

算法研究

一种新的基于数据场的语音增强算法

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摘要:

语音增强是消除噪声干扰的主要手段,在语音处理系统中得到广泛应用。传统语音增强算法认为相邻帧语音幅度谱之间是相互独立的,而研究表明语音幅度谱时频点之间存在相互依赖关系。缺乏对邻域时频结构信息的利用使得传统增强算法的性能难以进一步提高。本文首次将数据场引入到对语音的听觉感知领域,用数据场对语音的时频依赖性进行建模,提出一种新的基于数据场的语音增强算法。该算法通过最小化势场分布的熵确定了时频点之间的相互作用力程,在带噪语音数据场中估计噪声的最小统计量得到二值时频掩蔽值,最后利用二值时频掩蔽消除噪声干扰。实验测试表明,与Martin算法相比,基于数据场的语音增强算法在提高去噪效果的同时能有效减少语音的失真。

关键词: 语音增强; 数据场; 时频掩蔽; 噪声估计

A Novel Speech Enhancement Algorithm Based on Data Field

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Abstract:

In traditional speech enhancement algorithm the speech spectral amplitude is assumed to be mutually independent. Little work has been done to incorporate the time and frequency dependencies of speech. Without exploring the structure information of the time and frequency neighbors limit the performance of traditional speech enhancement algorithms. In this paper, we propose a novel speech enhancement algorithm based on data field theory, which is capable of modeling the time and frequency dependencies of speech. Data field defines the distribution of the magnitude of speech spectral samples conditioned on the values of their time and frequency neighbors. This formulation allows the explicit inclusion in the amplitude estimation model of both time and frequency dependencies that exist among the amplitudes of speech spectral. The proposed algorithm is evaluated by applying it to enhance noisy speech at various noise levels. Systematic evaluation shows that the proposed algorithm offers improved signal to noise ratio and presents an enhanced ability in preserving the weaker speech spectral components compared to Martin's algorithm.

Keywords: Speech enhancement Data Field Time Frequency masking; Noise estimate

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