Wiener Filter in Wavelet Domain for Mel-LPC based Noisy Speech Recognition

Abstract

This paper deals with a wavelet domain Wiener filter to estimate enhanced Mel-LPC spectra in presence of additive noises. In this implementation, Daubechies 4 (db4) wavelet function has been used as mother wavelet which enables a fast computation and decomposition using perfect reconstruction of filterbank. To implement the filter, noise is estimated from the initial 20 frames of input speech signal without applying any voice activity detection (VAD) system. In the proposed system, filtering is done in wavelet domain using Wiener gain. After filtering, inverse wavelet transform is applied to obtain enhanced time domain speech signal. Using this enhanced speech signal Mel-LP cepstral coefficients are calculated as speech feature. The proposed system is evaluated on Aurora-2 database and it has been found that the Wiener filter improves the overall word accuracy from 58.66 to 75.88% and the average Aurora-2 relative improvement has been found to be 42.50% for test set A.

References


Index Terms

Computer Science

Signal Processing
Keywords

Wiener filter, Wavelet Transform, Mel-LPC, Noisy speech recognition, Aurora-2 database