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Distributed-microphones based in-vehicle speech enhancement via sparse and low-rank spectrogram decomposition

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Abstract

In general, the in-vehicle speech enhancement is an application of the microphone array speech enhancement in particular acoustic environments. However, in this paper, we introduce a novel in-vehicle speech enhancement method based on distributed-microphones. The distributed-microphone signals have some features that the signals captured by microphone array do not have. Although distributed-microphones are not frequently used for speech enhancement, they can solve some practical problems, which cannot be solved by microphone array. In this paper, we propose a novel method using the signals acquired by distributed-microphones to enhance the speech corrupted by noise in-vehicle. The final enhanced speech is generated mainly by two steps. We first obtain the primary enhanced speech in each channel via sparse and low-rank spectrogram decomposition. Then based on the average improvements of segSNR (signal-to-noise ratio) and PESQ (perceptual evaluation of speech quality) in each channel, we fuse the primary enhanced speech in all channels into a single channel enhanced speech. In terms of PESQ and segSNR of the final enhanced speech, our approach outperforms several traditional approaches.

Keywords: Distributed-microphones, Speech enhancement, Speech fusing, Sparse, Low-rank

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