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TIME AND FREQUENCY DOMAIN ANALYSIS OF SUBBAND SPECTRAL SUBTRACTION METHOD OF SPEECH ENHANCEMENT USING ADAPTIVE NOISE ESTIMATION ALGORITHM

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Abstract

The speech processing systems used to communicate or store speech are usually designed for a noise free environment. But the presence of background interference in the form of additive background and channel noise drastically degrades the performance of these systems, causing inaccurate information exchange and listener fatigue. To obtain a more intelligible speech signal, and one that is more pleasant to listen, noise reduction is very much needed. Most implementations and variations of the basic spectral subtraction technique advocate subtraction of the noise spectrum estimate over the entire speech spectrum. However the physical noise will not affect the speech uniformly over the entire. This work proposes a frequency dependent Spectral Subtraction method, which takes into account the fact that the background noise affects the speech spectrum differently at various frequencies. This proposed approach outperforms the standard power spectral subtraction method resulting in improved speech quality for various noise types and its performance is evaluated by objective and subjective measure like signal to noise ratio (SNR), Mean Opinion Score (MOS) and Itakuro-Saito (IS) distance measure.

Keywords : Noisy spectrum, Spectral Subtraction, Adaptive Noise estimate, Spectral Subtraction