ON THE FUNDAMENTAL LIMITATIONS OF SPECTRAL SUBTRACTION: AN ASSESSMENT BY AUTOMATIC SPEECH RECOGNITION (ThuAmPO4)

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Abstract :

Spectral subtraction is one of the earliest and longest standing, popular approaches to noise compensation and speech enhancement. A literature search reveals an abundance of recent research papers that report the successful application of spectral subtraction to noise robust automatic speech recognition (ASR). However, as with many alternative approaches, the benefits lessen as noise levels in the order of 0 dB are approached and exceeded. While some previously published works relating to spectral subtraction provide a theoretical analysis of error sources, it is believed that none has provided supporting experimental evidence. The contribution made in this paper is the assessment of these different error sources in a conventional implementation of spectral subtraction under controlled, standard experimental conditions. The contribution of each error source to the degradation in ASR performance when noisy speech is processed by spectral subtraction is assessed as a function of noise level.
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*** Abstract : (cont.)**

Results illustrate that, perhaps contrary to popular belief, as noise levels in the order of 0 dB are approached phase and cross−term error sources do indeed contribute to ASR performance degradation and are comparable to those of magnitude errors.

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* Abstract : (cont.)	This is believed to be a new observation in the context of spectral subtraction and ASR.