Noise Cancellation Method for Robust Speech Recognition

Abstract

Noise cancellation is the process of removing background noise from speech signal. The degradation of speech due to presence of background noise and several other noises cause difficulties in various signal processing tasks like speech recognition, speaker recognition, speaker verification etc. Many methods have been widely used to eliminate noise from speech signal like linear and nonlinear filtering methods, adaptive noise cancellation, total variation denoising etc. This paper addresses the problem of reducing the impulsive noise in speech signal using compressive sensing approach. The results are compared against three well known speech enhancement methods, spectral subtraction, Total variation denoising and signal dependent rank order mean algorithm. An automatic speech recognition system for Digits in Malayalam Language is implemented using MFCC and GMM. The impulse noise corrupted speech signal and the enhanced speech signal (the output of the noise cancellation system) are given as input to the classification system. The speech recognition system gives 12.3 % accuracy for noisy signal where as 92.3 % accuracy for the enhanced signal Objective and subjective quality evaluation are performed for the four speech enhancement scheme. Results show that the signal processed by the compressive sensing based method outperforms the other three methods.

**Index Terms**

Computer Science  |  Signal Processing

**Keywords**

Speech Enhancement  |  Compressive Sensing  |  Over Complete Dictionary  |  Quality Evaluation Metrics And Automatic Speech Recognition