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RTF-steered binaural MVDR beamforming incorporating an external microphone for dynamic acoustic scenarios

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Abstract

Noise reduction algorithms for head-mounted assistive listening devices are crucial to improve speech intelligibility and speech quality in noisy environments. A well-known binaural noise reduction algorithm is the binaural minimum variance distortionless response (BMVDR) beamformer [1, 2, 3], which can be steered using the relative transfer function (RTF) vectors of the target speaker. Aiming at improving the noise reduction performance, recently the usage of an additional external microphone has been explored. In this contribution, we consider the recently proposed spatial coherence (SC) method to estimate the extended RTF vectors, assuming that the noise component in the external microphone signal is uncorrelated with the noise component in the head-mounted microphone signals [4, 5, 6]. Simulation results for a dynamic scenario with a moving speaker in a reverberant room with diffuse noise show that the SC method yields a slightly better performance than the widely used covariance whitening method at a much lower computational complexity. Moreover, simulation results show that the RTF-steered BMVDR beamformer filtering all microphone signals outperforms the RTF-steered BMVDR beamformer filtering only the head-mounted microphone signals, a fixed BMVDR beamformer steered towards the frontal direction as well as the external microphone signal.

Keywords: MVDR Beamforming, Binaural Noise Reduction, External Microphone

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