Abstract: Cancellation of Nonlinear Acoustic Interference in Dual Smartphone Scenarios for Robust Speech Recognition

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Abstract

This paper presents a method for canceling interfering sounds in a target signal with an incomplete and nonlinearly corrupted reference signal. One of the applicable environments is that a smartphone is performing voice recognition under very loud, background interference, and another smartphone is providing a reference signal for the interference. Because the relationship between the interfering source and the reference is not always linear due to the distortion caused by transmission and digital audio coding, neither conventional adaptive noise cancellation (ANC), nor blind signal separation (BSS) techniques can handle the given problem. We propose a channel equalization method on the nonlinear distortion based on maximizing the instantaneous correlation between the two channels, and an iterative interference activity detection algorithm that provides optimal estimation of the equalization filter coefficients. The reference signal from the secondary device is equalized to the interference in the primary device, which is then suppressed by the computed Wiener filters. Our experimental results show good interference suppression performance as evidenced by improved voice recognition rates in a simulated airport scenario.

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