

## Speech Enhancement Using Wavelet Coefficients Masking with Local Binary Patterns

**Authors :** Christian Arcos, Marley Vellasco, Abraham Alcain

**Abstract :** In this paper, we present a wavelet coefficients masking based on Local Binary Patterns (WLBP) approach to enhance the temporal spectra of the wavelet coefficients for speech enhancement. This technique exploits the wavelet denoising scheme, which splits the degraded speech into pyramidal subband components and extracts frequency information without losing temporal information. Speech enhancement in each high-frequency subband is performed by binary labels through the local binary pattern masking that encodes the ratio between the original value of each coefficient and the values of the neighbour coefficients. This approach enhances the high-frequency spectra of the wavelet transform instead of eliminating them through a threshold. A comparative analysis is carried out with conventional speech enhancement algorithms, demonstrating that the proposed technique achieves significant improvements in terms of PESQ, an international recommendation of objective measure for estimating subjective speech quality. Informal listening tests also show that the proposed method in an acoustic context improves the quality of speech, avoiding the annoying musical noise present in other speech enhancement techniques. Experimental results obtained with a DNN based speech recognizer in noisy environments corroborate the superiority of the proposed scheme in the robust speech recognition scenario.

**Keywords :** binary labels, local binary patterns, mask, wavelet coefficients, speech enhancement, speech recognition

**Conference Title :** ICSRLP 2017 : International Conference on Speech Recognition and Language Processing

**Conference Location :** Amsterdam, Netherlands

**Conference Dates :** December 04-05, 2017