

## 基于 Mel-TEO 的带噪语音端点检测算法

王茂蓉<sup>1</sup>, 周萍<sup>1</sup>, 景新幸<sup>2</sup>, 杨青<sup>1</sup>

(<sup>1</sup> 桂林电子科技大学 电子工程与自动化学院, 广西 桂林 541004;

<sup>2</sup> 桂林电子科技大学 信息与通信学院, 广西 桂林 541004)

**摘要:** 针对短时 TEO 能量算法抗噪性差的缺点, 提出了一种强噪声下的端点检测新算法. 该算法在短时 TEO 能量端点检测的基础上, 增加 Mel 倒谱距离判断环节, 采用先粗判后精判的互补性两级判决机制. 首先利用强抗噪性 Mel 倒谱距离进行端点粗判, 然后再利用体现语音信号时域特征与语音共振峰特性的短时 TEO 能量进行端点精判. 实验表明, 在信噪比相对较低的环境下, 该改进算法与传统的双门限法和短时 TEO 能量相比, 在没有增加运算复杂度的同时提高了检测系统的准确度.

**关键词:** 语音端点检测; 说话人识别; Teager 能量算子; Mel 倒谱距离; 噪声

## Voice Activity Detection Algorithm Based on

## Mel-TEO in Noisy Environment

WANG Mao-rong<sup>1</sup>, ZHOU Ping<sup>1</sup>, JING Xin-xing<sup>2</sup>, YANG Qing<sup>1</sup>

(<sup>1</sup> Department of Electric Engineering and Automation, Guilin University of Electronic

Technology, Guilin 541004, China; <sup>2</sup> Department of Information and Communication,

Guilin University of Electronic Technology, Guilin 541004, China)

**Abstract:** In order to solve the problem of the poor anti-noise performance, this paper proposes a new voice detection algorithm in noisy environment. On the basis of short-time TEO energy voice detection, increasing the judging section Mel Cepstral distance, we use two-stage decision mechanism with accurate judgment after rough judgment. First, we judge the voice endpoints preliminarily using Mel Cepstral distance which has a good anti-noise performance. Then, we judge the endpoints accurately using short-time TEO energy which reflects time-domain and voice formant characteristics of the speech signal. Experiments show that this algorithm has better capability in low SNR, compared with the traditional double thresholds and short-time TEO energy, without increasing the computational complexity and improving the accuracy of the detection system.

**Key words:** voice activity detection; speaker recognition; Teager energy operator; Mel cepstral distance; noise

**作者简介:**

王茂蓉 女, (1990-), 硕士研究生. 研究方向为语音识别与反蓄意模仿. E-mail: 13737726138@163.com.

周萍 女, (1961-), 硕士, 教授. 研究方向为语音识别与智能控制.

景新幸 男, (1960-), 博士, 教授. 研究方向为语音识别及其混合集成电路设计等.

杨青 女, (1976-), 硕士, 副教授. 研究方向为语音识别算法与仿真.