N \mid \text{speaker})}{P(\bar{x}_1...\bar{x}_N \mid \text{background})} > \lambda \]
  - Yes/no
- Speaker Models (Gaussian Mixture Models)
- Adaptation
  - $P(\bar{x} \mid \text{background})$
  - $P(\bar{x} \mid \text{speaker})$
Speaker Identification

Feature Extraction (MFCC)

feature vectors $\bar{x}_1, \ldots, \bar{x}_N$

Classification

$\hat{I} = \arg \max_{i=1, \ldots, M} P(\bar{x}_1, \ldots, \bar{x}_N \mid i)$

Speaker Models (Gaussian Mixture Models)

$P(\bar{x} \mid i = 1)$

$P(\bar{x} \mid i = 2)$

$P(\bar{x} \mid i = M)$

Speaker Id
Training the Model

Generic GMM

Adapt generic GMM using speaker specific data (e.g. MLLR)
Effect of Test Data

The longer the test utterance the better

(Adapted from the number of Gaussians)
Effect of Training Data

The more training data the better

The more training data, the more Gaussians you can afford
NIST - Speaker Recognition Evaluations

General Information

Introduction

NIST has been coordinating Speaker Recognition Evaluations since 1995. Each evaluation begins with the announcement of the official evaluation plan which clearly states the rules and tasks involved with the evaluation. The evaluation culminates with a follow-up workshop, where NIST reports the official results and researchers share in their findings.

Brief History

Since 1995, over 40 research sites have participated in our evaluations. Each year, new researchers in industry and universities are encouraged to participate. Collaboration between universities and industries is also welcomed.

The overall goals of the evaluations have always been to drive the technology forward, to measure the state of the art, and to find the most promising algorithmic approaches.
Best System Performance 1996-2003