



KALMAN FILTERING BASED NOISE POWER SPECTRAL DENSITY ESTIMATION FOR SPEECH ENHANCEMENT (WedAmOR6)

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★ Abstract :

We propose a method for estimating the power spectral density (PSD) of nonstationary noise when a noisy speech signal is given. The method is based on the Kalman filtering technique. In contrast to the known noise statistics tracking methods that are based on time smoothing of the noisy speech periodogram, we use a Kalman filter based on a low order model of the noise power spectrum and update the noise estimate for the next frame according to the difference between the measurement of the noisy speech power spectrum and the current Kalman estimate of it. We derive a recursive estimation scheme of a low computational complexity, which makes the proposed method well suited for real time implementations. The method can be combined with any speech enhancement algorithm that requires a noise PSD estimate. Objective and subjective performance evaluations show that the proposed scheme exhibits a good noise tracking performance and that it achieves improvement in the quality of the enhanced speech as compared to the case where noise PSD estimate remains invariant across time. Listening test results indicate a statistically significant improvement in the quality of enhanced speech compared to the fixed PSD case.