Speech Background Noise Removal
Using Different Linear Filtering Techniques

Abstract

Among the human beings, speech is the simplest and reliable way of communication. A speech signal transmits different information to the listener like type of language being spoken and emotion, gender and identity of the speaker . The individual characteristic like pitch, fundamental frequency, for- mant frequency can be distinguishing components of human speech. The three main processes by which sound generates—are twisting of nerves, wire beating of membranes or blowing of air through holes but the mechanism of human voice is different as it comes out in different languages and feelings by the control of brain . The range of frequency under which the speech signal falls is the 300–3400 Hz. However, the audible frequency range for human beings are from 20 Hz to 20 KHz . Audio signal processing often suffers from noise trouble . Speech back- ground noise is an undesired signal which mixed with speech signal at the time of generation of speech signal or at the time of transmission . The quality and the intelligibility of the speech signal gets degraded because of the present back- ground noise. Therefore, it becomes important to reduce this background noise from the speech. For removing or reducing the noise, different filtering techniques are there like adaptive filter, Kalman filter, sub-band coding, wavelet transform, etc. The various filters that have been designed and tested are presented in this paper. First, the different kinds of adaptive filtering techniques have been simple- mented on both the additive white Gaussian noise (AWGN) and the practical noise then the results of both have been compared. After the adaptive filters the optimum filter, i.e., Kalman filter is implemented for both types of the noise. Finally, the results of adaptive filters and the Kalman filter have been analyzed.