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Optimization of Acoustic Echo and Noise Reduction In Non Stationary Environment

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Abstract : Optimized speech enhancement method combines acoustic echo reduction and noise reduction in a unified framework for non stationary environment. Simultaneous optimization of noise and echo reduction is already done in stationary environment. In most of the times in transmission, signal properties change over time. We need to remove the artifacts of sound in those conditions. Recursive least square method proposed for noise and echo reduction. It gives little amount of mean square error and better results. Normally, partial optimization of acoustic echo reduction and noise reduction does not lead to total optimization. A cascade method of multiple functions causes mutual interference between these functions and degrades eventual speech enhancement performance. Unlike cascade methods, the proposed method combines all functions to optimize eventual speech enhancement performance based on a unified framework, which is also robust against the mutual interference problem. With the proposed method, in addition to time-invariant linear filters, time-varying filters are used to reduce residual acoustic echo signal, and background noise signal which cannot be reduced using time-invariant filters. These time-invariant filters and time-varying filters are also optimized based on a unified likelihood function to avoid the mutual interference problem. Under this, all the parameters are optimized simultaneously based on the expectation-maximization algorithm and calculates a minimum mean squared error estimate of a desired signal. The experimental results show that the proposed method is superior to the cascade methods.